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Decoding AI Art: From Motivation to Manifestation

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Abstract

This thesis explores the integration of Artificial Intelligence (AI) art into artistic practices from an HCI and practice-led perspective. It centres on understanding the 'why' behind AI art practice, moving beyond technical implementations to explore the underlying stated motivations and conceptual goals driving artists to engage with AI technologies. The research employs methods primarily from Human-Computer Interaction (HCI) and practice-led research, drawing on theoretical analysis and critical reflection.

The thesis makes three primary contributions to HCI and practice-led research on AI art practice. First, it presents the 'Five Tropes of AI Art', a flexible framework for analysing AI artworks based on observable practices and stated artistic motivations, offering a lens for HCI researchers and curators in related fields.

Second, it offers a practice-led case study of the 'Cat Royale' project, providing insights into the practical challenges of creating AI artwork. Third, it proposes a set of guidelines for AI art practice analysis, integrating theoretical understanding with practical experience from the case study. These guidelines, which include the Five Tropes framework, offer additional analytical lenses for navigating the complex landscape of AI art creation and presentation.

A key finding of this research is the critical importance of clear stated or inferred artistic motivation and effective framing in creating impactful AI art. It challenges the notion that AI art is solely about technological implementation, instead emphasising the human context of its creation and interpretation. This thesis constructs a series of analytical lenses focused on the observed motivations, tensions, and challenges that emerge during the development process of AI artwork. It examines how these factors can impact initial artistic goals, often requiring adaptations and compromises in response to AI's implications. By starting with the fundamental question of 'why' AI is used in art practice, the research provides a framework for understanding how artistic observed motivations evolve and are reflected in the framing of AI artworks. While touching upon concepts relevant to the Humanities, the thesis's primary contribution lies within HCI and the understanding of contemporary AI art practices and their creation.

Primarily aimed at researchers within HCI and curators working with contemporary/technolog engaged art, this thesis provides a framework for analysing and interpreting AI artworks. While artists and Humanities scholars may find the insights informative, the intention is not to prescribe rules for artistic practice but to offer analytical tools for understanding this evolving field. These insights may also prompt artists to critically reflect on their reasons for engaging with AI in their practice.

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List of Publications

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Chapter 1

Introduction

This thesis critically examines and advances the understanding of Artificial Intelligence (AI) art practice, offering novel insights into its integration into artistic practices. Through rigorous analysis and practical study, this research explores the complex landscape of AI art practice. Crucially, it centres on understanding the 'why' behind AI art creation as expressed by artists and observed in practice, moving beyond technical implementations to explore the underlying stated motivations driving artists to engage with AI technologies. Primarily aimed at HCI researchers and curators in related fields, this thesis provides a framework for analysing and interpreting AI artworks. While artists may find the insights valuable, the intention is not to prescribe rules for artistic practice but to offer analytical tools for understanding this evolving field. Those interested in the intersection of technology and creativity will also find this work informative. For this thesis, 'AI' refers to both the material technologies and computational systems that aim to simulate aspects of human intelligence and the broader discourse surrounding these technologies. This encompasses various approaches, including machine learning algorithms, natural language processing, and computer vision systems. By addressing AI technologies and discourse, this thesis distinguishes between the tangible tools and techniques employed in artistic creation and AI's wider conceptual and cultural implications as they relate to the creation and reception of AI art

within an HCI context. Throughout the thesis, the term 'AI' will be used as an abbreviation, with context clarifying whether it refers specifically to technologies or broader discourses and implications. The research employs methods primarily from Human-Computer Interaction (HCI) and practice-led research, drawing on theoretical analysis and critical reflection within these domains. It provides a historical perspective on AI art's evolution from early experiments to today's sophisticated generative models, delving into the complex interplay between stated artistic motivation and technological advancement. Central to this thesis is the exploration of artists' stated motivations in engaging with AI technologies. It challenges the notion that AI art is solely about technological implementation, instead emphasising the human factors of its creation, presentation and interpretation. The research examines how artists navigate the complexities of framing and communicating AI artworks to audiences, exploring the elements crucial in preserving communicated artistic concepts in these works. A key finding of this research is the critical importance of clear artistic motivation (inferred or stated) and effective framing in creating impactful and engaging AI artwork. These elements emerge as fundamental factors that distinguish impactful AI artworks from mere technological demonstrations. By focusing on the 'why' behind AI art practice, this thesis offers a deeper understanding of how artists conceptualise and realise their stated visions using AI technologies. In its simple definition, AI art is an artistic expression that uses complex computational processes in its conception, execution, or artwork. This genre encompasses various forms, including painting, sculpture, photography, video, and performance art, all created or influenced by AI technology using machine learning algorithms, natural language processing, and computer vision. The essence of AI art lies in its ability to impact the artistic process with AI technology. The thesis will delve deeper into the complexities of AI definitions, including historical context and current debates, in the literature review chapter 2. Recently, AI art has become a dynamic and rapidly evolving genre that merges contemporary artistic expression with advanced AI tech-

nology. Because of its blended nature of art and technology, AI art attracts traditional artists and draws in those skilled in AI programming, who are now exploring new avenues in the art world. This fusion of technology, artistry, and programming in the art has opened new opportunities for creative expression. This thesis critically assesses the adoption of AI technologies from an HCI and practice-led viewpoint. Rather than advocating for or against AI in art, it seeks to examine this emerging field's characteristics and qualities objectively. By maintaining a distanced stance, this research contributes to understanding how AI is being integrated into artistic processes. It is important to note that while this research touches upon concepts relevant to the Humanities, its primary methodologies and contributions are situated within HCI and practice-led research. It does not aim to provide a deep art historical or critical theoretical analysis but focuses on understanding the processes, motivations, and reception of contemporary AI art practices. This thesis offers a valuable resource for curators working with contemporary and technologically-engaged art and researchers within HCI, art & technology, and related fields navigating the dynamic field of AI art practice. Its insights into the stated or inferred motivations, practices, and implications of AI in art practice will also interest artists, both those who use AI and those who don't, as well as art lovers and technologists. It offers a new way of interpreting AI art beyond technical novelty, focusing instead on observable human motivations and practices. This research provides valuable insights into how technology reshapes artistic practice by emphasising the 'why' behind AI art.

1.1 Motivation

This research positions itself within the broader historical context of art's ongoing engagement with technology. From the mechanical reproduction enabled by the printing press to the digital revolution of the present day, technology has consistently shaped and challenged artistic practices. AI art, the focus of this

thesis, represents the latest chapter in this dialogue, pushing the boundaries of traditional notions of creativity, authorship, and the very role of technology that are pertinent to Human-Computer Interaction (HCI) and practice-led research.

My motivation for this research originates from my artistic practice and exploration of AI technologies. In previous work, I developed a system using genetic algorithms and machine learning to generate arrangements of three-dimensional models for aesthetic evaluation, aiming to support artists' creative process [2]. This experience sparked my interest in further investigating the potential of AI in artistic creation.

Furthermore, I am inspired by the work of curators like Luba Elliott, who actively document and analyse the emerging field of AI art [3]. Elliott's curation showcases the diverse ways artists engage with and use AI in their practice.

As an artist and a computer scientist, I was uniquely positioned to bridge the gap between technical understanding and artistic practice. This dual perspective allowed me to explore how AI technologies are integrated into artistic processes and how this integration affects observable artistic motivations and creative outcomes.

1.2 Scope and Central Questions

Central questions examined over the entire thesis are:

- What motivates artists to engage with AI in their creative practice, and how does this stated or inferred motivation shape the resulting artworks?
- How can AI artworks be examined based on artists' communicated motivations and approaches, and what new framework can be developed to better understand the diverse landscape of AI art practice?
- What insights can be gained from practical engagement in AI art, and how do these experiences inform the understanding of the field within

HCI?

- What are the key challenges and tensions artists face when creating AI art, particularly in balancing artistic vision, technological constraints, and ethical considerations?

- How do artists navigate the complexities of framing and communicating AI artworks to audiences, and what elements are crucial in communicating intended artistic concepts in these works?

These central questions are crucial for advancing the understanding of AI art within the fields of Human-Computer Interaction (HCI) and practice-led research. They address key aspects of observable artistic motivation, historical context as background, categorisation of practice, practical implementation, and audience engagement strategies. Interpreted through an HCI and practice-led lens, these questions guide the exploration of AI integration into creative processes, focusing on practical challenges, observable phenomena, and the development of analytical tools useful for researchers and curators in these domains. To answer these questions, the research employs a multifaceted approach grounded in HCI and practice-led methodologies:

- A literature review, structured in two parts, provides the necessary background context and critical grounding for this research. The first part traces the historical development of AI art and defines key concepts, while the second part critically examines existing frameworks and perspectives on AI art creation and reception.

- The development of the Five Tropes of AI Art framework offers a new lens for analysing AI artworks based on observed practices and motivations.

- A practice-led case study, the Cat Royale project, provides hands-on insights into the practicalities of AI art creation.

- Critical analysis synthesises these various strands of research, culminating in a set of guidelines for AI art analysis. These guidelines, which

include the Five Tropes framework as a key component, offer additional analytical lenses for HCI researchers and curators working with contemporary and technologically-engaged art to navigate the complex landscape of AI art practice. This synthesis bridges the gap between theoretical understanding and practical implementation, providing an approach to examining AI artworks.

1.3 Thesis Structure

The thesis is structured as follows:

1.3.1 Foundations and Origins of AI Art

This chapter lays the necessary background for understanding AI art's development within the context of this study. It defines key terms and traces AI's historical trajectory in art, from early experiments to current generative models. The chapter explores how AI techniques have been integrated into various art forms, considering issues such as authorship, originality, and bias as they manifest in practice. By examining AI art from a historical and technological perspective, this chapter sets the stage for deeper discussions in subsequent chapters.

1.3.2 Contemporary Perspectives and Frameworks in AI Art

Building upon the historical context, this chapter critically examines current AI art frameworks and debates relevant to understanding contemporary artistic practice. It explores diverse perspectives on the human-AI creative relationship and analyses various approaches to categorising and understanding AI art production and reception.

The chapter delves into framing and audience engagement strategies in AI art. It revisits the concept of authorship, first introduced in the historical context

chapter. This chapter examines how contemporary AI capabilities have further complicated authorship in practice. It explores how artists navigate the balance between human creativity and AI autonomy and how this impacts the attribution of artistic creation. The discussion encompasses various perspectives, from artists who view AI as a collaborative tool to those who present AI systems as autonomous creators.

The chapter also explores ethical considerations in AI art, including issues of data usage, bias, and the societal impact of AI-generated works. By connecting historical developments with current practices, this chapter illustrates the ongoing evolution of key themes in AI art, particularly the multifaceted nature of authorship and its central importance to AI art discourse. These two chapters collectively provide an overview of AI art's past and present, establishing a solid foundation for the deeper analyses that follow in subsequent chapters.

1.3.3 Methodology

This chapter outlines the methodological approach employed in this thesis, grounding it primarily in Human-Computer Interaction (HCI) and practice-led research traditions within art and technology. It emphasises the author's unique position as both an AI Developer and a PhD researcher, facilitating practical insights. The chapter details a multifaceted approach that combines practice-led research centred on the Cat Royale project, semi-structured interviews to gather rich qualitative data, critical analysis and the development and application of analytical frameworks, including the creation of the Five Tropes of AI Art framework and a set of guidelines to understand AI art. These guidelines, presented in the discussion chapter, are derived through a systematic process synthesising insights from the Five Tropes framework the Cat Royale project and artist interviews.

1.3.4 The Five Tropes of AI Art

This chapter introduces a novel framework developed as an analytical lens for understanding AI art practice based on artists' stated or observed motivations and audience engagement strategies. It explains how this framework moves beyond existing categorisations to offer new insights into why artists use AI and how they frame their work.

1.3.5 Cat Royale

This chapter provides an in-depth, practice-based HCI research of AI art through the author's involvement in the Cat Royale project. As the core practice-led contribution of this thesis, the chapter emphasises the author's firsthand experiences as both an AI Developer and PhD researcher, detailing the practical challenges and opportunities in integrating AI into artistic practice. It offers an overview of the project's development, from initial conceptualisation to final exhibition, documenting the collaborative processes, technical implementations, and ethical considerations encountered throughout. The author's dual role provides a unique perspective on the challenges of translating artistic vision into tangible AI artwork. The chapter presents a detailed account of the project's development phases, including initial conceptualization, preliminary testing, advanced development, and final exhibition. It explores the practical challenges and tensions in combining AI and artistic practices, including technical issues and ethical considerations. Insights from interviews with key project stakeholders offer firsthand perspectives on the creative and technical processes involved. An analysis of audience reception and engagement, including survey data and qualitative observations from the exhibition, is also included. The chapter discusses the communication strategies employed to engage diverse audiences with complex AI concepts. This case study provides valuable insights into the practical realities of creating AI art, the importance of ethical considerations, and the challenges of audience engagement strategies

in AI-driven artworks, contributing knowledge relevant to HCI and art and technology research.

1.3.6 Discussion

The discussion chapter synthesises insights from the literature review, the Five Tropes of AI Art framework, and the Cat Royale case study. It critically examines how the Five Tropes framework functions as an analytical tool when applied to real-world AI art projects, using Cat Royale as a primary test case. The chapter then discusses the practical HCI insights and tensions that emerged from the Cat Royale project, demonstrating how they complement and enrich the theoretical framework. This critical analysis reveals the need for additional analytical lenses to understand AI art projects. Building on this synthesis, the chapter presents a set of guidelines for AI art analysis. These guidelines, which include the Five Tropes framework as a component, offer additional analytical lenses for technology-engaged art curators and researchers in HCI and related fields to analyse AI art practice. They integrate theoretical understanding with practical experience, addressing aspects such as artistic motivation, technological implementation, ethical considerations, and framing. While primarily aimed at researchers within HCI, art & technology, and related fields and curators working with contemporary and technologically-engaged art, these guidelines may also prove valuable for artists interested in critically reflecting on AI art practices.

1.4 Contributions

This thesis makes three primary contributions to HCI and practice-led studies of AI art, complemented by additional significant findings:

1. **Theoretical Contribution:** The thesis proposes a new framework for analysing AI art based on artists' stated or inferred motivations. This

novel approach, 'The Five Tropes of AI Art' [4], provides a flexible set of analytical lenses for understanding diverse approaches and motivations in contemporary AI art practice. It focuses on the 'why' behind artists' use of AI rather than just the 'how', offering curators and researchers within HCI and related fields a tool to examine AI artworks. This framework builds upon and extends existing approaches, such as those proposed by Grba [5] and Forbes et al. [6], while emphasising adaptability in its application.

2. **Practical Contribution:** The thesis presents an in-depth case study of an AI art project, the Cat Royale installation. This practice-led HCI research offers valuable insights into the challenges and opportunities of creating impactful AI artworks, serving as a real-world test case for the theoretical framework. It reveals the complexities of implementing AI in artistic practice, providing insights into the interplay between artistic stated goals, technological constraints, ethical considerations, and audience engagement strategies.

3. **Methodological Contribution:** The synthesis of the theoretical and practical contributions culminates in a set of guidelines for AI art analysis, integrating theoretical understanding with practical experience. These guidelines offer an additional set of analytical lenses primarily for HCI researchers and curators in related fields to navigate the complex landscape of AI art practice and creation. They address key aspects of the creative process from initial conceptualisation to final presentation, with a particular emphasis on framing and motivation. Importantly, these guidelines are designed to be adaptable, recognising that curators and researchers in HCI and related fields may have limited access to certain aspects of the creative process.

The synthesis of these three primary contributions provides an approach to understanding and analysing AI art practice. It emphasises the importance

of artistic motivation, framing strategies, and the 'why' rather than just the 'how' of AI art practice.

In addition to these primary contributions, the thesis makes additional significant findings relevant to HCI and art and technology research:

1. **Historical Context:** The thesis provides a review of AI art's evolution, offering context for contemporary practice.

2. **Ethical Discourse:** The research advances the discourse on ethical implications in AI art within the context of HCI and responsible innovation, building on discussions initiated by scholars such as Galanter [7]. It provides insights into the multidimensional thinking required when artists address technology and ethics, balancing creative ambitions with social responsibility. This contribution is also summarised in an academic paper discussing frameworks for assessing ethical challenges in AI art projects [8].

3. **Exploration of Ambiguity:** The thesis introduces the concept of ambiguity as a creative strategy in AI art, relevant to HCI, interaction design, and creative practice, explored in a separate paper [9]. This work extends discussions on uncertainty in AI art, such as those presented by Dorin et al. [10], offering new perspectives on how artists can leverage the inherent unpredictability of AI systems for artistic effect.

4. **Audience Engagement Strategies:** The research highlights the crucial role of audience engagement in AI art from an HCI and practice-focused perspective. It examines how artists craft narratives to provoke reflection and interactions, emphasising the importance of considering the audience's perspective throughout the creative process. This practical exploration complements theoretical works like Cook et al.'s [11] study on framing in AI art, offering concrete examples of how framing choices impact audience reception.

5. **Interdisciplinary Collaboration:** The thesis emphasises the importance of collaboration between artists, technologists, and other experts in creating effective AI art experiences. It demonstrates how diverse perspectives and skills contribute to the development of innovative and impactful AI artworks, highlighting practical implementation challenges and strategies relevant to HCI/art projects.

These contributions and additional findings collectively underscore the critical roles of motivation, framing, and ethical consideration in AI art practice. They reveal that while AI art is technologically driven, it is fundamentally rooted in human choices and actions.

Ultimately, this thesis provides an understanding of AI art creation, presentation, and reception by bridging theoretical frameworks with practical insights. It contributes to the ongoing dialogue about the role of AI in contemporary artistic practice, informing curatorial practices in this context, enriching HCI academic discourse, and providing a resource for those seeking to understand and engage with the evolving landscape of AI in art.

Chapter 2

Foundations and Origins of AI Art

2.1 Introduction

This chapter lays the necessary background for understanding the development of AI art within the context of this thesis, serving as the first part of the literature review. It aims to provide a solid foundation for the critical discussions focused on HCI and practice-led research that follow in subsequent chapters. The content is structured to achieve several key objectives. Firstly, it establishes a clear understanding of fundamental concepts by defining key terms essential to the discourse on AI art practice. This includes exploring the nuanced definitions of AI itself, as well as related concepts such as machine learning and deep learning. Secondly, the chapter traces the historical trajectory of AI in art, from its early experimental phases to the current era of sophisticated generative models. This historical perspective is crucial for contextualising contemporary AI art practices and understanding their roots. Thirdly, it examines how AI techniques have been integrated into various art forms over time. This exploration considers pivotal issues such as authorship, originality, and the potential for bias in AI-generated art, providing a critical lens through which to view these technological interventions in artistic

practice.

By examining AI art from both historical and technological perspectives, this chapter sets the stage for the deeper, more focused discussions that follow. It provides the necessary context for understanding the current state of AI art practices and the debates surrounding it. The subsequent chapter 3 builds upon this foundation. It examines current frameworks for defining and categorising AI art. It explores diverse perspectives on AI's impact on artists and audiences, delving into questions of artistic agency and the evolving relationship between artists and AI. It also critically evaluates approaches to assessing the artistic merit of AI-generated works, considering factors such as communicated intentionality, framing, and explainability, highlighting ethical considerations in developing and presenting AI art.

2.2 Key Concepts and Definitions

This section defines and clarifies essential terms used throughout the thesis, providing a foundation for understanding the complexities of AI art.

2.2.1 Authorship, Originality, and Apparent Intent in Art Practice with AI

While the definition of art is a complex and evolving subject beyond the primary scope of this HCI-focused thesis, this section explores the specific aspects of authorship, originality, and communicated intent as they relate to the intersection of art and AI in creative practice. These concepts are particularly relevant when examining the unique challenges and opportunities presented by AI in artistic creation:

- Authorship. Traditionally, authorship in art refers to the individual or group responsible for conceiving and creating a work. The artist is seen as the source of the creative vision and the executor of the artistic pro-

cess. AI systems challenge this by acting as collaborators or generators, complicating attribution.

- Originality. Originality in art is often associated with the uniqueness of a work and its distinctness from previous creations. It implies the artist's ability to bring forth new ideas and expressions. AI's reliance on training data and generative capabilities raises practical questions about the locus and nature of originality in AI-assisted works.

- Communicated Intent. In the context of art practice, intent often refers to the artist's stated or inferred motivations, goals, and the message they seek to convey through their work and its framing. It can be understood as the driving force behind the creative process and a potential lens through which the audience interprets the artwork. AI introduces complexity, as the intent might reside partly with the artist, partly emerge from the system, or be primarily interpreted by the audience.

These concepts, traditionally considered fundamental to understanding and evaluating art, are being practically challenged and redefined by the emergence of AI in the creative process. As AI systems become increasingly capable of generating novel outputs, participating in creative decisions, and even operating autonomously, the lines between human and machine authorship, originality, and perceived intent become blurred. This thesis explores the practical implications of this blurring for the art world and how artists are navigating these complex questions.

2.2.2 Definition of AI

While AI is widely used, its definition remains fluid and evolving. This section traces the term's origin and explores the various approaches to AI development, including top-down rule-based systems and bottom-up learning models like neural networks.

One crucial aspect of achieving AI is through Machine Learning (ML). ML is a subset of AI that focuses on enabling systems to learn from data and improve their performance over time without explicit programming. While AI encompasses a broader range of techniques and goals, ML has garnered more consensus in its definition. The following sections will delve deeper into the evolution of AI and then provide a more detailed exploration of ML.

In 1943, Warren S. McCulloch and Walter Pitts [12] published a paper discussing networks of idealised and simplified artificial neurons and how they might perform simple logical functions. The paper inspired computer-based neural networks (and later deep learning) and the idea that neural networks mimic the brain.

Then, in 1956, the term Artificial Intelligence was coined for a summer conference at Dartmouth University, organised by a young computer scientist, John McCarthy [13]. During the conference, scientists debated how to progress AI technology. The idea that dominated the debate and attracted later funding from the US government was a top-down approach: programming a computer with the rules a human would follow in the decision-making. Others, such as Frank Rosenblatt, who developed the Perceptron [14], an early neural network model, and Oliver Selfridge, who worked on Pandemonium [15], a system for pattern recognition, preferred a bottom-up approach. This approach involved neural networks that simulated brain cells and learned new behaviors. However, this latter idea did not receive much interest at the time, probably due to the limitation of computational power that prevented a good performance. Nevertheless, the Dartmouth Workshop provided a broader definition, suggesting that AI involves creating machines that exhibit intelligent behaviours [16]. This definition, though useful, does not offer a concrete methodology for evaluating or classifying AI systems. For that, the research community decided to use the so-called Turing Test, developed during World War II by the mathematician Alan Turing, which set the bar for an intelligent machine. This test posits that a system can be considered intelligent if it is indistinguishable

from a human in conversation [17].

While no system has definitively passed the Turing Test in its purest form, some chatbots, like Eugene Goostman in 2014 [18], have achieved temporary success by fooling a portion of human judges. However, these successes were often attributed to the chatbot's ability to exploit loopholes in the test, such as mimicking human errors or deflecting questions rather than demonstrating true understanding. The Turing Test's usefulness as a measure of intelligence has been increasingly debated. Critics argue that it focuses solely on linguistic abilities, neglecting other aspects of intelligence such as visual perception, problem-solving, or emotional understanding. Additionally, it emphasises imitation rather than genuine cognition. As AI has progressed beyond simple chatbots, the limitations of the Turing Test have become more apparent. Researchers are exploring alternative metrics, such as the Abstraction and Reasoning Corpus (ARC) [19], which assesses the capacity to learn and solve complex tasks from limited examples.

The period after 1987 marked a turning point for AI. Following a long period of disillusionment known as the "AI winter" during which people began seriously doubting AI's ability to reach anything near human levels of intelligence, its commercial value started to be realized [20]. This shift was driven by several factors:

- Researchers began focusing on developing expert systems, which were AI programs designed to solve specific problems within a narrow domain, such as medical diagnosis or financial analysis. These systems proved more practical and achievable than the pursuit of general intelligence.

- Progress in ML algorithms, particularly those based on statistical analysis and pattern recognition, allowed for the development of more effective and efficient AI systems. These algorithms could learn from data and improve their performance over time, making them suitable for real-world applications.

- The availability of more powerful computers and the decreasing cost of computing resources made it feasible to train and deploy AI systems that required significant computational power.

- Recognising the potential of AI to automate tasks, improve efficiency, and create new business opportunities, corporations began investing heavily in AI research and development.

Instead of aiming for general intelligence, these expert systems focused on much narrower tasks.

These were the years when the researchers went back to solving ML problems using algorithms that can learn from large amounts of data the underlying rules or functions that map the input data to the desired output. For instance, Brooks [21] argued that pre-programming a computer with the rules of intelligent behaviour was wrong and that neural networks should be used instead as they can learn the rules automatically from the data.

The definition of AI is still the subject of evolving debates among researchers. For instance, François Chollet [19], aiming for a different measure of intelligence, proposes to reintroduce logical programming to augment the ability of the neural networks to generalise and potentially solve discrete problems. Even if it can be argued that a similar idea was deployed in the AlphaGO Google experiment [22], where traditional programming and reinforcement learning are united to beat a human at the game of Go, Chollet aims to define a new framework where AI is capable of a more human level ability of generalisation. Following the excitement around his paper, Chollet launched the ARC competition (Abstraction and Reasoning Corpus) on the Kaggle website, asking the challenge: Can a computer learn complex, abstract tasks from just a few examples?

The idea of Chollet is that current ML algorithms are data-hungry and brittle (they can break once they need to provide a prediction from new information that they did not observe during training), making it challenging to develop

systems that can deal with the unpredictability of the human mind or environment. The Kaggle ARC is an attempt to measure the development of AI. It aims to provide a baseline for measuring AI skill development on unknown tasks. It hints at a future where AI might swiftly learn to tackle new challenges independently.

In 2022, Joshua Benjo [23] investigated the significance of understanding AI at the human level as capturing causality, capturing how the world works, understanding abstract actions and how to use them to control thinking and planning, even in new scenarios, and finally explain what happened. Most modern ML models need to be better understood in this regard, as they only work under fixed experimental conditions. On the other hand, for Benjo, the solution can be causal learning, which can be closer to how humans think. It focuses on the representation of structural knowledge in the data generation process to enable interventions and changes in the training data from the model. Usually, an ML model depends on a data assumption of independent and identically distributed random variables. Causal learning, in contrast, allows for the inference of data with interventions and can provide understanding and predict the effect of interventions.

Despite the evolving nature of these definitions, today, we can think of AI as a computational system that tries to simulate the functioning of the human brain by exploiting data and the surrounding environment and adapting to various activities to achieve desired outcomes. This adaptation can occur through two primary modes of learning:

- Supervised Learning: In this mode, the AI system is trained on a dataset of labelled examples, where each example includes input data and the corresponding desired output. The AI system learns to map inputs to outputs based on these examples, and it requires human intervention to provide the labelled data.

- Unsupervised Learning (or Self-Learning): In this mode, the AI system

is presented with unlabeled data and must discover patterns and relationships within the data independently. The AI system learns without explicit human guidance, adapting its understanding based on the inherent structure of the data.

- Reinforcement learning, a type of self-learning, involves the AI system learning through trial and error, receiving feedback from its environment and adjusting its actions to maximise rewards.

The idea is that with enough information about the world and the capacity for self-learning, machines can eventually achieve a level of intelligence that rivals or even surpasses human capabilities.

As artists have used it, it is worth mentioning that the Generative Adversarial Network (GAN) is a powerful technique within unsupervised learning. GAN training involves two distinct neural networks: the Discriminator and the Generator. The Discriminator learns to distinguish between real images from a dataset and "fake" images generated by the Generator. The Generator learns to create increasingly realistic images that can fool the Discriminator. The two networks are trained together in a competitive process. The Discriminator tries to correctly identify real and fake images, while the Generator aims to create images that can deceive the Discriminator. As the training progresses, the Generator develops and improves its ability to produce images that are indistinguishable from real images.

2.2.3 Defining Machine Learning

In contrast, the field of ML, indeed older than the definition of AI, presents a more definable concept. In 1763, Thomas Bayes [24] created a framework for thinking about the likelihood of occurrences, using maths to update the probability of a hypothesis as new information becomes available. Bayesian inference would become an essential technique in ML due to his work. In 1842, the mathematicians Ada Lovelace and Charles Babbage fed an Analytical

Engine the first computational algorithm. Lovelace envisioned a computer that could solve problems of any complexity, and she called the idea Poetical Science [25].

In 1959, Arthur Samuel [26] introduced the term ML and its definition as programming a computer that can play a game better than the programmer that wrote the program for the computer. In 1969, researchers at the Stanford Institute developed Shakey [27], the first mobile robot able to make decisions about its actions by reasoning about its surroundings. Even if slow and prone to failure, it represented the first attempt of an ML algorithm to learn from its predictions and the consequences of its actions.

The years that followed saw numerous advancements in ML technology, particularly with the advent of the internet as an enabling technology in the late 1990s and early 2000s. The internet's increasing scale and accessibility provided new data collection and analysis opportunities, fostering the development of more sophisticated ML algorithms. In this context, Richard Wallace [28] created the chatbot ALICE (Artificial Linguistic Internet Computer Entity), inspired by Joseph Weizenbaum's ELIZA software [29]. However, ALICE benefited from the addition of natural language sample data gathering allowed via the Web.

In the 1980s, Yann LeCun designed the convolutional neural network (CNN). He applied CNNs to text sequences and images in order to enable machines to automatically extract useful features and patterns from these types of data. This was a significant departure from traditional methods, which required manual feature engineering. . In the 1990s Yann LeCun produced LeNet-5, a practical application of CNNs for recognising handwritten digits. This success led to the development of the many CNN models we know today, capable of processing and learning from images.

In 1997, Deep Blue, a chess-playing computer developed by IBM [30], defeated world chess champion Garry Kasparov in a highly publicised six-game match. This victory marked a significant milestone in the history of ML, demonstrat-

ing that machines could outperform even the most skilled humans in a complex game. Deep Blue achieved this success through a combination of brute-force computation, evaluating millions of possible moves per second, and a sophisticated evaluation function, which assessed the strength of each position based on factors like material balance, piece activity, and pawn structure.

In 2008, Google released the first voice recognition application thanks to the possibility of using an algorithm that processes the data of different Google users in parallel by sorting the computational work on a vast network of computers [31].

Then, in 2009, Stanford researcher Fei-Fei Li [32] identified a significant problem of neural networks: the ability of a neural network algorithm to produce satisfactory results is directly related to the quality of the data available during its training. Following his intuition, Fei-Fei Li developed an image database representative of the images found in the real-world. He released a database (ImageNet) composed of 14 million images that tens of thousands of workers have labelled by Amazon Mechanical Turk. Even today, the database is a benchmark for new technological developments for neural networks applied to computer vision.

2011 is remembered as the year in which IBM demonstrated an autonomous system called Watson [33] to solve puzzles and complex questions in the field of ML applied to written text. Watson's success on the game show Jeopardy!, where it defeated two former champions, showcased its ability to understand complex language, process vast amounts of information, and reason effectively. This victory demonstrated the potential of ML to handle real-world tasks involving human language and knowledge, such as analysing medical records, automating customer support and enhancing user experience across various industries.

With the historical evolution of ML, the most common definition is that it enables systems to learn and improve from experience autonomously without explicit programming [34]. This process involves developing algorithms to run

on computers capable of analysing data, identifying patterns, and making decisions with minimal human input. Today, ML finds application in various domains, such as speech and image recognition, medical diagnosis, and predictive analytics. The essence of ML lies in training models with vast datasets, allowing them to make increasingly accurate predictions or classifications over time.

ML is categorised into three main types: supervised, unsupervised, and reinforcement learning. Supervised learning involves training algorithms with labelled data to predict outcomes, like estimating house prices based on historical data. On the other hand, unsupervised learning deals with unlabeled data, aiming to discover hidden patterns or structures, like spotting fraudulent bank transactions with anomaly detection. Reinforcement learning is the process of letting the machine learn a policy by performing actions and learning from the outcomes of the actions in the environment, like playing chess or some application in robotics.

2.2.4 Defining Deep Learning

As mentioned earlier, ML has become a dominant force in AI, enabling systems to learn from data and adapt to various tasks. Deep Learning has emerged as a particularly powerful approach within the diverse landscape of ML algorithms, revolutionising how machines perceive and interact with the world.

Deep Learning [35] is a subset of ML, itself a branch of AI, which focuses on building algorithms that can model high-level abstractions in data. These algorithms are structured in layers, forming an artificial neural network to mimic the human brain's function and structure. Deep learning models automatically learn complex representations of data through multiple processing layers. Each layer uses the output from the previous layer as input, allowing the model to build a deep (hence the name) understanding of patterns in the data. Deep learning is particularly powerful in handling large volumes of

unstructured data (for instance, text and images). It is widely used in applications like image and speech recognition, natural language processing, and autonomous vehicles.

Natural Language Processing (NLP) is a branch of Deep Learning that allows a machine to read, understand and derive meaning from human languages. In 2017, Google released a paper called "Attention Is All You Need" [36], which proposed a new solution for NLP. The model works exclusively on attention mechanisms: a multi-head attention that applies more than one attention in parallel. Attention mechanisms are at the heart of a neural network architecture called Transformers. The transformer architecture overcomes the limitation of training the model with an expensive recurring neural network [37] and instead performs the learning of the entire sequence in one go. Google implemented several Transformers neural networks such as Roberta [38] and BERT [39].

2.2.5 Generative AI

The history of technological advances in AI is characterised by cycles of great enthusiasm and disillusionment, often influenced by funding availability and limitations in computational power. Indeed, recently, there has been a significant development phase fostered by earning opportunities, increased computational capacity, and vast data availability. This has led to a surge in generative AI, a field where machines learn patterns from existing data and generate new data that share similar characteristics. Generative AI refers to a group of technologies that automatically generate visual or written content based on text prompts. It has undergone a leap in complexity and become widely available within just a few years [40]. This technology can potentially revolutionise various fields, including design, art, and content creation. Generative AI enables the creation of new and original content by learning patterns and styles from existing data, and it can produce outputs that mimic human-created content

autonomously [41]. The applications of generative AI are diverse, ranging from text-to-image generation to music composition and even assisting in the design process [42].

A notable example of these advancements is the development of Large Language Models (LLMs), such as the Generative Pre-trained Transformer (GPT) series developed by OpenAI. These models are trained on massive text datasets and can generate remarkably human-like text, translate languages, write different kinds of creative content, and answer questions. While some might see these outputs as simply sophisticated statistical predictions, LLMs can engage in tasks that require a deeper understanding of context and relationships, which many consider a form of complex reasoning. The evolution of LLMs began with the original GPT, followed in February 2019 by GPT-2, discussed in OpenAI's blog post "Better language model and their implications" [43] and the associated paper [44]. This model, with ten times the parameters and training data of its predecessor, demonstrated a significant leap in text generation capabilities. The goal of the GPT-2 model is straightforward: predict the next word in a sentence or block of text given the previous words. While GPT-2 generates output one token at a time, models such as BERT use deep bidirectional context for predicting outcomes on sentiment analysis and question-answering tasks. This makes BERT less readily adaptable for automatic text generation, in contrast to GPT-2. GPT-3 was announced in May 2020, followed by GPT-4 (2023) and GPT-4o (2024), further showcasing the potential of LLMs for a wide range of creative and practical applications. A recent blog post from Microsoft [45] explores how GPT can assist human creativity in writing, summarising large amounts of data, translating texts, and offering a range of creative opportunities. Contrary to previous beliefs, these LLMs display a surprising level of general intelligence, suggesting that larger datasets and model scales might be key to developing more generalised AI.

2.3 Exploring the History of AI Art

While the definitions described before provide a foundation for understanding AI as a broad technological field, their application in the context of art introduces unique considerations and challenges. In artistic practice, AI becomes not just a tool but a collaborator, a subject, and sometimes even a creator in its own right. The machine learning algorithms and neural networks described above are repurposed by artists to generate visual content, compose music, or create interactive experiences. For instance, Generative Adversarial Networks (GANs), a type of machine learning system, have become particularly popular in AI art for their ability to create novel images ranging from photorealistic portraits to abstract compositions. Similarly, natural language processing models are being used to generate poetry or interactive narratives. By exploring AI in the context of art, it's crucial to consider how these technologies intersect with traditional artistic concepts such as creativity, authorship, and aesthetic value. The following sections will delve into how artists have adopted and adapted AI technologies, transforming them from tools of computation into instruments of creative expression.

Having established the fundamental concepts and evolving definitions of AI, ML, Deep Learning and Generative AI, the following content discusses their impact on art. This section traces the historical trajectory of AI art, highlighting key milestones and influential figures who have shaped the field. It intertwines the broader narrative of AI's evolving capabilities - from early expert systems to the rise of neural networks and powerful generative models discussed earlier - with examples of how artists have harnessed these advancements for creative expression, leading to the emergence of AI art as a distinct genre.

Almost as soon as computers became available, they were used to create generative digital art. While artists like Frieder Nake and Vera Molnar created algorithmic art in the sixties, these works did not employ techniques commonly

thought of as AI [46].

One of the earliest AI-based artworks was AARON, created by Harold Cohen [47]. First developed in 1973 and continually refined for over 40 years, AARON uses a rule-based system, also known as an expert system, programmed by Cohen to guide the creation of paintings. Unlike later AI art that leverages ML, AARON's creative process is driven by a complex set of rules and instructions that Cohen meticulously encoded, mimicking his understanding of artistic composition, colour theory, and form.

2.3.1 Deep Learning and the Rise of Generative Art

The section then delves into the impact of deep learning on AI art, discussing influential algorithms like DeepDream and the emergence of generative adversarial networks (GANs). It explores the concept of transfer learning and its applications in generating art inspired by different styles.

More recently, artists leveraged deep neural networks to train AI in generating traditional-looking artworks. For instance, Gene Kogan's Cubist Mirror employed style transfer and a webcam to render live video of a museum space as a Cubist painting [48].

As mentioned earlier in the chapter, Deep Learning is a powerful subset of ML that has significantly impacted the art world, especially with the rise of generative art.

Google's DeepDream was one of the first Deep Learning algorithms to produce artistic images. DeepDream is a deliberate modification of a convolutional neural network-based image classifier. Instead of requiring the computer to identify a specific object, the user requests that an image be produced securely classified as the object itself. The output image is a collage of the object's components, repeated and imagined to resemble a dream or hallucination, as is often observed. DeepDream was used by Alexander Mordvintsev [49] to generate dreamy and deeply psychedelic images.

The subsequent evolution of the technique has allowed considerable progress in the images generated by AI, highlighting the synthesis of two different approaches: Neural Style Transfer or Generative Adversarial Networks (GAN) [50]. The operator can select an input image and a style image with Neural Style Transfer, and the output is the first image in the "style" of the second. While Style Transfer is comparable to image filtering, GAN can create new (fake) images that are close to current creative styles.

A prime example of a GAN-generated artwork that captivated public attention is the "Portrait of Edmond Belamy." Created in 2018 by Obvious, a Paris-based collective of artists and researchers, the portrait depicts a fictional man in a dark coat and white collar, reminiscent of 18th-century European portraiture. The artwork was generated by a GAN trained on a dataset of 15,000 portraits spanning the 14th to 20th centuries. The "Portrait of Edmond Belamy" made headlines when it was sold at Christie's auction house in New York for $432,500, far exceeding its estimated price of $7,000 to $10,000. The buyer, an anonymous collector, was reportedly drawn to the artwork's unique blend of traditional aesthetics and AI-generated novelty.

Another critical step in the advancement of AI has been the concept of transfer learning, in which the internal decision weights of an artificial neural network trained on one task are transferred to predict another task. For example, CycleGAN [51] is used to generate art by influencing the artistic composition attributes of another style.

Beyond image generation, advancements in natural language processing, particularly the emergence of Large Language Models (LLMs), have also had a profound impact on AI art. Building upon the foundation of transformer architectures (2.2.5), LLMs, with their capacity for generating human-quality text and engaging in complex reasoning, have opened up new avenues for artistic expression.

These advancements, including models like GPT-3 [52] and DALL-E [53], have enabled the automatic generation of high-quality images and text using

prompts provided by users.

The automatic generation of high-quality images and the ability to generate text using simple prompts that users can provide opened up many artistic applications.

Several examples exist of developers and artists engaging with the new tools. For example, in his latest interactive "Appropriate Response" work, Mario Klingemann investigates how much 'meaning' can be expressed in 125 letters. His art piece uses the GPT-2 model to generate 125-letter-long sentences on an analogic screen and engage the audience to reflect on expectation, and our relationship with AI [54].

Artist Alexander Reben used GPT-2 to question how artists and machines might collaborate. The viewer is presented with Ruben's artwork, which consists of a series of plungers and a caption that explains its origin and historical value. However, the art piece was produced according to the written instructions generated by the GPT-3 algorithm. Although Reben points out that every command of the machine has been personally selected and curated, the project highlights how GPT-3 can collaborate in a new form of conceptual art [55].

"AI Dungeon," created by Nick Walton and launched by Latitude.ai in 2019 [56], is an example of how LLMs were pushing the boundaries of interactive storytelling. This text-based adventure game uses GPT models to generate dynamic narratives that respond to player choices, creating a unique and personalised experience for each user.

Today, AI art encompasses various practices and techniques, from generative image and text systems to robotic installations and virtual reality experiences. As AI advances, artists find new ways to incorporate these technologies into their creative processes.

2.4 AI's Impact on Society and the Arts

While the previous sections have traced AI's technical evolution, this section delves into its rapid advancement's broader societal and artistic implications as context for this study. It's important to distinguish between the direct use of AI in art creation (as discussed in the previous sections) and the broader influence of AI on artistic practices and themes. This section explores how AI shapes society and, in turn, influences art that reflects on or critiques these changes, even when the art itself may not be generated using AI technologies. This distinction highlights the multifaceted relationship between AI and art practice. Artists may engage with AI not only as a tool for creation but also as subject matter, a cultural phenomenon to be examined, or a societal force to be critiqued. By exploring this broader impact, this section seeks a more comprehensive understanding of AI's role in contemporary art practice. The following paragraphs explore the intersection of AI with society and art, examining the opportunities and challenges it presents. They address critical questions about:

- The role and practical application of AI art: How do artists use AI as a medium, a tool, or subject matter, and how does its integration challenge and redefine traditional notions of creativity and authorship within creative workflows?

- The ethical considerations surrounding AI relevant to HCI and art practice: Beyond its potential benefits, what are the ethical concerns associated with AI, including its impact on privacy, personal data ownership, copyright, intellectual property, the spread of misinformation, and the potential for automation to displace human jobs?

- The role of artists in critiquing AI: How are artists using their work to address AI's social, ethical, and political implications and its impact on society?

- Feminist AI Art: How do feminist artists use AI in their practice to challenge gender stereotypes and reclaim agency in the face of automation?

2.4.1 The Emerging Discourse on AI Art

AI art has informed a dialogue about the nature of creativity, authorship, and the role of technology in artistic expression. This discourse encompasses a wide range of perspectives, from those who view AI as a powerful new tool for artistic creation to those who question whether AI-generated works can be considered art. Many artists and researchers have begun to explore the potential of AI in art, considering its various roles and implications. Some, like Lomas [57], view AI as a collaborative partner, enhancing and expanding human creativity in novel ways. This perspective aligns with Mazzone's [58] argument for a fruitful collaboration between artist and machine, where both contribute their unique strengths to the creative process. Others see AI as a subject matter in itself, using art to critique and explore the societal impacts of AI technology. Anantrasirichai et al. [59] highlight both the impressive outputs of AI and the ongoing challenges in achieving genuine computational creativity, raising questions about AI's potential to understand and engage with the world around it. The discourse also extends to broader societal implications of AI, as Akten notes in [60]. While AI offers significant benefits in fields like health research, it also poses potential dangers, such as spreading misinformation and perpetuating biases. This complexity creates opportunities for artists to critique and explore the social consequences of AI through their work. Some researchers, like Boden [61], even speculate about the possibility of AI as an autonomous creator, challenging traditional notions of authorship and artistic apparent intent. Artists like Rolez [62] suggest that as machines become more autonomous, artists should be prepared to embrace this evolution and use AI to explore new dimensions of creativity. As technology continues to evolve, so does the discourse surrounding AI art. Artists, critics, and scholars are grappling with how to understand, evaluate, and categorise these new forms

of creative expression. This ongoing dialogue sets the stage for more detailed explorations of the motivations, methodologies, and implications of AI in art explored from the HCI and practice-led perspective of this thesis, which will be examined in depth in chapter 5 on the Five Tropes of AI Art and chapter 6 on the Cat Royale project.

2.4.2 Ethical Considerations Surrounding AI

The rapid advancement of AI technology brings a range of ethical concerns that have become central to the broader societal discussion. AI's impact on privacy, data ownership, the spread of misinformation, and the potential displacement of human jobs are critical issues artists encounter and are beginning to address in their work.

Leymarie [60] highlights the complex impact of AI on society. While AI can offer significant benefits in fields like health research and prevention, it poses potential dangers. AI systems can be used to disseminate false information, perpetuate bias, and automate decisions that can lead to unintended consequences. Tamki [63] explores the challenges of mitigating biases in AI systems, particularly in large language models trained on massive datasets.

AI's reliance on vast amounts of data raises concerns about privacy and ownership. Using personal data to train AI systems without proper consent or safeguards can lead to ethical dilemmas. Bender [64] discusses the risks of relying solely on large datasets, arguing the importance of carefully documenting data and ensuring ethical data collection practices.

An important ethical consideration is the issue of the copyright of a work of art created using an algorithm not developed by the artist. McCormack [65] doubts that the developers of a computational model are entitled to copyrights; otherwise, we should give credit for artistic photographs to the camera's inventor. However, there is a more complex debate regarding the data source used for AI training, specifically when the data could be copyrighted

images. Many artists and content creators have raised concerns about their copyrighted works being used in training datasets without their permission or compensation. This issue extends beyond visual art to include literary works, music, and other forms of creative expression. For instance, in 2023, several prominent authors, including George R.R. Martin and John Grisham, filed a lawsuit against OpenAI, alleging copyright infringement in the training of language models using their published works [66]. Similarly, in the visual arts, platforms like Stable Diffusion and Midjourney have faced criticism and legal challenges for using copyrighted images in their training data without explicit permission from the artists [67]. These cases highlight the tension between the need for diverse, comprehensive datasets to train AI models and the rights of creators to control and benefit from the use of their work. Another significant concern is the protection of image and vocal rights. AI technologies now allow for the creation of deep-fakes, which are highly convincing artificial images, videos, or audio of real people. This capability raises serious questions about consent, privacy, and potential misuse. The complexity of these issues and their potential impact on the future of AI in art will be further explored in chapter 3.6, where the thesis delves into the ethical implications of AI in creative practices. Recently, artists have been selling digital works produced by AI in online markets using cryptocurrencies and the blockchain that ensure copyright recognition to the publisher of the work [68]. These digital works of art are cryptographically registered with a token on a blockchain. The token allows them to be securely traded using cryptocurrencies from one collector to another. The popularity of this sales mechanism has led to the introduction of the non-fungible token (NFT) [69] in the digital art market. This makes it suitable for uniquely identifying a digital asset and exchanging AI-generated digital artwork. While NFTs seem to offer a valuable solution to copyright, some concerns related to NFTs are still not fully resolved, particularly their negative environmental impact and the fact that the images generated might still be using copyrighted images in the training data.‘

2.4.3 Artists as Critics and Commentators on AI

In response to the challenges and opportunities presented by AI, many artists are embracing their role as critics and commentators on this transformative technology. Through their work, artists explore AI's ethical, social, and political implications, raising critical questions about its impact on our world. This critical engagement with AI is explored in greater depth in chapter 5, where the thesis introduces the Five Tropes of AI Art. Particularly relevant to this discussion is the trope "AI as Subject Matter," which encompasses works that directly address the societal implications of AI technology.

Anantrasirichai [59] suggests that AI can inspire artists to embrace new forms of creative expression, pushing them to think about art in unconventional ways. AI can challenge artists' assumptions about creativity and authorship, encouraging them to explore new territories and question existing paradigms. As mentioned earlier, artists can also use AI as a subject of their work, exploring its limitations, biases, and potential dangers. Quach [70] highlights the concerns surrounding AI systems like DALL-E, which learn from vast datasets without proper attribution, raising questions about copyright and artistic ownership.

By incorporating AI into their practice, artists can initiate critical dialogues about AI's impact on society. Audry [71] argues that viewers are likely to attribute personality and motivations to AI-generated artworks, highlighting the importance of considering the role of the audience in interpreting and understanding AI art. Artists can use their work to provoke questions, spark discussions, and foster a greater awareness of AI's potential benefits and risks.

One group of artists that exemplifies this critical engagement with AI technology is feminist artists. These creators have been at the forefront of exploring the intersections of gender, technology, and power in the context of AI. Feminist artists use their work to challenge gender biases in AI systems, question the gendered nature of AI assistants, and explore how AI might reinforce or

disrupt existing power structures. Their practice is a prime example of how artists can use AI as a tool and a subject for critical examination and societal reflection.

2.4.4 Feminist AI Art

Feminist artists are using AI in their practice to challenge long-standing power structures and reclaim agency in a world increasingly dominated by technology. They are questioning the biases inherent in AI systems and how these systems can perpetuate existing inequalities. Using AI as a critique and creative expression tool, feminist artists are redefining the relationship between humans and technology and shaping a more inclusive and equitable future for art and society. Feminist artists are drawing attention to the biases embedded in AI systems, often reflecting the historical and cultural prejudices of the data used to train these systems. Sinders [72] highlights the need for more diverse and representative datasets to counteract the stereotypical representations of women in image searches. Her project "Feminist Data Set" involves creating a more inclusive dataset for AI training, challenging the often male-dominated data used in many AI systems. This work aligns with the "Data-Driven Creative Choices" trope that the thesis will discuss in chapter 5, where the curation of training data becomes a critical artistic strategy. Grønneberg [73] underscores how datasets like ImageNet reflect hierarchical assumptions about race, gender, and class, demonstrating the importance of critically evaluating the data that fuels AI systems. Her work often takes the form of interactive installations that allow viewers to experience firsthand the biases present in AI systems, aligning with the "Reflective Investigation of AI" trope and the "Data-Driven Creative Choices" trope (see chapter 5). Feminist AI artists reclaim agency in the face of automation, challenging the notion that technology is inherently neutral. They are reimagining the role of women in a technological world, highlighting the need for a more equitable and inclusive

approach to AI development. Artists like Lynn Hershman Leeson [74, 75] has been a pioneer in this field, using her work to explore issues of identity, representation, and the impact of technology on our lives. Leeson's work often takes the form of digital avatars and AI-driven installations that question the construction of female identity in digital spaces. Her project "Agent Ruby," an AI web agent that evolves through conversations with users, exemplifies the "AI as Subject Matter" trope (chapter 5), directly addressing the social and ethical implications of AI. Another notable example is Joy Buolamwini's work, whose "Gender Shades" project exposed racial and gender biases in commercial AI facial recognition systems. Buolamwini's work, which combines technical research with performance art, falls under both the "AI as Subject Matter" and "Reflective Investigation of AI" tropes, using art to critique and expose the limitations of AI systems. These artists, through their diverse approaches ranging from dataset creation to interactive installations and performance art, are not only critiquing existing AI systems but also proposing alternative, more inclusive visions for the future of AI. Their work demonstrates how art can serve as a powerful tool for exposing, questioning, and potentially rectifying the biases embedded in our technological systems.

2.5 Summary

This first part of the literature review has established the foundation for understanding AI art practice by exploring key concepts, historical developments, and ethical considerations relevant to this study. It traced the evolution of AI from its early beginnings to the current state of LLMs and generative AI, highlighting how these advancements have opened up new possibilities for artistic expression. The division of the literature review into two parts serves a crucial purpose in the structure of this thesis. This first part focuses on the historical and technological context of AI, providing the necessary background to understand the tools and concepts that AI artists are working with. It also ex-

plores the broader societal implications of AI, including ethical considerations and its impact on creativity and human expression, as context for the primary HCI and practice-led investigation. This context is essential for understanding the environment in which AI art is created and received. The second part of the literature review, which will follow, will build upon this foundation by examining the specific frameworks and taxonomies developed by researchers to categorise and understand AI art practices. It will explore how artists use AI technologies to create engaging and impactful artworks. This structure allows for a more focused and in-depth exploration of AI art practices, building on the contextual understanding established in this first part. While separated for clarity, these two parts of the literature review are inherently interconnected. The historical and technological context explored in this first part directly informs the artistic practices and frameworks discussed in the second part. Together, they provide an overview of the AI art landscape, from its technological foundations to its current manifestations in artistic practice.

Chapter 3

Contemporary Perspectives and Frameworks in AI Art

3.1 Introduction

Building upon the historical background and foundational concepts established in the previous chapter 2, this section of the literature review critically examines contemporary frameworks and perspectives relevant to understanding AI art practices. Firstly, it analyses various frameworks proposed by researchers and scholars for defining and categorising AI art practice. Secondly, it explores artists' perspectives on AI art, providing insights into how practitioners view AI's integration into their creative processes. Thirdly, it delves into the complex interplay between human creativity and AI capabilities, investigating how artists navigate the balance between their own creative vision and the autonomous potential of AI systems. This exploration encompasses a range of perspectives, from those who view AI as a collaborative tool to those who present AI systems as independent creators. Furthermore, this chapter examines strategies for framing and audience engagement strategies in AI art. It revisits and expands upon the concept of authorship introduced in the previous chapter, exploring how contemporary AI capabilities have further complicated this notion. Lastly, it addresses the ethical considerations inherent in AI

art creation and deployment. By synthesising these diverse perspectives and frameworks, this chapter provides an overview of the current state of discussion surrounding AI art practice. It establishes a critical foundation for the subsequent chapter, which will present an original framework for AI art analysis, contributing to the understanding of how AI is used to create impactful and engaging artistic experiences for the audience.

3.2 Categorising AI Art

Researchers have proposed varying frameworks for categorising the outputs of AI art techniques and the factors that shape the public reception of AI art. This section explores some of the ongoing efforts to categorise AI art practice, examining different frameworks proposed by researchers to classify artists' diverse outputs and techniques.

3.2.1 Grba's Framework

The following content describes a critical framework for AI art developed by Dejan Grba, a Serbian artist, researcher, and educator specialising in digital art and new media. Grba's work, published in the peer-reviewed journal Digital Creativity in 2022 [5], draws from his experience as both a practitioner and theorist in the field of computational arts. His framework, which identifies four prominent features observed in AI art along with key issues and prospective directions, offers a perspective that bridges computer science, media theory, and contemporary art practice. Grba's paper [5] discusses four prominent features of AI art by investigating examples of contemporary artists and artworks. This analysis is grounded in Grba's interdisciplinary approach, which combines insights from art history, media studies, and computer science to provide a comprehensive view of the AI art landscape. The first feature Grba identifies is creative agency and authorship, where artists explore notions of creative agency, authorship, and originality in relation to AI systems. The au-

thor mentions artists like Harold Cohen, Adam Basanta, Nao Tokui, and Anna Ridler as examples who tackle topics like anthropomorphism, computer creativity, and intellectual property in their work. It's worth noting that Grba's framework is not mutually exclusive; many individual artists engage with multiple features in their work. The second feature relates to the epistemological space of machine learning systems. Artists associated with this feature investigate the inner functionality of AI systems to explore what AI systems know, how they learn, and the limits of their understanding. For example, artists like Mike Tyka, Nao Tokui, and Weidi Zhang visualise the machine-learning training process, looking to reveal the artefacts and boundaries of systems through aesthetic exploration.

A third aspect mentioned in the paper is the tendencies toward AI spectacularisation and mainstream adoption explored by the artists. For instance, some artists explore large-scale, flashy AI art installations and events, often commercially driven and novelty-driven. Examples highlighted in the paper include high-budget studios like Refik Anadol.

The fourth feature of AI art relates to politically tactical explorations. The paper suggests artists like Derek Curry, Jennifer Gradecki, Anna Ridler, and Jake Elwes who produce socially engaged, politically minded AI art that often addresses socio-political issues around training data biases and algorithmic stereotypes.

The author then discusses the key issues revealed by examining the AI artworks and the above features.

- Cogency - Many AI art projects appear to Grba to need more interesting ideas, interesting abstractions, or cultural/historical context. They have unclear relations between technical aspects and conceptual goals, often leading to a lack of deep conceptual thinking.

- Authenticity - Over-focus on technical novelty over poetic articulation. This issue concerns the methodological and aesthetic uniformity observed

in AI art, often resulting from artists using similar code libraries and datasets, leading to a lack of originality.

- Technocentrism - This term focuses on technology over artistic aspects in AI art, where artists may prioritise technical skills over other important factors like creativity or critical engagement.

- Academism - The paper criticises certain tendencies in AI art that conform to academic norms, leading to repetitive topics, uniform techniques, and sometimes shallow conceptual underpinnings.

- Speculation - The key issue the author identifies regarding speculation in AI art is its tendency towards inflated ideas that lack interesting grounding, impact and connection with the audience.

- Ethics - This encompasses the ethical challenges artists face in AI art practice, including issues of originality, the socio-political context of technology, and the balance between artistic integrity and professional success.

To address those issues, the author proposes the following prospects for future practice:

- The author advocates fostering a mature objective across technical, conceptual and critical competencies. This objective originates from seeing art as integrating ideas and tools to advance understanding, not merely demonstrating novel configurations. By experiencing diverse art making's cognitive and physical demands, artists can appreciate tools as means, not ends.

- The author says artists can make their critiques more impactful by clearly revealing AI tech's cultural and political backgrounds. Instead of prominent aesthetic or rhetorical critiques, artists should use approaches that make audiences think critically and see things differently. Tactics like

surprise, mystery and playful interaction can unlock insights. Fundamentally, the tactics proposed can drive impactful AI art by demystifying AI tools and reclaiming fundamental questions.

- The author argues artists should address the tempting creativity aimed only at commercial success or technical demonstration. Instead, they should respect their methods as frameworks stirring curiosity, interpretation and progressive thinking. By dynamically engaging sophisticated tools like machine learning, artists in constantly improving technical privileged positions can push the boundaries of what creativity means.

- The author argues that artists should resist prioritising careers over art making and remain open to taking risks. The author advocates for artists to embrace risky commitments without predetermined outcomes. Progress requires rethinking systems, incentives and commitments from artists and institutions to nurture unfiltered artistic curiosity and expression.

The author suggests that AI art requires frameworks that enable audiences to engage deeply with the art, considering its complexities and demands. Inspired by Stephen Wilson's perspective [76], the author points out that any framework should assess AI art in terms of its strengths, limitations, and context. There is an emphasis on understanding the political nature of technology and the ethical implications of artistic choices in AI art, and overall, the approach advocates for critical, self-correcting evaluations to challenge biases and assumptions, aiming to advance the field in a culturally and ethically conscious manner.

Summary

Grba's framework offers a valuable lens for identifying prominent features and critical issues within contemporary AI art practice. His identification of features like 'creative agency' or 'epistemological space' provides useful starting points for analysis. However, the framework primarily categorises observed

phenomena and practitioner challenges rather than offering a systematic structure focused specifically on the underlying artistic communicated motivations driving the adoption and application of AI. While the identified issues (Cogency, Authenticity, etc.) highlight important practical concerns, focusing on clear artistic observed motivation, as proposed in this thesis, can potentially address many of these. By emphasising the importance of robust and communicated motivation in AI art practice, many of the concerns raised by Grba - such as cogency, authenticity, and the balance between technical novelty and artistic depth - can be naturally addressed. A well-defined artistic motivation serves as a guiding principle, encouraging artists to engage deeply with both the conceptual and technical aspects of their work. This approach not only aligns with Grba's call for mature objectives but also adds a focus on the 'why' rather than the 'how' in the theoretical framework presented later in this thesis for analysing and understanding AI art. Moreover, focusing on motivation can help artists navigate ethical challenges and avoid the pitfalls of pure spectacularisation or academism that Grba mentions.

3.2.2 The University of Oxford Survey Framework

This subsection presents the five new activities identified by the report developed in collaboration with the University of Oxford [77] about artists using AI techniques. The study was led by Luba Elliott, an AI art curator and researcher, in partnership with Anne Ploin, a researcher at the Oxford Internet Institute. This interdisciplinary team, combining expertise in art curation, AI technology, and academic research, examined the opportunities offered by AI to artists through a series of interviews with practicing artists and curators in the field of AI art practice. It focused on media and fine artists using generative AI techniques as part of their practice. The report features insights from a diverse range of contemporary artists who incorporate AI into their practice. These include Robbie Barrat, known for his work with GANs; Sofia

Crespo, who explores the intersection of nature and technology; Jake Elwes, whose work often addresses issues of bias in AI; Lauren Lee McCarthy, who investigates social relationships and surveillance; Anna Ridler, known for her data-driven artworks; and Helena Sarin, who combines traditional art techniques with machine learning.

The authors of the document identified five new activities associated with the use of AI models in artistic practice:

- Technical research: Understanding available machine learning models, how they work, and leveraging them for artistic purposes. This can involve intensive research into technical machine learning literature to grasp model behaviours and understand their potential application in art.

- Using and building machine learning models: Writing specific algorithms from scratch or modifying existing ones to achieve desired outcomes. Models can range from off-the-shelf to completely custom.

- Using and building datasets for model training: Models must be trained on existing, curated, or custom data. Custom datasets are labour-intensive to build and can give the artist's desired outcome more precisely. Curated datasets involve selecting available data that conform to a specific style of theme the artist wants to leverage.

- Combining models: Explore opportunities to combine different models to allow more control over outputs, generate image content or modify images and style with some controlled filtering by the artist.

- Selecting outputs: Whatever the machine creates, the artist still has the activity of curating the outputs.

The authors continue the report by exploring artists' challenges, including skills gaps, resource limitations, and inclusion barriers, and discussing the future of AI art and the need for hybrid expertise.

The artists interviewed emphasised that valued creativity in art-making involves intentional decision-making and contextual understanding, aspects that current AI systems were perceived by them to struggle to replicate autonomously. While AI can generate unexpected visual variations, the artists noted that these systems lack the ability to make informed, purposeful artistic choices without human guidance.

Looking back, artists found parallels between AI art and past periods, like 1960s/70s code-based art and experimental harnessing of randomness. Some saw AI as a "step change," but most felt the artist-medium relationship was fundamentally unchanged, as artists addressed human rather than technical questions.

Challenges highlighted include barriers around skills, resources, language, and inclusion. However, the report argues that the future of AI art likely belongs to those with both technical and artistic capabilities, as human/AI complementarity continues through artists refracting capabilities into their work.

Overall, while introducing some shifts, according to the report, AI techniques integrate into the creative toolkit available to artists rather than revolutionising practice. The relationship remains based on collaboration rather than automation.

Summary

The report "The State of AI Art: Emerging Artistic Practices in AI Art," published in 2022 by Ploin in collaboration with the University of Oxford, provides a valuable snapshot of the AI art landscape. This study, led by AI art curator Luba Elliott and Anne Ploin from the Oxford Internet Institute, offers insights based on interviews with practising AI artists and AI art curators. While comprehensive at the time of its publication, the rapid pace of AI advancement necessitates a framework that can adapt to constant evolution. The report's focus on AI techniques, while relevant in 2022, has already been somewhat outpaced by newer techniques and models that have emerged since

its publication, pushing the boundaries of AI art even further. Crucially, its primary contribution is describing the 'how' (the activities) rather than the 'why' (the communicated motivations). One of the most significant findings of the report is that artists felt machine learning models could produce surprising visual variations but lacked the intentionality and context needed to create artwork. This observation directly aligns with the core question of this thesis: the role of artistic motivation in AI art. The report's emphasis on the value of making choices in the creative process underscores the critical role of the artist in providing intentionality and context to AI-generated outputs, making their role in AI art creation significant and indispensable.

The report highlights the need for a framework that can remain relevant and insightful despite the continuous emergence of new AI technologies. This framework should be able to capture the fundamental principles of AI art while accommodating the fluidity and dynamism inherent in this ever-evolving field.

3.2.3 Galanter's Framework

The following content presents Galanter's framework for evaluating AI art, highlighting key challenges and questions when considering AI-generated works and a detailed discussion of the nine problems (authorship, intent, uniqueness, authenticity, dynamics, postmodernity, locality, creativity, and meaning) and their associated questions.

Galanter [7] introduces a series of problems that translate as relevant questions regarding AI art practice and reception. These problems foster multiple possibilities when considered by artists, critics, historians and audiences. Importantly, according to the author, they apply meaningfully to all AI art forms but are trivial or less significant when applied to non-AI art.

The first is the problem of authorship, which asks how traditional views of authorship shift in AI art regarding credit, expression, and provenance. Specific questions include determining who the artist is - the programmer or the

computer. The paper cites the example of poststructuralist perspectives on the author's death to show how digital AI art resonates with notions of decentralised production. The second is the problem of artist motivation (phrased by Galanter as 'intent'), examining why artists choose to work with and give control to autonomous AI systems. The motivation may be injecting surprise, exploring the creative system, or pragmatically increasing efficiency.

The third problem is uniqueness, addressing whether the mass production of unique generative artworks diminishes their value. It introduces the paradox of mass-produced unique objects where endless original outputs are possible. The paper gives examples of artists leveraging this paradox around uniqueness and reproducibility as part of their work. The fourth problem is authenticity, questioning whether AI art is art. The paper relates this to multiple theories defining art, from art as a representation to art as an institution, including emotional expression.

Additional problems covered are whether AI art requires changing over time when exhibited (dynamics); whether it manifests postmodern concepts like simulacra (postmodernity), where the essence of it resides when outputs and code vary (locality, code and malleability); whether AI systems can be considered creative and if so, how (creativity); and the scope for communicated meaning or purpose beyond exhibiting the AI system itself (meaning).

Summary

Galanter's framework offers a set of pertinent questions and critical issues that distinguish AI art practice from traditional art forms. The Problems and Related Questions can be summarised in the following list:

- The problem of authorship - Who is the artist - the programmer or the computer?
- The problem of communicated intent - Why is the artist working with and giving control to AI systems?

- The problem of uniqueness - Does the mass producibility of unique AI artworks diminish their value?
- The authenticity problem - Given its unemotional, unthinking nature, is AI art art?
- The problem of dynamics - Must AI art change over time while exhibited to count as generative?
- The locality problem - Is the art in the code, the system, the specific output, or something more abstract?
- The problem of creativity - Can AI systems be considered creative?
- The problem of meaning - Can and should AI art be about more than exhibiting the AI system itself?

This approach provides a valuable tool for artists, critics, and audiences to engage more deeply with AI artworks. The framework's emphasis on observed intent highlights an opportunity this thesis takes up to explore how artistic motivation translates into AI-driven creative processes. Finally, Galanter's focus on creativity and purpose ('meaning') points to the challenge of analysing audience reception and interpretation in relation to artists' framing and goals, rather than assuming inherent meaning construction by the AI itself.

3.2.4 Browne's Framework

Browne [78] proposes a framework that categorises AI artists into three primary types based on their level of technical engagement with AI:

- **Bricoleurs:** These artists engage with AI by utilising outputs from pre-trained generative machine learning models without modifying the underlying code. They focus on curating and manipulating AI-generated outputs to create their artwork.

- **Engineers:** This group demonstrates a deeper technical engagement with AI. They opt to code their own algorithms or modify existing systems to produce AI-driven artworks, showing a more hands-on approach to the technology.

- **Contemporary artists:** Browne defines these as artists who integrate AI as a tool within their existing artistic practices. This approach suggests a more fluid and multifaceted engagement with AI, where the technology becomes one of many tools in the artist's repertoire.

This framework provides a useful lens for understanding the varying degrees of technical involvement in AI art creation, highlighting how different approaches to AI can shape artistic practices and outcomes.

Summary

Browne's framework offers a valuable perspective on artists' technical engagement with AI. It categorises them based on their level of involvement with the technology. This classification helps to understand the diverse approaches artists take when incorporating AI into their work, from those who use pre-existing models to those who develop custom algorithms. While Browne's framework is insightful in understanding the technical processes artists employ in AI art creation, it falls short in addressing the 'why' behind their actions. It's crucial to consider the underlying motivations that drive artists to engage with AI, as this can provide a deeper understanding of their work and the impact of AI on the art world from a practice perspective. While useful, categorising artists based on their technical engagement may only partially capture the nuanced and often fluid nature of artistic practice. Artists may move between these categories or combine approaches depending on their project motivations or conceptual goals.

3.2.5 Mendelowitz's Framework

Mendelowitz [48] proposes a taxonomy for categorising AI art to provide guidelines for understanding this emerging art form based on interactive properties. The taxonomy encompasses five categories:

- **Generative AI:** Artworks that use AI to create new content autonomously.
- **Reactive AI:** Installations that respond to environmental inputs or audience interactions.
- **Interactive AI:** Works that engage in more complex, two-way interactions with viewers.
- **Learning AI:** Pieces that adapt and evolve based on cumulative interactions.
- **Static AI:** AI-generated works that remain fixed once created.

Each artwork is classified based on the artist's control over data flow and output within the public installation. This approach underscores the importance of considering the audience's role and the specific context of the exhibition when analysing AI art. It offers a framework that is particularly relevant to public and interactive AI art installations, where the audience's interaction and the unique context of the exhibition play a significant role in the interpretation and experience of the artwork.

Summary

Mendelowitz's taxonomy provides a structured approach to categorising AI art based on the nature of AI's involvement and the level of interactivity in the artwork. This classification system offers valuable insights into how AI can be integrated into artistic practices, particularly in public and interactive installations relevant to HCI. However, like other frameworks examined earlier, this taxonomy primarily focuses on the technical aspects and functional characteristics of AI artworks rather than the underlying motivations of the artists.

While it provides a useful tool for describing and categorising AI art, it does not explicitly address why artists work with AI or what conceptual goals they aim to achieve through these different approaches. This gap in motivational analysis presents an opportunity for further research, such as that undertaken in this thesis, to explore the relationships between these technical categories and artists' motivations.

3.2.6 Forbes's Framework

Forbes et al. [6] identify four distinct groups of AI artists based on their motivations and approaches:

- **Generative AI Artists:** This group utilises AI primarily for its generative capabilities, employing algorithms to generate artwork automatically. They focus on exploring AI's creative potential as an autonomous or semi-autonomous creator.

- **Interactive AI Artists:** These artists leverage AI to facilitate novel mappings between user inputs and artistic outputs. They highlight the interactive potential of AI technologies, often creating works that respond dynamically to audience engagement.

- **Boundary-Pushing AI Artists:** This group focuses on pushing the boundaries of generative art experiences, exploring AI-driven art's aesthetic and conceptual possibilities. They often experiment with cutting-edge AI technologies to create innovative artistic experiences.

- **Critical AI Artists:** The fourth group engages with AI to critically examine its role in society. They use art as a platform for reflection and critique, often addressing AI technologies' ethical, social, and political implications.

Summary

Forbes et al.'s classification represents a step towards understanding the motivations behind AI art creation, moving beyond purely technical categorisations. By identifying four distinct groups of AI artists, this framework addresses the 'why' alongside the 'how' of AI art practices. However, while this Classification touches on motivations, it focuses primarily on approaches and outcomes. The categories are defined by the artists' observed intentions and how they utilise AI in their work.

3.3 AI Art Perception and the Audience

This section moves towards understanding the reception of AI art, reviewing studies that explore how audiences perceive AI-generated artworks and how various factors influence their interpretation and engagement.

3.3.1 The Relationship Between Artist Actions, Audience Reception, and the Role of AI

Advancements in AI technology, particularly in generative AI, have impacted the dynamics between artist actions, audience reception, and the overall creative process. This impact manifests in various ways, including how artists conceive and execute their ideas, how audiences engage with AI-generated art, and the evolving understanding of art in this context.

A crucial aspect of this dynamic is audience acceptance, which plays a pivotal role in defining whether AI-generated output is considered or valued. Lyu et al. [79] emphasise that audience reception is a defining step in the artistic process, highlighting the connection of artist approaches, AI technology, and audience perception in shaping the interpretation and perceived value of AI-generated art. Lyu et al. [79] conducted a mixed-methods study to explore the differences in interaction with text-to-image AI systems between artists and non-artists

and audience perception of the resulting artworks. Ten artists and ten non-artists were invited to co-create artworks using Midjourney, a text-to-image AI system. The researchers recorded the participants' actions and reflections during this process. The study collected two sets of AI-generated images (one set from artists and one from non-artists) and included a painting created by a human artist as a reference sample. These were then used in a visual question-answering task. The study involved 42 subjects with artistic backgrounds for the audience reception component. Their findings reveal that while artists and non-artists showed differences in their creation actions and attitudes toward AI, the technology seemed to blur distinctions in how audiences perceived the final artworks, regardless of the creator's artistic experience. Their study reveals that while artists may utilise AI to realise their creative visions, the audience's acceptance ultimately determines whether the output achieves the status of art in their view. This finding underscores the importance of HCI and art practice of considering audience perspectives and engaging in dialogue with audiences when creating and presenting AI art.

Another important factor influencing audience reception is attribution knowledge, which is the information about the artwork's creator. Gangadharbatla [80] investigated the impact of attribution knowledge on the evaluation of artwork, specifically examining how knowing whether a human or AI created an artwork influences individuals' perceptions. The study found that people often need explicit information to accurately identify AI-generated artwork, tending to associate representational art with human creators and abstract art with machines. Furthermore, attribution knowledge was found to interact with the type of artwork, influencing purchase intentions and evaluations. This suggests that disclosing the role of AI in the creative process can significantly impact how audiences perceive and value the artwork.

3.3.2 Can AI Make Art? Audience Perspective

The following content explores Audry and Ippolito's theoretical perspective on AI art [71], which proposes a model for understanding audience interpretation in the context of AI-generated artworks. It further emphasises the importance of audience interpretation and the construction of artist functions by the audience, where the audience may attribute an artist's function to the artwork even in a situation where the artistic ownership is ambiguous. This theoretical framework emphasises the importance of audience interpretation and the construction of artist functions by the audience, suggesting that viewers attribute an artist's function to the artwork even when artistic ownership is ambiguous. This theoretical perspective on audience interpretation provides a foundation for understanding the complex relationship between AI art, artists, and viewers from an HCI viewpoint. It sets the stage for exploring more concrete strategies that artists employ to guide audience interpretation, which will be discussed in section 3.4 Framing for the Audience in AI Art.

The authors examine the contrasting views of AI art pioneers Harold Cohen and Leonel Moura on whether machines can create art or exhibit creativity. Cohen, the creator of the art-making robot AARON, attributes creativity to the unique, collaborative dialogue between the programmer and the program, dismissing the idea of modelling human creativity through algorithms due to computers' lack of continuity, lived experience, and the ability to break the rules or reflect on imposed constraints independently. In contrast, Moura adopts a more Duchampian perspective, referring to the conceptual approach pioneered by Marcel Duchamp in the early 20th century. To elaborate, Duchamp's approach, named by his "readymades", such as the famous urinal titled "Fountain," challenged traditional notions of art by asserting that the act of selecting and presenting an object as art was itself an artistic gesture. In the context of AI art, Moura's Duchampian approach suggests that the significance of robotic art lies not in whether the machine itself possesses creativity but in how the

art world and audiences receive and interpret its outputs.

Fundamentally, the paper argues that the crucial question for understanding reception is not whether machines can be artists but what role is left for the functions that viewers construct to interpret and make sense of AI art. According to this view, the artist is a conjecture that viewers attach to a work to help interpret it based on the perceived personality, biography, and other characteristics of the inferred creator. The authors propose a theoretical model in which viewers will likely reconstruct human meta-artists behind the programming, even when engaging with machine-generated art. This hypothesis is based on philosophical concepts of authorship and analogies to other fields rather than direct audience research. Different viewer analogies applied to the machine would result in different meta-artist interpretations to make sense of the work. Some other pioneering projects, like Tom Ray's artificial life ecosystem Tierra [81], actively try to minimise artist influence to make stronger arguments for machine creativity. However, the viewer's tendency to interpret and add human value to the artwork proved difficult to eliminate. While no direct evidence is presented, the authors suggest that viewers might perceive Ray in different ways based on his approach to Tierra, potentially revealing a tendency to infer human-like intentions or characteristics even in highly abstract computational systems. For instance, when Ray explains that he feels no guilt erasing his computational living being from Tierra since he can recreate them precisely by resetting initial conditions, viewers may perceive him either as a heartless psychopath unconcerned with the destruction of his synthetic lifeforms or as a rational scientist prioritising experimentation. This raises the question of whether viewers do indeed anthropomorphise such abstract systems and, if so, how this affects their interpretation of AI-generated art.

The paper concludes that the pertinent question from an audience perspective is not "Can machines be artists?" but rather, what role is left for artist functions constructed by viewers trying to interpret machine art, whether created by humans or machines. It effectively reframes AI art debates toward the au-

dience's likely imaginative tendency to infer creative agencies and motivations based on outputs, branching in multiple directions but ultimately grounded in human interpretation despite the supposed autonomy of machines.

3.4 Framing for the Audience in AI Art

The process of categorising and evaluating AI art, as discussed in previous sections, presents complex challenges that extend beyond purely technical considerations. Central to this challenge is the question of framing, which is how AI artworks are presented, explained, and contextualised for audiences. Framing acts as a critical bridge between the artist's stated goals and the audience's understanding, significantly shaping how an AI artwork is perceived, interpreted, and ultimately valued. Understanding framing is therefore key from an HCI perspective, as it directly impacts user/audience experience and interpretation. This section delves into the emerging discourse on framing in AI art, drawing upon research from multiple disciplinary traditions. It examines how different fields contribute to our understanding of framing and how these perspectives converge in the context of AI art. Specifically, we will explore the following:

- Framing in Computational Creativity: Colton's [82] work within computational creativity provides a foundation for understanding framing in AI art by emphasising the importance of providing context about the artist's communicated motivations and processes.

- Framing as Audience Engagement: Cook et al.'s [11] expanded taxonomy examines framing as a deliberate strategy for shaping audience perception, going beyond mere description to actively engage the public with the artwork.

- Explainable AI Art: Llano et al.'s [1] principles for explainable AI art emphasise transparency and two-way communication between artists and

audiences, enabling a deeper understanding of the creative process and fostering collaboration.

- Framing for Understanding Generative Processes: Dorin's [10] framework for understanding generative art offers a structured approach to explicating the often opaque processes of AI art creation, providing a valuable tool for both artists and audiences to engage with these works.

- Framing and Ambiguity: Sivertsen et al.'s [9] research introduces a process-centred framework that highlights the role of ambiguity in framing AI art. They argue that intentional opacity or ambiguity can be a powerful artistic tool, prompting deeper engagement and challenging traditional notions of transparency.

By integrating these perspectives, this section aims to build an understanding of framing in AI art, addressing the crucial gap identified in earlier discussions: the need to consider not just the technical or motivational aspects of AI art creation but also how these works are presented and received by audiences. It acknowledges the interdisciplinary nature of this inquiry, drawing upon insights from computational creativity, human-computer interaction, art theory, and media studies.

3.4.1 Colton's concept of framing

The following content introduces Colton's concept of framing in computational creativity [82], emphasising the need to provide information about the artist's motivations, expressed intentions, and processes to enhance audience understanding.

Colton [82] understands how the description accompanying a work of art must also be an essential aspect of AI art. The information that usually accompanies a work of art concerns the artist's feelings towards the work, what the artist thinks it expresses, how the artist adapts to other works within the community, and the artist's state of mind before, during and after creation.

Colton calls attention to a general framework for this information, such as the observed motivation and intention or processes involved in creating a work. Adding to Colton's statement, motivation answers the question of why, intention answers what, and the process answers how. In this sense, it becomes possible to imagine the same questions in the specific context of artists who have used machine learning algorithms in their work and how the answers to the questions can help to better understand the various applications of AI in the artistic field.

The information includes the artist's life; themes of interest include political, intellectual, personal, cultural and religious influences; reasons for working in a particular area; essential events in the artist's life; how an artist feels about her or his work, what do they think it expresses or how it relates to everyday concepts; such as how the work is created, how the processes involved in its creation fit together or whether a new technique or material has changed the way something was done.; the influence of external characteristics such as politics, or how new techniques have influenced the work. Framing information can significantly impact the audience's evaluation and understanding of an artefact. Take, for instance, Michael Craig-Martin's An Oak Tree (1973). Presenting a glass of water alongside a text declaring it to be an oak tree dramatically alters the viewer's perception. Without the framing text, the object is just a glass of water. However, the accompanying narrative compels the audience to engage in a conceptual dialogue about essence, perception, and the nature of art itself. In this case, the framing is not merely supplementary; it becomes an integral part of the overall creative presentation and, arguably, the artwork itself. This concept extends beyond visual art. Colton's work with the automated poetry generator showcases how AI can create framing information alongside the artefact. This system generates poems and produces accompanying text that describes its creative process, highlighting aspects it finds appealing or challenging. This meta-level creativity adds another layer of engagement for the audience, providing insight into the AI's aesthetic judgment

and process. Moreover, Colton emphasises the potential for "dually creative" approaches, where AI-generated framing could be a product of a separate yet interconnected creative act. Imagine an AI system that generates paintings and writes accompanying artist statements or fictional biographies, introducing narratives around its work. Such a system could even engage in interactive dialogues with the audience, answering questions about its creative process or responding to critiques, further blurring the lines between artist and machine.

3.4.2 Framing AI art. Cook et al.'s framework

The following paragraphs present Cook et al.'s expanded definition of framing and propose a taxonomy for classifying framing purposes and forms. In their exploration of framing in AI art, Cook et al. [11] examine how artists can use framing to shape audience understanding and engagement. Recognising that framing can be a powerful tool for bridging the gap between artist communication and audience perception, they offer a new taxonomy of framing purposes and forms.

First, they propose a new definition of framing in AI art, which is the description of creative work obtained in collaboration with software to alter the public's perception, shifting the emphasis of the description to the public engagement with the work.

To define the concept of framing, the authors consider the entire creative process. In listing the aspects to be kept in mind when describing the work for the public, they suggest that framing can be part of planning the work of art, or at least that the framing can share many aspects useful for planning. Their approach goes through framing from the planning stage to the final output:

- They consider the motivation of the work to determine the effect it wants to have on the audience.

- They consider the sources of information available to achieve the effect.

- They introduce the concept that different AI techniques can give different opportunities to describe the final artwork.
- They suggest that framing does not need to provide comprehensive information but also enhance the experience with secondary information that adds value.

The authors propose a taxonomy relating to the purposes and usefulness of framing. Framing can:

- Reassure the sceptical public that the system uses an AI algorithm, whether the choice of the system was intentional or the result of a random selection.
- Prevent criticism of the work by demonstrating that the system is aware of its shortcomings and can identify areas to optimise.
- Provide the context, artistic influences, and inspiration drawn from the real-world.
- Describe the processes the autonomous system uses to produce the work, including the sources of information and the techniques used.
- Clarify with which evaluation function the system evaluates its decisions to provide information to help an observer evaluate the work and engage more deeply.
- Provide incomplete descriptions to inject ambiguity or uncertainty into the audience's interpretation of the work or increase the effort required to understand it.
- Show work that was not part of the final artefact to inform about the challenges encountered during the process.
- Describe parameters or conditions provided to the system before or during the creation of the work.

- State the objectives set or the motivations behind the work. These can be personal goals, like a stylistic goal. They can also be events that have triggered a creative activity to respond to external stimuli.

Finally, the authors highlight how framing can take different forms: it can be a written text, a visual image, or integrated into the system itself in the form of a dialogue with the public and, in this way, becoming capable of changing over time.

3.4.3 Explainable AI art. Llano et al.'s framework

This subsection introduces the concept of explainable AI art, drawing on Llano et al.'s design principles for facilitating collaboration between artists and AI systems [1].

The research on the potential of introducing the concept of framing in works of art produced with AI finds confirmation in a research field that wants to propose explainable AI. In particular, the authors of the paper Explainable Computational Creativity [1] propose a series of design principles for AI art systems that aim to support greater effective collaboration between artists and AI.

For example, the authors explain how the framing described by Cook et al. [11] is primarily intended as a final interaction; that is, it accompanies an output with the expectation that its perceptual value will increase. However, the authors maintain that the need to communicate the functioning of the software is also suitable for other interactions that occur during the production of a creative process, such as setting an initial goal, delivering the product to an audience or getting initial feedback.

Furthermore, the authors believe that the explanations of the choices made by the system can facilitate human-machine collaboration from the planning stage. In practice, the authors support the idea of enabling two-way communication between artist and AI that would provide information, such as failed

attempts, successful artefacts, strategies used, temporal information, user reactions, arguments to support machine decisions, steps, evaluations, metrics, influences that constitute the processes and decisions within the functioning of a domain.

The authors designed a framework to obtain a model of explainable AI in the artistic field, as highlighted in the interactions illustrated in Figure 3.1 (reproduced from [1]). This framework emphasises the cyclical and collaborative nature of the creative process in explainable AI, where the "XCC System" represents a computational creativity system designed with explainability features. The smiley face signifies the human collaborator (artist, designer, etc.) who engages with the system throughout the creative journey. The diagram illustrates a generalised process, highlighting how past experiences, shared mental models, and ongoing argumentation shape the creative output and its accompanying explanations. Importantly, the system's internal workings are made visible through "Exposing the Process," enabling transparency and fostering a deeper understanding for the human collaborator.

Relevant past experiences shape the creative process, and the arguments shape the shared mental model exchanged with the user and relevant past experiences. Long-term memory is updated with new experiences of the creative process, and the system's functioning is exposed through different interfaces that allow the user to understand the procedures underlying the system's functioning.

3.4.4 Dorin's framework

The following paragraphs discuss Dorin's framework for understanding AI art from the perspective of generative AI (defined in 2.2.5).

While primarily focused on generative art, Dorin's framework offers insights into how artists can frame AI art for audience understanding. By breaking down the creative process into distinct components, this framework provides

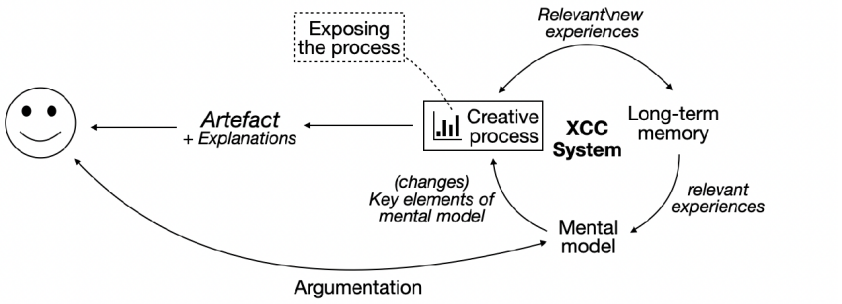

Figure 3.1: *XCC design principles: the creative process is shaped by relevant past experiences, and the shared mental model, which is shaped by the arguments exchanged with the user and relevant past experiences. The long-term memory is updated with new experiences of the creative process, and the system's operation is exposed through different interfaces that allow the user to understand the underlying procedures of the system. (Reproduced from [1])*

a structured approach to explicating the often opaque processes of AI art creation. In the context of framing, Dorin's work can be seen as a tool for artists to articulate their process and for audiences to engage more deeply with AI artworks.

The paper 'A Framework for Understanding Generative Art' [10] illustrates the four components (entities, processes, environmental interaction, and sensory outcomes) and their relevance to analysing generative artworks. The paper argues that a descriptive framework is needed to analyse, compare, and critique generative artworks, which rely, according to the authors, more on autonomous systems and processes than direct artist control.

The authors propose a framework with four main components:

- entities (the basic elements the process acts on)
- processes (the mechanisms of change and interaction)
- environmental interaction (input/output between process and environment)
- and sensory outcomes (how the results of the process are made perceptible to the audience)

The paper analyses examples of diverse generative artworks spanning different media and periods to demonstrate the framework's efficacy. For instance, it applies the framework to analyse Cardew's The Great Learning, Paragraph 7, where the "entities" are the human singers, the "processes" involve the rules governing their vocal interactions, the "environmental interaction" stems from the room's acoustics influencing their pitch choices, and the "sensory outcome" is the resulting self-organising choral work. Another example is Reas' Process 18, where the framework highlights the "entities" as mobile lines, the "processes" as their movement and orientation rules, the absence of "environmental interaction," and the "sensory outcome" as the accretive image formed by those lines. By applying the framework to these diverse works, the paper reveals that it can effectively describe a wide range of works consistently, highlighting underlying commonalities that might not be readily apparent.

For Dorin, applying this framework to AI art, where algorithms play a central role, can help clarify the often opaque processes in creating such works. By making these processes explicit, the framework can facilitate a deeper understanding of the interplay between human observed intentionality and algorithmic autonomy in generative art practices, including AI art.

Dorin's framework offers a structured approach to understanding generative art, including AI art, by breaking the creative process into distinct components. The framework's emphasis on making explicit the often opaque processes in AI art creation aligns with the importance of framing in AI art. By clearly articulating the entities, processes, environmental interactions, and sensory outcomes involved in an AI artwork, artists can provide audiences with a deeper understanding of their work. This transparency can enhance audience engagement and appreciation. The interplay between human observed intentionality and algorithmic autonomy highlighted by Dorin's framework is particularly relevant to exploring how artists integrate AI into their practice. It underscores the complexity of AI art creation and the need to properly understand the artist's role in guiding and shaping the creative process.

3.4.5 Ambiguity in AI Art: A Process-Centered Framework

Building upon the frameworks discussed earlier, Sivertsen et al. [9] introduce a novel perspective on AI art that focuses on the role of ambiguity in the creative process.

Sivertsen et al. expand on Gaver et al.'s three types of ambiguity [83] (information, context, and relationship) by proposing a fourth type: the ambiguity of process. This new category acknowledges that the technical process can be a source of ambiguity and artistic exploration in AI art.

The authors analyse nine AI artworks, examining how artists engage with machine learning at different stages of the creative process:

- Data set creation
- Model training
- Application to a domain

The framework provides insights into how artists intentionally introduce and manipulate ambiguity throughout the AI art creation process. The study also identifies several techniques that artists use to evoke ambiguity:

- Deliberate use of questionable data sources.
- Creation of new, provocative data sources.
- Intentional introduction of visual artefacts.
- Underfitting of generative models.
- Novel output modalities.
- Juxtaposition of visual domains.
- Application of models to unexpected domains.

These techniques demonstrate how artists can leverage the inherent uncertainty in machine learning systems to create ambiguous and thought-provoking artworks.

Sivertsen et al.'s framework suggests that ambiguity can be a valuable quality in AI systems rather than something to be eliminated. It extends Grba's [5] discussion of creative agency and authorship by highlighting how ambiguity can be intentionally introduced throughout the creative process.

It offers a valuable addition to the existing literature on AI art by highlighting the role of ambiguity and focusing on the entire creation process. By viewing AI as 'improvisational rather than dependable' and 'interpretable rather than explainable,' this framework opens up new avenues for exploration in AI art.

Interestingly, this framework presents a contrast to the idea of transparency discussed so far in terms of framing. It suggests that, in some cases, intentional opacity or ambiguity can be a powerful artistic tool. This tension between transparency and ambiguity in AI art adds a layer of complexity to the discussion of framing, suggesting that effective framing might sometimes involve strategically withholding or obscuring information to provoke deeper engagement.

3.5 Artist vs AI Art

This section shifts focus to artists' perspectives on AI art, reviewing empirical studies and interviews that capture their hopes, concerns, and reflections on integrating AI into their creative practices.

Shi et al. [84] conducted an in-depth interview study with 25 artists across various disciplines. This reveals a prisoner's dilemma where artists feel pressured to adopt AI tools to remain competitive despite concerns for perceived loss of artistic control. The study also highlights a significant gap in understanding between artists and AI developers, with artists often viewing AI systems as black boxes rather than seeking deeper technical comprehension. This lack of

understanding can lead to mistrust, apprehension, and resistance to AI technology, underscoring the need for accessible AI education tailored for artists and collaborative efforts to bridge the knowledge gap.

Ali and Breazeal's research [85], based on interviews with artists and analysis of social media discussions, further illuminates the multifaceted perspectives within the artistic community. While some artists embrace AI as a valuable tool for augmenting creativity and exploring new aesthetic frontiers, others express deep anxieties about data misuse, plagiarism, and the potential for AI to undermine artistic agency. A resounding theme is the concern over using artist datasets without proper consent to train commercial AI systems (something we discussed already here 2.4.2, sparking debates regarding copyright, ownership, and the ethical implications of profiting from artists' work without their permission. This concern underscores the need for greater transparency from AI developers and platforms, as well as regulatory frameworks that protect artists' rights and ensure fair compensation for using their data.

Despite these anxieties, there is a growing recognition that AI is an inevitable force in the creative landscape. Artists are beginning to grapple with navigating this technological revolution, balancing the potential benefits of AI with the need to preserve artistic autonomy and integrity. However, some optimistic outlook is tempered by a pragmatic awareness of the potential for AI to disrupt creative industries and transform artistic practices. The challenge for artists is to embrace AI's potential while remaining vigilant about its limitations and potential downsides, advocating for ethical development and use, and ensuring that AI can augment human creativity rather than supplant it.

3.6 Ethical Implications

As AI's role in art creation evolves, scholars have begun to examine the philosophical and ethical implications of this technological integration. This section explores how scholars from diverse fields, including philosophy, art theory, com-

puter science, and cognitive science, have begun to address the complex issues of autonomy, authenticity, authorship, and observed intention in AI art. They approach these questions through various epistemological lenses, drawing upon concepts from aesthetics, ethics, philosophy of mind, and critical theory to examine the implications of AI for artistic practice and the nature of creativity itself.

3.6.1 The Question of Artistic Autonomy

Issak [86] investigates the potential risks AI art poses to artistic autonomy. The research emphasises the importance of preserving what Issak terms the "inner creative spark" within human-AI partnerships. Issak's work suggests that AI could constrain ideation processes and impact artistic flow, drawing on psychological principles related to self-determination and information theory. The study analyses how AI can aid or disrupt autonomous flow in various artistic contexts. Issak proposes rethinking novelty generation by incorporating the creator's desired intent and controls, offering a path to safeguard creative autonomy while engaging with AI technologies.

3.6.2 Reexamining Autonomy and Attribution

McCormack, Gifford, and Hutchings [65] critically examine attribution and autonomy in AI art, prompted by the high-profile sale of the AI-generated portrait "Edmond Belamy." Their analysis distinguishes between physical/systemic autonomy in computational systems and higher-order mental/intentional autonomy associated with human creativity. The researchers argue that current AI art systems exhibit limited autonomy. They primarily aggregate and mimic features from their training data. They note that these systems lack the 'intentional agency and abstract understanding of human creative cognition'. The authors also highlight potential public misperceptions arising from the terminology of AI, which may imply capacities like symbolic reasoning and

intentional goals that current systems do not possess. They emphasise the responsibility of artists and researchers to accurately represent the capabilities and processes of AI systems in art creation.

3.6.3 Implications for Artists and Artistic Practice

The research by McCormack et al. [65] also considers the potential risks for artists engaging with autonomous creative systems. They raise concerns about artists potentially unlearning fundamental creative capacities by excessively relying on AI. The study suggests that overemphasis on technical achievement in AI art could lead to a confusion of means and ends, potentially resulting in artworks that demonstrate technical ability but lack 'meaningful' aesthetic or symbolic value. These scholarly perspectives on autonomy, authenticity, authorship, and intention in AI art highlight this field's complex philosophical and practical challenges. They underscore the need for continued critical examination of AI's role in artistic creation and its implications for artists and audiences.

3.7 Summary and Research Directions

The literature review presented in chapters 2 and 3 has revealed two significant gaps in the current understanding of AI art from an HCI and practice-led perspective. Firstly, while existing research often focuses on AI art's technical aspects or outcomes, there is a lack of insight into the observable or stated motivations driving artists to engage with AI technologies. Secondly, there is a scarcity of first-hand, practice-led research in AI art creation, limiting the understanding of the practical challenges and decision-making processes involved in developing AI artworks. These gaps underscore the need for an approach focused on motivation and practice in studying AI art within HCI and related fields. The literature review has highlighted several crucial themes that shape the landscape of AI art and inform this research. AI integration seems

to alter the understanding of artistic creation, challenging traditional notions of authorship, originality, and communicated intent in practice. This shift is prompting scholars from diverse fields to grapple with fundamental questions about agency, intentionality, and the analysis of AI art. The review has also emphasised the importance of clear artistic motivation and effective framing strategies in creating impactful AI art that resonates with audiences and contributes to broader societal discourse. Furthermore, it has underscored the ethical imperatives surrounding AI art practice, particularly concerning data usage, privacy, bias, and the potential displacement of human labour. Lastly, the review has illuminated the evolving relationship between artists and AI, highlighting how the role of the artist is transforming from that of a sole creator to a collaborator or facilitator of AI systems. These key takeaways have directly informed the methodology of this thesis, which will be described in detail in the next chapter 4. The research approach has been carefully designed to address the identified gaps (the lack of focus on motivation and practice-led insights within HCI/Art Technology studies of AI art) and build upon the insights gained from the literature review. It employs a multifaceted strategy grounded in HCI and practice-led research that includes the development of a novel framework for analysing AI artworks based on artists' motivations, a practice-led case study documenting the creation of an AI-driven art installation, and the formulation of guidelines for analysing AI art. The methodology chapter that follows will provide a detailed account of how these research directions will be pursued, setting the stage for the original contributions of this thesis.

Chapter 4

Methodology

4.1 Introduction

This chapter outlines the methodology employed in this thesis. The research primarily draws from Human-Computer Interaction (HCI) and practice-led research traditions, integrating these with elements of theoretical analysis and qualitative inquiry to provide an understanding of AI art practice. This chapter provides a detailed account of the methodological approaches employed, situating them within the broader context of research in art and technology and specifically within human-computer interaction (HCI). In the following chapters 5, 6 and 7, aspects of the general methodology illustrated here will be expanded, adding more details specific to each area of investigation. The methodology of this thesis is grounded in the rich history of studying interactive and technologically enhanced art practices within HCI and art and technology research. It builds upon existing approaches while addressing the unique challenges posed by AI art from this primary perspective.

4.2 Research Questions

This thesis addresses a set of core research questions that guide the overall investigation into AI art practice from an HCI and practice-led perspective.

These questions, initially introduced in the thesis introduction, are reiterated here to demonstrate how they inform the methodological choices and research design. The main research questions guiding this thesis are:

- What motivates artists to engage with AI in their creative practice, and how does this motivation shape the resulting artworks?
- How can AI artworks be examined based on artists' communicated motivations and approaches, and what new framework can be developed to better understand the diverse landscape of AI art practice?
- What insights can be gained from practical engagement in AI art, and how do these experiences inform the understanding of the field?
- What are the key challenges and tensions artists face when creating AI art, particularly in balancing artistic vision, technological constraints, and ethical considerations?
- How do artists navigate the complexities of framing and communicating AI artworks to audiences, and what elements are crucial in communicating intended artistic concepts in these works?

These central questions are crucial for advancing the understanding of AI art practice as a dynamic and evolving field. They address key aspects of artistic observable motivation, historical context as background, categorisation, practical implementation, and audience engagement strategies. To answer these questions, the research employs a multifaceted approach primarily drawing from HCI and practice-led methods:

1. A literature review, structured in two parts, provides the necessary background context and critical grounding for this research. The first part traces the historical development of AI art and defines key concepts, while the second part critically examines existing frameworks and perspectives on AI art creation and reception.

2. The development of the Five Tropes of AI Art framework offers a new lens for analysing AI artworks based on observed practice and motivations.

3. A practice-led case study, the Cat Royale project, provides hands-on insights into AI art creation.

4. Interviews with artists and analysis of audience feedback offer diverse perspectives on AI art practices and reception.

5. Critical analysis synthesises these various strands of research, culminating in a set of guidelines for AI art analysis. These guidelines, which include the Five Tropes framework as a key component, offer additional analytical lenses for researchers within HCI, art & technology, and related fields and curators working with contemporary and technologically-engaged art to navigate the complex landscape of AI art creation and presentation. This synthesis bridges the gap between theoretical understanding and practical implementation, providing an approach useful for HCI researchers and curators examining AI artworks.

These questions are central to the thesis methodology for several reasons:

- The research questions directly inform the choice of methods, particularly the use of practice-based research, semi-structured interviews, and critical analysis within an HCI framework. For instance, the question about artists' motivations aligns with the use of qualitative inquiry methods.

- These questions reflect the interdisciplinary nature of the research, requiring drawing insights relevant to art historians, HCI methodologies, and audience studies.

- Questions about framing and audience impact are particularly suited to the practice-led research approach, as exemplified by the Cat Royale project. They allow the exploration of these issues through direct artistic practice and observation.

- The questions point to integrating theoretical inquiry and practice-based research, a key aspect of the methodology. For example, the question about communicating concepts in AI artworks requires both theoretical analysis and practical exploration.

Each of these main research questions will be explored through the various methodological approaches outlined in this chapter, including theoretical analysis, practice-based research, and qualitative inquiry. The specific methods used to address each question, along with more detailed sub-questions, will be elaborated in the relevant chapters 5, 6 and 7 of the thesis.

4.3 Methodological Foundations

Early research in digital and interactive art often emphasised technical novelty [87], [88]. However, as the field has evolved, researchers have increasingly recognised the need for more holistic methodologies considering technological components, creative aspects, audience experience, and broader cultural contexts. This thesis is primarily grounded in Human-Computer Interaction (HCI) and practice-led research traditions, drawing inspiration from several key methodological approaches interpreted through this core lens:

- **Practice-based research**: Following Candy and Edmonds' [89] pioneering work, which emphasised the importance of the artist-researcher dual role, and Haseman's [90] concept of "performative research," this thesis integrates artistic practice as a central component of the research process. The creation and exhibition of AI art installations, such as the Cat Royale project, discussed in chapter 6, serve as both a means of inquiry and a subject of study. This approach combines creative practice with systematic inquiry, allowing for a deep exploration of the AI art creation process from the inside.

- **HCI methodologies**: Benford et al.'s [91] approach emphasises study-

ing artistic works in real-world contexts, recognising that the complexities of audience interaction and environmental factors are crucial to understanding technologically-enhanced art and generating HCI knowledge. This methodology has been particularly influential in shaping the thesis' exploration of how AI artworks are experienced and interpreted by audiences and how artists have embraced the challenges of AI art in its development, which is discussed in the chapters 6 and 7. Additionally, the research leverages HCI approaches to study the experience and interaction, adapting these methodologies to the context of AI art. This is informed by Gaver and Bowers' [92] research-through-design methodology, which provides a framework for understanding how design practices can generate new knowledge. Building on these approaches, this thesis introduces a specific methodological approach in the form of a set of guidelines for AI art analysis. These guidelines, presented in the discussion chapter, are derived through a systematic process of critical analysis, synthesis, and validation of findings from the HCI/practice-led study. This process combines critical analysis of the Five Tropes of AI Art framework and its application to the Cat Royale project, synthesis of insights from practice-led research with theoretical understanding, integration of additional data from artist interviews and audience feedback analysis, and comparative analysis with other AI art projects.

- **Qualitative inquiry**: This research employs qualitative methods to explore AI artists' and audiences' observed motivations, experiences, and perspectives. This includes semi-structured interviews, following the principles of the frameworks proposed by Kallio et al. [93] and DiCicco-Bloom and Crabtree [94]. Critical analysis of these interviews serves two key purposes: firstly, to identify patterns in artists' approaches and stated motivations, and secondly, to validate and refine the insights gained from the Cat Royale project. This method provides a means of

triangulating the findings, confirming the tensions observed during the project's development and assessing the accuracy and applicability of the Five Tropes of AI Art framework. The synthesis of these qualitative insights forms an essential part of the discussion in Chapter 7, where they are also used to validate the theoretical frameworks developed earlier in the thesis.

- **Critical analysis**: Drawing on analytical perspectives concerned with technology's role in culture, this thesis incorporates critical analysis of AI artworks, considering their aesthetic, conceptual, and interactional dimensions as they relate to audience experience and artistic practice. This builds on analytical frameworks developed by Grba [5] and Forbes et al. [6], allowing for a deeper understanding of how AI art fits into the evolving landscape of technologically mediated art. This foundational methodology informed the chapter 5 on the Five Tropes of AI art Framework.

Building on these foundations, this research incorporates several strategies tailored to the unique challenges of AI art:

- **Integration of AI-specific analytical frameworks**: This research develops a framework (the Five Tropes of AI Art) that specifically addresses the unique characteristics of AI-driven creative processes from a practice perspective. This framework extends existing taxonomies such as those proposed by Grba [5] and Forbes et al. [6]. It provides a new lens for understanding and categorising AI art practices, focusing on the 'why' of AI art rather than just the 'how', offering a more nuanced approach to classifying AI artistic endeavours.

- **Dual role of the researcher as AI developer and observer**: Unlike traditional art research, where the researcher is often an external observer, this study leverages the researcher's dual role as both an AI

developer and an observer. This unique position allows for insights into the technical challenges and creative decisions that shape AI artworks, providing an understanding of the AI art creation process.

- **Application of new framework in real-world settings**: The thesis methodology leverages the researcher's dual role and the opportunity presented by the Cat Royale project to validate the classification tropes in a real-world setting. This approach allows for an assessment of the framework's utility and effectiveness by determining which tropes apply to the project and which do not, thereby testing the framework's applicability in practice.

This interdisciplinary approach, centred on HCI and practice-led research, allows for an examination of the AI art landscape, focusing on artists' motivations, framing strategies, and the practical aspects of AI art creation. It reflects the cyclical nature of practice-led research illustrated in Figure 4.1, where practice, theory, and studies inform and enrich each other throughout the research process.

By incorporating these methodological strategies, this thesis aims to provide an understanding of AI art, considering its technical, artistic, societal, and experiential aspects from an HCI and practice-led viewpoint. The approach enables both theoretical analysis and practice-based research, as exemplified in the detailed case study of the Cat Royale project. This multi-faceted methodology allows for a rich exploration of how AI is shaping artistic practices and challenging traditional notions of creativity, authorship, and the role of technology in art within this specific disciplinary context.

4.3.1 Practice-Led Research

Central to this thesis is the practice-led research approach, which aligns with Gaver & Bowers' [92] research-through-design methodology. This approach recognises that creating and exhibiting AI artworks generates unique insights

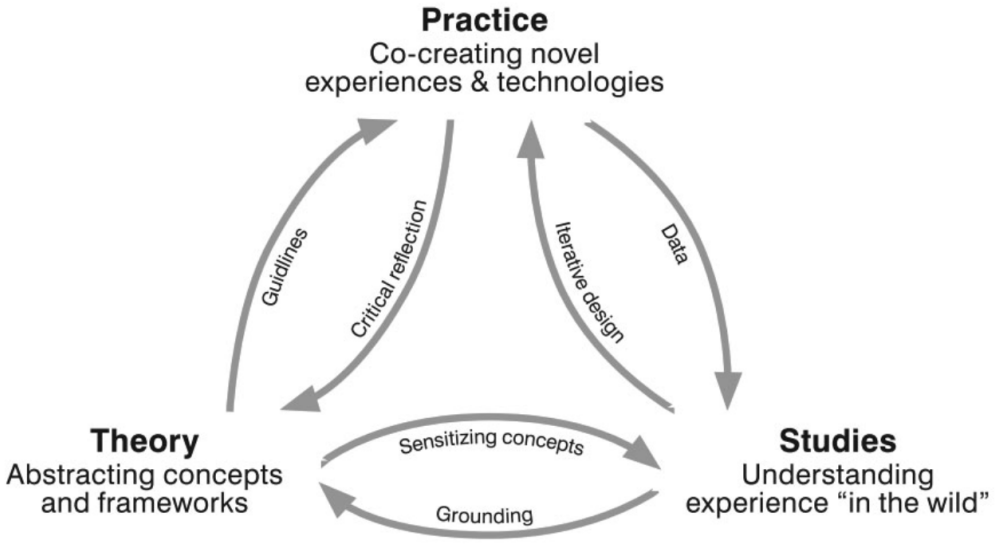

Figure 4.1: *From practice to theory in an artist-led research approach (Benford and Giannachi, 2012)*

that inform theoretical understanding. The practice-led component of this research is exemplified through the execution of the Cat Royale project. This project serves as both a creative output and a subject of study, allowing for insights into the process of creating AI art practice and its reception by audiences.

Figure 4.1 illustrates the cyclical nature of practice-led research, demonstrating how practice, theory, and studies inform and enrich each other in the research process. This model has guided the overall research strategy of this thesis, allowing for continuous refinement and adaptation of both artistic practice and theoretical framework.

This research embodies the principles of Practice-Led Research in the Wild (PLRITW), as conceptualised by Benford et al. [91], but adapts them to the unique context of AI art creation. PLRITW typically emphasises research in public, uncontrolled settings, and while Cat Royale was not a traditional public installation, it pushed the boundaries of controlled environments in several ways. As a researcher and AI developer, I was deeply embedded in the project, working directly with artists in their studios and actively participating in the AI system's development. This hands-on involvement provided access

to the creative and technical processes. Moreover, the project involved real-time interaction with live subjects, the cats, whose unpredictable behaviours constantly challenged and shaped the AI system's responses. Although the final audience engagement was mediated through video presentations rather than direct interaction, the development process itself occurred in a 'wild' setting, balancing artistic vision, technological constraints, and the spontaneous actions of animal participants. This approach captured the complexities of AI art creation in a way that purely theoretical or laboratory-based research could not, offering unique insights into the challenges and opportunities of integrating AI into artistic practice.

4.3.2 Semi-Structured Interviews

As part of the qualitative inquiry component of the interdisciplinary approach, this research employs semi-structured interviews to gather rich, qualitative data about individuals' experiences with AI art. This method aligns with the practice-led research strategy, allowing for in-depth exploration of artists' stated motivations and creative processes. The choice of semi-structured interviews is grounded in qualitative research traditions and offers several advantages in the context of this study:

- **Flexibility**: Semi-structured interviews allow for a balance between consistency across interviews and the ability to explore unique aspects of each participant's experience [93].
- **Depth**: This method enables in-depth exploration of complex topics, allowing participants to express their thoughts and experiences in their own words [94].
- **Context-sensitivity**: The semi-structured format allows the researcher to adapt questions based on the specific context of each artist's work and experiences, which is particularly valuable given the diverse nature of AI art practices.

The semi-structured interview format proved particularly valuable for this research, offering a flexible method that facilitated both the confirmation of existing insights and the discovery of new perspectives. This approach allowed for targeted questioning of individuals involved in various aspects of the Cat Royale project, including artists, media and communication team members, and exhibition staff. The flexibility of the format enabled the exploration of central themes, such as artistic motivations and framing strategies, while allowing participants to discuss their specific roles and experiences freely. Furthermore, this method helped validate the Five Tropes of AI Art framework by asking artists to reflect on how they would classify their work within this taxonomy. It also permitted in-depth discussions with team members who interacted directly with audiences and analysed survey data, providing valuable insights into public reception and engagement. By integrating insights from the practice-led research component, the interviews could probe specific aspects of AI art creation revealed through the Cat Royale project while remaining open to new and unexpected findings. This approach ensured a rich, multifaceted understanding of the AI art creation process, its reception, and its broader implications within the scope of HCI and practice-led research.

4.3.3 Analytical Frameworks

The Development of the Five Tropes of AI Art framework in this thesis builds upon existing approaches to categorising and analysing AI art while introducing new perspectives focused on observed motivation and practice. This framework draws inspiration from:

- Grba's [5] analysis of AI art features employs a qualitative, analytical approach combining elements of art criticism, cultural analysis, and technological assessment.

- Forbes et al.'s [6] categorisation of AI artists provides a taxonomy based on creative approaches and objectives.

However, this research extends beyond these existing frameworks by focusing on artists' observed motivations and integrating this analysis with practice-led research and observations from the case study. The development of the framework involved:

- Contextual analysis of AI art within its historical, cultural, and technological contexts. Explored in chapters 2 and 3.
- Comparative analysis of various AI artworks and practices to identify patterns of motivation and approach. Detailed in chapter 5

This approach allows for understanding AI art practices, considering both the technical aspects and the broader artistic and cultural implications as relevant to HCI and the creation process.

4.4 Research Design

The research design of this thesis integrates multiple methodological approaches to address its core objectives:

- **Development of the Five Tropes of AI Art**: This component involves a review and analysis of AI artworks, artists' observed motivations, and presentation strategies. The specific methodology for developing the framework will be detailed in its respective chapter. This approach, detailed in Chapter 5, employs qualitative content analysis and comparative techniques to identify recurring themes and patterns in artists' identified motivations and approaches to AI art creation
- **The Cat Royale Art Installation**: This practice-led research component involves the development of an AI art installation. The methodology for this aspect employs participant observation, reflective practice, and documentation techniques to capture the complexities of creating an AI artwork.

- **Synthesis and Guideline Development**: The final component of the research involves synthesising insights from the previous components and developing guidelines for AI art analysis and understanding. This integrative approach draws on the findings from theoretical analysis, practical experimentation, and qualitative interviews. It extends the overall methodology by employing thematic analysis and cross-case synthesis to derive a set of guidelines for AI art practice analysis that expand on the Five Tropes of AI framework.

Each component employs specific methodological approaches, which will be detailed in their respective chapters. This structure allows for an exploration of AI art practice from multiple perspectives while maintaining methodological rigour and coherence throughout the thesis.

4.5 Limitations

While the methodologies employed in this research aim to provide a solid understanding of the AI art practice landscape, it is important to acknowledge certain limitations.

- Disciplinary Scope: As outlined in the introduction, this thesis primarily contributes to HCI and practice-led research domains. It does not engage in deep theoretical analysis from disciplines such as Art History or Critical Theory, although it touches upon relevant concepts. Therefore, the findings and frameworks presented should be understood within this specific disciplinary context.

- Sample size: While the study focuses on a select number of prominent AI artworks and artists, allowing for an in-depth analysis of significant works relevant to current practice, this purposive sampling means the findings may not generalise to all forms of AI art. Future research could

benefit from a broader sample to further validate and expand upon these findings.

- Data accessibility: The availability of data about AI artworks, particularly concerning the processes and techniques employed, can be provided with limitations. This limitation may affect the depth and comprehensiveness of the analysis.

- Subjectivity: Practice-led research, while providing valuable insights, is inherently subjective, and the researcher's interpretations and perspectives may influence the research findings.

Despite these limitations, the methodologies employed in this research provide a robust and nuanced understanding of the contemporary AI art practice landscape.

4.6 Summary

This chapter has outlined the methodology employed in this thesis to investigate the stated or observed motivations of AI artists and their strategies for engaging audiences. By integrating practice-led research, qualitative inquiry, and critical discussion within an HCI context, this approach provides a solid foundation for exploring the complex landscape of AI art practice, ensuring the rigour and depth of the research within its defined scope. Building on these methodological foundations, the next chapter introduces the Five Tropes of AI Art, a novel framework developed through this research. This framework, emerging from the systematic analysis of AI artworks and artist practices, offers a new lens for analysing the diverse ways artists engage with AI technologies in practice.

Chapter 5

The Five Tropes of AI Art

5.1 Introduction

The preceding chapters have established AI art's historical context and relevant theoretical background. Building upon this groundwork, this chapter addresses a critical gap in the current discourse: a systematic understanding of the diverse stated or observed motivations driving artists to engage with AI technologies. While previous research has often focused on the technical aspects of AI art or its aesthetic outcomes, this chapter aims to uncover the underlying motivations behind AI art creation, offering a novel framework for categorising and analysing artists' approaches and communicated goals. This chapter introduces the 'Five Tropes of AI Art,' a framework developed through rigorous analysis of contemporary AI artworks and artists' practices. This framework moves beyond existing categorisations, primarily focusing on technical approaches or aesthetic outcomes. Instead, it provides analytical lenses focused on the conceptual and motivational factors shaping AI art practices. The Five Tropes framework serves multiple purposes:

- For researchers in HCI, digital art, and related fields, it offers a reflective lens and a structured approach to analysing and contextualising AI artworks based on creator motivation and practice.

- For curators of AI art, it provides a reflective lens for thematic organisation and interpretation of AI art exhibitions, enabling more coherent and insightful presentations.
- For artists, it offers a reflective lens through which to consider their practice and motivations, potentially inspiring new directions or collaborations.

Drawing upon the methodological approach outlined in chapter 4, this chapter systematically analyses a carefully curated selection of contemporary AI artworks. Through this analysis, five distinct, though not mutually exclusive, tropes have been identified that encapsulate the primary approaches and patterns of motivation driving artists' engagement with AI in contemporary practice:

1. AI and Co-Creativity
2. Data-Driven Creative Choices
3. Reflective Investigation of AI
4. AI as Subject Matter
5. AI as an Autonomous Artist

Each trope will be explored in depth, supported by illustrative diagrams. By examining these tropes as analytical lenses, this chapter aims to provide an overview of the diverse landscape of AI art motivations as observed in practice, offering insights into how artists are leveraging AI not just as a tool but as a medium for exploring complex ideas about creativity, agency, data, and the role of technology in society. This chapter lays the groundwork for the subsequent practical exploration in chapter 6, where this framework will be applied to the Cat Royale project, demonstrating its utility in understanding real-world AI art practices. Furthermore, it informs the broader discussion in chapter 7 on challenges, considerations and set of guidelines in AI art analysis.

5.2 Approaches to Categorising AI Art

AI art has seen numerous attempts to categorise and contextualise artists' diverse approaches and outputs. As explored in detail within the chapter 3), scholars have proposed various frameworks to understand this emerging domain. These frameworks range from Grba's [5] analysis of common aspects in AI artworks to Forbes et al. [6] exploration of artists' approaches in AI art creation. Dorin et al. [10] offer a framework for understanding generative art, while Sivertsen et al. [9] introduce a process-centred approach focusing on ambiguity in AI art practice. Other noteworthy contributions include Browne's [78] categorisation of AI artists based on technical engagement, Mendelowitz's [48] taxonomy for AI-based public art. Building upon these existing analyses, this chapter proposes a novel approach to categorising AI art. It diverges from previous studies by employing a question-based methodology that centres on the artist's observed motivations for incorporating AI into their work. This approach offers an analytical lens to understand AI art practice by prioritising the artist's stated or observed intent rather than focusing solely on technical processes or artistic outcomes. Departing from classifications based on technical skills or level of control, this chapter examines how artists present their creative processes and contextualise their work within the broader discourse of AI. Expanding on the work of Grba [5] and Forbes [6], who identify primary motivations such as AI as a collaborator, subject matter, or autonomous artist, this chapter introduces five distinct tropes. Each trope encapsulates a unique approach to integrating AI into artistic practice, providing a framework for understanding the diverse observed motivations shaping this evolving field. This new framework aims to offer a more flexible and inclusive understanding of AI art practice by acknowledging the dynamic nature of artistic practice and recognising that an artist's motivations and approaches may evolve.

5.3 Methodology

This chapter expands upon the methodological framework established in chapter 4, specifically focusing on the development of a framework for categorising AI art practice into five tropes. This process involved a multi-stage qualitative analysis of selected AI artworks, drawing upon artist statements, interviews, exhibition descriptions, and critical reviews to understand the stated or inferred motivations and goals driving the integration of AI into artistic practice. The methodology for this strand of the thesis involved several key steps:

5.3.1 Artwork Selection

The initial step involved curating a list of AI artworks based on their social media impact and prominence within relevant AI art and technology communities. This selection was informed by metrics such as:

- Social media following
- Online engagement with artist interviews
- Mentions on dedicated AI art platforms
- Number of views on artists' video interviews
- Recurrence in the relevant HCI and art/techliterature review

This selection process aimed to capture a sample of contemporary, visible, and influential works within the field, aligning with the criteria outlined in chapter 4 for selecting artworks based on their digital footprint and recognition within relevant online and practice communities.

Rationale and Limitations of Artwork Selection

The selection criteria outlined above were chosen specifically for the purpose of this HCI and practice-led thesis. The aim was not to establish an art

historical canon of AI art, but rather to understand the stated or observed motivations and practices of artists currently engaging with AI in ways visible to online discourse. These criteria, while favouring visibility and recent impact over traditional art historical metrics, allowed for the identification of recurring patterns of engagement, observed motivation, and framing relevant to understanding current practice at the intersection of HCI and art. However, this selection method inevitably biases the sample towards artists with strong online presences (specifically Western society) or those featured in specific tech-art circles. It may underrepresent artists working outside these spheres or those whose work hasn't yet gained significant traction in these specific communities. Furthermore, these criteria do not primarily rely on established art critical or art historical evaluations of quality or significance. The resulting tropes, therefore, reflect patterns in currently visible practice rather than a definitive statement on the long-term artistic merit or historical importance as defined by traditional art history. Despite these limitations, this selection process served the specific research goal of developing a framework grounded in the observable motivations and approaches prevalent in contemporary AI art practice, providing a useful lens for HCI researchers and AI art practice curators navigating this rapidly evolving field.

5.3.2 Systematic Analysis

Following artwork selection, a systematic analysis was undertaken, encompassing the following steps:

1. Identification of AI Techniques and Tools: This stage involved thoroughly examining each artwork's AI techniques and tools, drawing upon artist statements, technical documentation, and critical analyses to understand the technologies utilised.

2. Aesthetic and Technical Examination: Each artwork was analysed for its aesthetic and technical characteristics, considering visual elements,

interactive features, performance aspects, and the technical intricacies of the AI technologies employed. This analysis aimed to understand how AI contributes to the artwork's overall form and interaction.

3. Interpretation of Artwork's Communicated Concepts: This stage involved a critical interpretation of the artwork's communicated concepts and effects, guided by predefined research questions. These questions probed the artist's approach to incorporating AI, the creative autonomy granted to the AI system, and the artwork's stated or inferred message or critique.

4. Clustering into Tropes: Based on the insights from the previous steps, the artworks and artists were grouped based on shared patterns in practice and motivation, leading to the emergence of five distinct tropes of AI art practice.

5.3.3 Research Questions

Central to this methodology was applying a set of research questions designed to uncover the artist's stated or observable motivations and intentions behind integrating AI into their creative process. These questions (referenced later with these letters and digits: Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8), mirroring those outlined in chapter 4, were as follows:

1. Q1: Is AI problematised within the artwork to encourage critical reflection on technology's role in society?

2. Q2: Does the artwork grant AI the agency to make independent creative decisions, or does the artist retain a higher degree of control?

3. Q3: Does the artist prioritise control over the AI's contribution, adapting it to fit their vision, or do they embrace a more collaborative approach, allowing the AI to shape the creative outcome?

4. Q4: Does the artwork convey a serious message about AI, engaging with the technology's ethical, political, or societal implications?

5. Q5: Does the artwork explore AI as a collaborator in interactive performances, pushing the boundaries of human-machine creative partnerships?

6. Q6: Does the artist utilise AI as a tool to expand their creative capabilities, exploring new avenues of expression?

7. Q7: Is data curation a primary focus for the artist, with AI serving as a tool for manipulating and generating outputs based on data?

8. Q8: Is the AI technology itself presented as the artist, challenging traditional notions of authorship and agency in art?

5.3.4 Clustering into Tropes

Based on the analysis from the above steps, the artworks and artists were then clustered based on commonalities in their approaches and observed motivations. This clustering led to five distinct tropes, each representing a unique approach to integrating AI into art practice:

1. AI and Co-Creativity: Artworks where AI expands the creative scope.

2. Data-driven Creative Choices: Selecting training data as a key creative strategy.

3. Reflective Investigation of AI: Using AI playfully to comment on technology in everyday life.

4. AI as Subject Matter: Addressing sociopolitical and ethical issues seriously through AI.

5. AI as an Autonomous Artist: Presenting AI as an artist initially set up by a human.

5.3.5 Further Research Questions

In addition to the primary research questions, this strand of the thesis also addressed the following questions:

- How can AI artworks be classified based on the artists' observable motivations?
- What are the defining characteristics and implications of each identified trope of AI art practice?
- How does the developed framework contribute to the understanding and analysis of the AI art landscape for HCI researchers and AI art curators?

This analytical framework, grounded in a qualitative examination of artist motivations and contextualised within the broader methodological approach outlined in chapter 4, provides a foundation for understanding the diverse ways artists engage with AI in practice. By categorising these approaches into five tropes, this chapter offers a tool for analysing, interpreting, and contextualising the evolving landscape of AI art practice.

5.4 The Five Tropes of AI Art

This section introduces the five tropes of AI art that emerged from the analysis using the methodology outlined in the previous section. Each trope represents a unique approach to incorporating AI into artistic practice, reflecting distinct observed motivations and goals. These tropes provide a structured framework to be used as an analytical lens for understanding how artists engage with AI. The five tropes of AI art are:

1. **AI and Co-Creativity:** This trope encompasses artworks where AI serves as a collaborative partner, expanding the artist's creative scope and enabling the exploration of novel artistic possibilities. Artists working within this trope view AI as a tool for augmenting their creative

process and pushing the boundaries of their artistic expression.

2. **Data-Driven Creative Choices:** In this trope, the selection and curation of training data become paramount to the creative process. Artists meticulously craft datasets to achieve specific aesthetic or conceptual outcomes, highlighting the influence of data on AI-generated art.

3. **Reflective Investigation of AI :** Artists within this trope employ AI playfully and experimentally to explore technology's role in our lives. Through often interactive and engaging works, they invite audiences to reflect on the implications of AI, encouraging critical engagement with technology.

4. **AI as Subject Matter:** Artworks within this trope directly address the social, political, and ethical implications of AI. Artists engage with AI as a subject worthy of critical examination, using their work to spark dialogue and raise awareness about AI's impact on society.

5. **AI as an Autonomous Artist:** This trope encompasses artworks that challenge traditional notions of authorship by presenting AI as an independent creative entity. Artists set the initial parameters and guide the AI's development, but the AI system ultimately generates the artwork, raising questions about agency and creativity in the age of intelligent machines.

While trope three is characterised by a personal and experiential engagement with AI, inviting individual contemplation and playful interaction, trope four critically engages with broader ideological and societal issues related to AI.
The following sections will delve into each trope, providing a detailed analysis of representative artworks and artists to illustrate each category's key characteristics and artistic contributions. By exploring specific examples, the sections illustrate the diverse observed motivations driving artists to embrace AI in their practice.

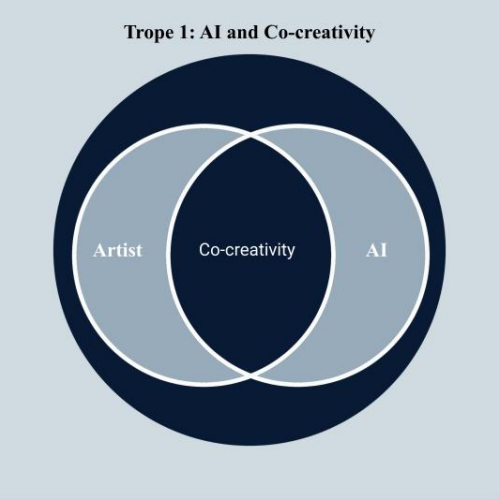

Figure 5.1: *The overlapping circles between the Artist and AI represent the collaborative creative synergy (©Guido Salimbeni).*

5.5 Trope 1. AI and co-creativity.

For some artists, AI alone did not unlock previously unobtainable levels of creativity, yet technology opened up an exciting space for exploration and experimentation (Fig. 5.1). For these artists, advancements in AI technology have become a reason for exploring new artistic territories. The analysis shows that artworks produced in this trope tended to favour AI as a prerequisite to exploring innovative co-creative interactive performances (Q5) or to expand the artist's creative skills in the process (Q6). Moreover, the artworks assigned to this trope sometimes assumed the AI to make independent creative choices (Q2), though the artist still actively participated in the art process.

The following subsections delve deeper into the works of a selection of artists in this trope whose practices exemplify its core characteristics. By examining their approaches to integrating AI into their creative processes, these examples illustrate how AI can serve as a collaborative partner.

5.5.1 Sougwen Chung

Sougwen Chung explores the dynamics of human-machine collaboration, blurring the lines between artist and machine and pushing the boundaries of cre-

ative expression. Chung's artistic practice, deeply intertwined with technological innovation, is a compelling case study for understanding how AI can augment human creativity, leading to novel artistic forms and thought-provoking reflections on the evolving relationship between humans and AI.

Chung's artistic journey began in 2015 with a fascination for the intersection of art and robotics, prompting her to explore how these seemingly disparate domains could converge to create new possibilities for artistic expression [95]. Her early experiments, driven by a desire to understand the interplay between human and machine agency in art, involved collaborative drawing with a robotic arm. This initial exploration led to the development of her 'Drawing Operations Unit: Generation' (DOUG) series, an example of her ongoing commitment to investigating the potential of human-machine creative synergy (Q5).

Chung believes that combining AI and robotics with traditional forms of creativity can help her think deeper about what it means to be creative and how to expand her creative skills in real-time collaboration with AI (Q5, Q6), a concept that she clearly explained in her TED talk when she said that 'collaboration is the key to create the space for both human and machine' [96].

The DOUG series, spanning several iterations, illustrates Chung's evolving exploration of human-machine collaboration in art. Each iteration builds upon the previous, introducing new levels of complexity and pushing the boundaries of what is possible in this dynamic interplay.

Chung's initial experiment with D.O.U.G. involved a robotic arm that mirrored her real-time drawing movements. While technically rudimentary, this first project revealed a crucial insight: the machine's inherent imperfections and unpredictable movements enriched the collaborative process (Q6), adding a layer of spontaneity and serendipity to the artwork. This realisation led Chung to embrace the beauty of shared imperfection between humans and machines, which became a recurring theme in her work.

In the second iteration of DOUG, Chung incorporated a neural network trained

on a vast dataset of her past drawings. This allowed the machine to respond to her artistic gestures more precisely, reflecting a deeper understanding of her artistic style and creative process. This development marked a significant shift in Chung's approach, moving beyond simple mimicry to a more sophisticated form of collaboration, where the machine served as a creative partner capable of generating novel artistic contributions (Q2) within a shared artistic style.

Expanding the scope of her exploration, Chung introduced a multi-robotic system consisting of twenty custom-built robots for DOUG Generation 3. This collaborative ensemble, connected to a network of publicly available cameras throughout New York City, transformed the urban landscape into a vast canvas for human-machine creative expression. The robots, trained on a visual dataset of cityscapes captured by the camera network, responded to Chung's artistic gestures in real-time, creating a dynamic and multi-layered visual narrative that reflected both the artist's vision and the city's dynamic energy.

Chung's stated desire to explore human-machine collaboration, challenge traditional notions of artistic skill and iterate over experiments to find innovation drives her approach. By framing her work as an exploration of shared creativity between humans and machines, Chung invites audiences to reconsider their preconceptions about AI and art. Her communicated motivation to embrace imperfection and prioritise collaboration over technology results in technically impressive, conceptually rich, and thought-provoking artworks. When this approach is clearly communicated to the audience through framing and artist statements, it allows for a deeper appreciation of the work beyond its technological aspects, demonstrating how explicit artistic motivation can shape the interpretation and perceived significance of AI art.

5.5.2 Alexander Reben

Alexander Reben is an American artist who explores collaboration with AI in art practice [97]. In the artwork called amalGAN, developed in 2018, an AI

algorithm captured a human body's signals to produce artistic outputs that human painters completed as oil-painted canvases. The process involved a collaboration with AI that aimed to expand the artist's skills, and AI was an indispensable component of the art project (Q5, Q6). In amalGAN, the artist also aimed to achieve a balance in control of the final output between the AI and the artist (Q2, Q3).

AmalGAN involved a complex interplay of AI algorithms, human input, and traditional artistic techniques to create a series of oil paintings on canvas. The process, as outlined below, highlights the intricate collaboration between artist and machine, each contributing unique capabilities to the creative outcome:

1. The process begins with an AI algorithm combining words to generate an image based on its interpretation of those words. The AI then produces variations of this initial image by 'breeding' it with other images, creating a set of 'child' images.

2. Another AI system presents these 'child' images to the artist, simultaneously measuring the artist's brainwaves and body signals to identify which image elicits the strongest positive response. This biofeedback loop guides the AI in refining its image generation process, creating images tailored to the artist's subconscious preferences (as envisioned by the artist).

3. The previous steps are repeated until the AI determines it has reached an optimal image, reflecting a continuous dialogue between human and machine, with each iteration shaping the outcome.

4. Once the optimal image is selected, a different AI system increases its resolution, filling in missing details based on its learned understanding of visual patterns.

5. The resulting high-resolution image is then sent to a team of anonymous

painters in a Chinese painting village, who meticulously execute the AI-generated design as an oil painting on canvas.

6. Finally, another AI system analyses the completed painting, attempting to identify its subject matter and generate a title for the artwork.

The 'amalGAN' project exemplifies the AI and co-creativity trope by demonstrating a harmonious blend of human and machine contributions (Q5). AI expands the artist's creative capabilities (Q6), generating novel visual concepts and assisting in the selection process based on biofeedback. The artist, however, retains a crucial role, guiding the AI's development, curating its outputs, and ultimately realising the final artwork through traditional artistic techniques (Q2, Q3).

Reben's work exemplifies how a clearly articulated artistic motivation can provide a strong rationale and structure for AI art projects. The complex journey each painting undergoes in the amalGAN project is a testament to this deliberate approach. Every step in the process, from the initial AI-generated image to the final human-painted canvas, reflects a specific, multi-stage workflow. The intricate workflow demonstrates a communicated strategy to use AI not merely as a tool but as an integral part of the creative process that triggers reflection and adds significant value. The AI's role in generating initial concepts, refining them based on the artist's biofeedback, and even attempting to title the final piece showcases a deliberate integration of machine intelligence at multiple stages of creation. By framing his work as an investigation into the nature of creativity itself, Reben invites audiences to engage with questions about the role of AI in art. The use of AI is not incidental but essential, serving a clear purpose in expanding creative possibilities and pushing the boundaries of what art can be.

5.5.3 Ross Goodwin

Ross Goodwin became famous for making the first sci-fi film based on a script generated by a neural network [98] and played by real actors. In his recent work, Automatic On The Road, released in 2018, the artist installed a printer inside a car with enough rolls to make a million words to produce the longest English novel. The printer was connected to a GPS surveillance camera on the car roof, a microphone inside, and a clock to record a journey on American roads automatically. The artwork reimagined the classic American literary road trip, where an AI interpreted audio and visual inputs captured during the journey, converting them into textual narratives. As the car moved, these stories were printed out in real-time by a printer installed within the vehicle, producing a continuous paper output of the novel. The artist explored AI as a tool to expand human creativity (Q6) and also as a prerequisite (Q5) to introduce ambiguity around who controls the artistic process (Q2, Q8).

While Goodwin conceived the project and designed the AI system, the narrative itself emerged from the AI's interpretation of its surroundings, creating a unique blend of human and machine authorship.

The concept of creating 'the longest novel ever written' is not just a provocation but a pioneering exploration of AI's unique capabilities in storytelling and perception. The choice of AI for this project is deliberate and significant. While a human author could embark on writing an endless novel, Goodwin's use of AI serves multiple purposes that a human writer could not match. The AI's ability to capture and process vast amounts of information from multiple sources (GPS, camera, microphone) simultaneously and convert these inputs into narrative in real-time is unparalleled. The AI's unbeatable speed in generating content raises intriguing questions about the quantity versus quality debate in artistic production. However, it also challenges our notions of quality itself - with access to such a wealth of environmental data, could the AI create a richer, more comprehensive narrative than a human observer?

Goodwin's motivation to use AI in this context is clear: to push the boundaries of what constitutes a 'journey' in literature. By allowing the AI to be both the observer and the narrator of the road trip, he creates a new form of storytelling that is uniquely suited to AI's capabilities.

5.5.4 Annie Dorsen

Annie Dorsen, a theatre director and artist, pushes the boundaries of the AI and co-creativity trope through her innovative exploration of algorithmic theatre. Dorsen's artistic practice is rooted in her background in theatre and her fascination with the transformative potential of technology. She collaborates with computer programmers to design software that functions as a performer, either alongside or replacing human actors, creating a new genre of theatre that she refers to as 'algorithmic theatre' [99]. This approach challenges traditional notions of theatrical performance, prompting audiences to reconsider the boundaries between human and machine in collaborative creativity.

One of Dorsen's works, 'Hello, Hi There' (2010), exemplifies her approach to algorithmic theatre. This performance features two chatbots, early examples of natural language processing programs, engaging in an unscripted conversation on stage. The chatbots interact with each other in real-time, creating a unique and unpredictable performance at each iteration.

This project exemplifies the AI and co-creativity trope by highlighting the potential for AI to generate emergent narratives and contribute to a real-time, improvisational performance (Q5, Q6). While limited in their linguistic capabilities, the chatbots can generate humour, conflict, and moments of surprising coherence, prompting viewers to reconsider their assumptions about AI and creativity. The artwork's reliance on AI as an essential element of the performance (Q5) and its presentation of AI as making independent decisions (Q2) further underscore its alignment with this trope.

Dorsen's work in algorithmic theatre, particularly 'Hello, Hi There,' demon-

strates a clear motivation to explore new frontiers in performance art by positioning AI as an actor on stage. The artist's primary motivation is exploratory and experimental. Dorsen creates a unique laboratory for observing and learning from the unpredictable interactions between AI and the audience by placing AI chatbots as performers. This setup allows her to investigate new dimensions of theatrical direction, challenging traditional notions of what it means to be a director when actors are algorithms with their own decision-making processes. Furthermore, Dorsen's approach invites the audience to become active participants in this exploration. The use of AI actors likely prompts viewers to reflect on their own expectations of performance, the nature of dialogue, and the boundaries between human and machine creativity. In this context, the audience's reaction becomes an integral part of the artwork itself, providing valuable insights into how we perceive and interact with AI in creative contexts. As a potential audience member, one might feel compelled to experience this novel form of theatre firsthand, curious about how AI might interpret and execute theatrical performance.

5.5.5 Karen Palmer

Another example that is worth mentioning in this trope is Karen Palmer's work [100] that shows how AI technology can allow interactions with the public otherwise laborious or inefficient to obtain with human intervention (Q5, Q6). In her work Riot AI, the artist asks how a viewer would respond in a situation of high tension. Riot AI is an interactive film that uses AI and facial recognition to navigate an imaginary urban riot. While the viewer watches the film, the machine learning algorithm monitors the emotions of calm, anger or fear. So when a police officer confronts the viewer directly in the film, the emotion of anger pushes the film in one direction. At the same time, fear shifts the film in another direction so that the artist intends to take some control in the process (Q3).

Palmer's 'Riot AI' (2016) project exemplifies her approach to emotionally responsive storytelling. This interactive film immerses viewers in a simulated urban riot, challenging them to navigate a tense and emotionally charged landscape. The film utilises AI and facial recognition technology to analyse the viewer's emotional responses in real-time, adapting the narrative based on their calm, angry, or fearful expressions.

As the viewer progresses through the film, they encounter various characters, including a riot police officer, a woman being arrested, an anarchist, and a looter. Their emotional responses to these encounters influence the direction of the narrative, leading to different outcomes and challenging them to consider the impact of their emotions on their actions. For instance, anger toward the police officer might escalate the situation, while a fearful response could lead to a different path.

'Riot AI' aligns with the AI and co-creativity trope by showcasing how AI can be used to personalise storytelling and create a more interactive and engaging experience for the viewer (Q5, Q6). By analysing the viewer's emotional responses, the AI system adapts the narrative, creating a unique and personalised journey for each participant. This approach not only enhances the immersive quality of the film but also encourages viewers to reflect on their emotions' role in shaping their perceptions and actions (Q3).

The artist's choice to use AI is not arbitrary but essential to the work's core concept and execution. The AI in this installation acts as a unique mediator between the audience and the narrative, enabling a level of real-time interaction that would be challenging, if not impossible, to achieve through human control alone. This technological collaboration allows Palmer to step back from directly steering the narrative, instead empowering the audience to become active participants in shaping their experience. What makes this use of AI engaging is its visibility and transparency to the audience. Viewers know the AI's role in interpreting their emotional responses and adjusting the narrative accordingly. This awareness encourages the audience to reflect on the

content of the film and the process of their interaction with it. The motivation behind incorporating AI in this manner is clear: to create an objective, responsive mechanism that allows for a truly personalised and interactive storytelling experience. Without the AI, the installation would lose its unique ability to adapt in real-time to each viewer's emotional state, significantly diminishing its impact.

5.5.6 Wayne McGregor

Wayne McGregor, a choreographer known for his innovative and technologically driven approach to dance, embodies the AI and co-creativity trope by exploring human-machine partnerships in choreography. The curiosity about the intersection of human movement and technology drives McGregor's artistic practice. He sees AI as a powerful tool for understanding and expanding dance vocabulary, enabling him to explore new forms of movement, push the boundaries of choreography, and create unique and unexpected performances. His work with AI often involves training machine learning models on vast datasets of his past choreographic works, allowing the AI to learn his style, analyse patterns, and generate new movement sequences that reflect his artistic sensibilities while introducing novel elements.

One of McGregor's projects exploring AI and co-creativity is 'AI Dancer' (2008) [101]. This installation, developed in collaboration with the Random Dance Company, involved a real-time interaction between dancers and an AI system that generated choreographic sequences based on their movements. The AI system, trained on hours of video footage of McGregor's previous choreographies (Q7), learned to recognise and predict movement patterns, offering dancers a constantly evolving stream of potential movement phrases inspired by McGregor's style but infused with novel and unexpected combinations (Q2). During the performance, dancers interacted with the AI system by performing movements before a screen. The AI system, in response, generated and dis-

played visualisations of potential choreographic sequences that could follow the dancer's current pose. This real-time feedback loop allowed dancers to explore new movement possibilities, break free from habitual patterns, and discover unexpected expression pathways.

'AI Dancer' exemplifies the AI and co-creativity trope by highlighting the potential for AI to serve as a muse for dancers, offering a source of inspiration and guidance (Q6). By analysing and synthesising McGregor's choreographic language, the AI system provides dancers with a new lens through which to view movement, expanding their creative vocabulary and enabling them to explore uncharted territories of expression. Moreover, the project underscores the importance of collaboration, demonstrating how humans and machines can work together to push the boundaries of artistic possibility (Q5).

McGregor's work demonstrates how a clear artistic motivation can push the boundaries of AI art in traditional fields like dance. His intention to explore new forms of movement and expand the language of dance drives the innovative nature of his collaborations with AI. By framing his work as an investigation into the potential of human-machine partnerships in choreography, McGregor invites audiences to reconsider their understanding of creativity in dance.

5.5.7 Ellen Pearlman

Ellen Pearlman offers another example of the AI and co-creativity trope by exploring biofeedback and AI interaction. Her projects often highlight AI's potential to enhance artistic experiences.

Pearlman's artistic practice is rooted in her fascination with the human brain, its intricate workings, and its relationship with technology. She sees AI as a tool for exploring the depths of human consciousness, challenging us to reconsider our assumptions about agency, privacy, and the boundaries between self and machine. Her work often incorporates biometric data, such as brainwave activity and facial expressions, to create interactive and immersive perfor-

mances that respond to the performer's emotional and cognitive states.

One of Pearlman's works exploring the AI and co-creativity trope is 'AIBO' (2015), an immersive interactive performance staged within a 360-degree theatre. This performance, inspired by the story of Noor Inayat Khan, a Sufi covert operative during World War II, utilises AI to translate the performer's emotional state into a dynamic visual display. The performer, wearing a dress adorned with illuminated threads, reads from a booklet while a device captures her brainwave activity and facial expressions. This data is fed into an AI system that controls the colours and patterns of the illuminated threads, creating a visual representation of the performer's inner emotional landscape (Q5, Q6).

'AIBO' exemplifies the AI and co-creativity trope by demonstrating how AI can enhance artistic expression and create a unique form of audience engagement. By translating the performer's biofeedback into a visual spectacle, the AI system adds a new dimension to the performance, inviting the audience to witness and engage with the performer's emotional journey in real-time. The AI's role as a mediator between the performer's inner world and the audience's perception underscores its essential role in expanding the scope of the artistic experience (Q6).

Pearlman's work exemplifies how a clear artistic motivation can harness AI to explore profound human experiences. Her intention to investigate the intersection of technology, consciousness, and emotion drives the nature of her projects. Her motivation to use biofeedback and AI to create immersive, responsive performances results in personal and thought-provoking works.

5.5.8 Scott Eaton

Scott Eaton is an artist and technologist with expertise in anatomical and figurative representation. His work, characterised by its blend of traditional artistic techniques and cutting-edge digital tools, pushes the boundaries of

figurative art, exploring new forms of expression. His projects, often blurring the lines between human artistry and machine intelligence, demonstrate AI's potential to enhance artistic capabilities and serve as inspiration, leading to unexpected and aesthetically compelling outcomes.

Eaton's artistic journey began with a deep fascination for the human form, leading him to develop a mastery of anatomical drawing, sculpture, and painting. This foundation in traditional artistic techniques serves as a basis for his exploration of AI, allowing him to approach the technology with a clear artistic vision and a deep understanding of the nuances of figurative representation. He sees AI not as a replacement for human skill but as a collaborative partner, a tool for expanding his creative vocabulary and exploring new territories within figurative art.

One of Eaton's most notable projects exploring AI and co-creativity is 'Entangled' (2019), a series of works utilising AI to transform his hand-drawn sketches of human figures into three-dimensional digital paintings. The process, as outlined below, highlights the dynamic interplay between artist and machine, each contributing unique capabilities to the creative outcome:

1. Eaton begins by creating a series of pencil sketches of human figures, capturing the essence of form, movement, and gesture.

2. These sketches are fed into an AI system trained on a vast anatomical and figurative imagery dataset. The AI system, leveraging its learned understanding of light, shadow, and form, transforms the two-dimensional sketches into three-dimensional digital paintings, adding shading and depth in real-time.

3. Eaton interacts with the AI system throughout the process, adjusting parameters, providing feedback, and guiding the AI's rendering decisions. This collaborative dialogue between artist and machine results in a final artwork reflecting Eaton's artistic vision and the AI's unique capabilities.

'Entangled' exemplifies the AI and co-creativity trope by demonstrating how AI can be used to enhance artistic efficiency and expand creative possibilities (Q5, Q6). The AI system frees Eaton from the technical aspects of 3D rendering, allowing him to focus on the artistic essence of his work. Moreover, the AI's ability to generate unexpected and sometimes surprising results introduces an element of serendipity into the creative process, leading to outcomes that Eaton might not have conceived on his own (Q2, Q8).

By framing his work as an exploration of how AI can augment human creativity, Eaton invites audiences to reconsider the relationship between technology and traditional art forms.

5.5.9 Nao Tokui

Nao Tokui, an artist, researcher, and associate professor at Keio University, embodies the AI and co-creativity trope through his innovative exploration of AI-powered music performance. Tokui's work, characterised by its focus on real-time interaction, improvisation, and the blurring of boundaries between human and machine creativity, explores the possibilities of musical performance. His projects, often involving complex interplay between multiple AI systems and a human DJ, showcase AI's potential to generate music and serve as a creative muse, pushing the boundaries of what is possible in disk-joking and inspiring new forms of musical expression.

Tokui sees AI not as a replacement for human DJs but as a collaborative partner capable of generating unexpected musical ideas, challenging artistic boundaries, and inspiring new levels of improvisation and spontaneity. His work often involves developing custom AI systems that can generate music in real-time, respond to the DJ's inputs, and create a dynamic and ever-evolving musical dialogue.

One of Tokui's most notable projects exploring AI and co-creativity is 'AI DJ Project 2: Ubiquitous Rhythm.' This improvisational DJ performance uses

multiple AI systems to generate and manipulate music in real-time, creating a unique and organic musical experience that leverages the relationship between humans and machines.

The performance unfolds as follows:

1. One AI system continuously generates two-bar rhythm patterns and corresponding bass lines, providing a foundation for musical improvisation.

2. Another AI system selects and integrates musical loops that complement the generated rhythms and basslines, adding layers of texture and complexity to the soundscape.

3. Tokui, as the DJ, listens to the AI-generated elements and dynamically adjusts the sound of the drum machine, synthesiser, and other instruments in real-time. He also controls the volume, audio effects, and transitions between tracks, shaping the overall flow and development of the performance.

4. Tokui can further interact with the AI systems by using turntables to mix external audio sources, such as vinyl records, into the performance. The AI systems, in response, analyse the mixed sound and select new loops or adjust their generative parameters to integrate the external audio seamlessly.

5. This continuous interplay between the human DJ and the AI systems creates a fluctuating feedback loop, where each element influences and responds to the others, resulting in a dynamic and unpredictable musical journey.

'AI DJ Project 2: Ubiquitous Rhythm' exemplifies the AI and co-creativity trope in several ways. First, it demonstrates how AI can be used to enhance the creative possibilities of DJing (Q5, Q6), enabling real-time music generation and pushing the boundaries of improvisation. Second, it showcases the

potential for a truly collaborative relationship between humans and machines, where both contribute to the artistic outcome in a dynamic and responsive way (Q2). Finally, it emphasises the importance of embracing uncertainty and surprise in the creative process, allowing the AI's unexpected musical choices to challenge the DJ and push them beyond their comfort zone.

Tokui's work exemplifies an artistic motivation that parallels Sougwen Chung's approach to the visual arts but is applied to the realm of music. The artist's stated primary motivation is creating a collaborative space where human creativity and AI capabilities intertwine in real-time. This approach provides a clear rationale for the use of AI in the artwork. The AI component makes achieving the project's goal of spontaneous, diverse, and unexpected musical input possible. Furthermore, Tokui's work invites the audience to witness and engage with a new creative process. The visible interplay between humans and machines in the performance allows viewers to appreciate the collaborative nature of the artwork.

5.6 Trope 2. Selecting training data

This section explores the second trope of AI art, where artists prioritise selecting and curating training data for AI as a fundamental aspect of their creative process. For these artists, AI is a powerful tool for manipulating and generating impactful AI artworks from data. Still, the human element remains paramount in shaping the artistic vision and imbuing the artwork with intentionality and emotional resonance. They recognise that while AI can process vast amounts of information and produce novel outputs, the artist's creative choices in selecting the data sources determine the artwork's output.

Artists working within this trope view the creative curation of training data (Q7) as a critical strategy for shaping the AI's output, recognising that the data fed into the system influences the generated results. They carefully select, organise, and manipulate datasets to achieve specific aesthetic or conceptual

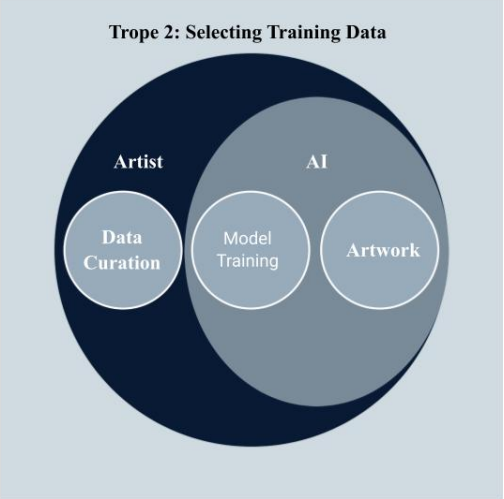

Figure 5.2: *Flowchart of the artist's process from data curation to model training, leading to AI-generated artwork (©Guido Salimbeni).*

goals, using data as a raw material for artistic expression. Figure 5.2 visually represents this approach, highlighting the artist's role in guiding the AI's creative journey through careful data selection and manipulation. The artists in this trope appear to focus their motivation on identifying the poetic and emotional feelings within these data and the result of the algorithms.

The following subsections delve into the practices of artists who exemplify this trope, showcasing how they leverage the power of data curation to explore new creative territories.

5.6.1 Refik Anadol

Through his multimedia installations and immersive experiences, Refik Anadol exemplifies the data-driven creative choices trope. He views AI as a 'thinking brush,' a powerful tool for processing and transforming vast amounts of data into captivating visuals that evoke a sense of wonder and invite reflection on the nature of memory, perception, and the digital world.

Anadol's artistic practice is rooted in his belief that data, often seen as abstract and intangible, can be transformed into a tangible and emotionally resonant artistic medium. He meticulously curates and manipulates datasets, from architectural blueprints and cityscapes to climate data and social media

feeds. He uses AI algorithms to reveal hidden patterns, generate unexpected connections, and create immersive environments that engage the audience.

One of Anadol's notable projects showcasing his data-driven approach is 'Machine Hallucinations,' [102], an ongoing series of immersive installations that explore the aesthetic possibilities of AI-generated imagery. Often displayed on large-scale, high-definition screens, these installations feature complex waves of colour, abstract shapes, and fluid movements. However, these visually impressive displays are not simply random patterns; they represent meticulously curated datasets that AI algorithms have processed and transformed.

In one iteration of 'Machine Hallucinations,' Anadol utilised a dataset of over 10 million images of New York City, carefully selected and curated to capture the city's architectural diversity, urban rhythms, and collective memory. He then trained a machine learning model on this dataset, allowing the AI to analyse the images, identify patterns, and generate new visual representations reflecting its data interpretation. The resulting installation, a symphony of light, colour, and movement, offered viewers a unique and evocative perspective on the city shaped by the AI's analysis (Q7).

Anadol's work exemplifies a clear and compelling artistic motivation that transforms data into a new form of raw material for creativity. His approach can be likened to a painter mixing colours on a palette, but instead, Anadol mixes vast datasets to create his digital canvases. This framing of data as a malleable medium for artistic expression is both innovative and accessible, allowing audiences to understand the concept easily while appreciating the complexity of the exploration. By framing data as an ensemble of our shared environment, Anadol creates a context for his work that invites interpretations extending beyond mere visual spectacle. It invites the audience to see the world around them in a new light, potentially prompting recognition of hidden patterns and connections in the data that surrounds us daily.

5.6.2 Sofia Crespo

Sofia Crespo [103], an artist who explores the intersection of nature and technology, embodies the Data-Driven Creative Choices trope through her curation of datasets and her artistic interpretation of AI-generated outputs. Crespo's artistic practice is rooted in her fascination with the natural world, its intricate forms, and its diversity. She sees AI as a tool for extending her creative vision, enabling her to explore the potential for artificial life forms and to create speculative worlds that blur the lines between the real and the imagined. Her work often involves training AI models on vast datasets of natural imagery, allowing the AI to learn the patterns and structures of nature and generate novel forms that mirror the real-world.

One of Crespo's projects showcasing her data-driven approach is 'Neural Zoo' (2018-2020) [103], a series of works that explore the concept of artificial life through AI-generated imagery. The project involved training a Generative Adversarial Network (GAN) on a vast dataset of images depicting various animal species, anatomical structures, and natural textures. Crespo carefully curated this dataset (Q7), selecting images that captured the diversity and complexity of the natural world, with a particular focus on intricate details, patterns, and textures.

The trained GAN, guided by Crespo's curated data, generated images depicting fantastical creatures resembling existing animals yet having unique and often surreal features. These artificial species, products of the AI's interpretation and recombination of natural forms, challenged viewers to reconsider their understanding of the boundaries between the real and the imagined, prompting questions about the nature of creativity, the potential for artificial evolution, and the role of humans in shaping the future of life.

Crespo's motivation to explore artificial life forms and biology drives her projects' innovative and thought-provoking nature. By framing her work as an investigation into the potential for AI to imagine new forms of life, Crespo in-

vites audiences to reconsider their understanding of nature and evolution. She prompts the audience to expand the imagination of the natural world through AI artwork. AI has a clear purpose in her work, allowing the artist to create complex simulations using vast biological datasets that require computational power. The audience can readily understand this need for AI, as in our current world, we recognise that such intricate simulations are achievable through advanced computing technologies.

5.6.3 David Young

David Young [104] exemplifies the Data-Driven Creative Choices trope through his minimalist approach to AI training and his fascination with the beauty of machine imperfections.

Young's fascination with AI stems from his belief that the creative process, whether human or machine-driven, is fundamentally about exploration, experimentation, and the embrace of the unknown. He sees AI not as a tool for achieving perfect results but as a technique that can lead to unexpected discoveries and aesthetic insights. His work often involves intentionally limiting the amount of data provided to the AI during training, prompting the machine to deal with ambiguity, make mistakes, and generate outputs that reflect its evolving understanding of the world.

One of Young's notable projects exemplifying his data-driven approach is 'Learning Nature,' a series of works exploring AI's potential to generate abstract landscapes that evoke a sense of the natural world. Rather than training his AI models on vast datasets of real-world landscapes, as is common in AI art, Young intentionally provides minimal data during the training process (Q7). This constraint forces the AI to extrapolate from limited information, resulting in familiar and strange landscapes, blending elements of nature with unexpected forms, distorted perspectives, and dreamlike qualities.

'Learning Nature' highlights Young's belief that the most interesting aspects

of AI art often lie in the machine's imperfections and struggle to learn. By intentionally limiting the data provided to the AI, he creates a space for the machine to make mistakes, generate unexpected results, and reveal its own unique biases and interpretations. Rather than detracting from the artwork, these imperfections become a source of aesthetic interest, highlighting the AI's evolving understanding of the world and its unique way of seeing.

Young's approach to AI art can be likened to the watercolour technique, where artists allow the natural flow of water to shape the painting. Similarly, Young lets the data and computational processes follow their inherent patterns, embracing the 'natural flow' of AI. This method of using data as raw material echoes Anadol's approach, but Young uniquely leverages the intrinsic dynamics of computation. By providing minimal data and allowing the AI to extrapolate, Young creates outputs that are both consistent from a computational perspective and visually coherent to the audience. This approach results in artworks that feel organic and fluid, mirroring the natural world while remaining distinctly artificial. Young's clear motivation to explore and showcase the beauty in machine imperfections leads to AI art that invites viewers to reconsider their expectations of technological perfection and appreciate the unique aesthetics that emerge from constrained AI systems.

5.6.4 Mario Klingemann

Mario Klingemann [105] exemplifies the Data-Driven Creative Choices trope through his exploration of the latent space of AI-generated imagery. Klingemann's artistic practice often centres on using AI to learn patterns and generate new data based on its training. He curates training datasets (Q7), selects images and data that align with his artistic vision, and then trains neural networks to generate new images based on their learned patterns and relationships. However, Klingemann's role extends beyond simply feeding data into the machine; he acts as a curator, explorer, and interpreter of the AI's output.

One of Klingemann's projects showcasing his data-driven approach is 'Memories of Passersby I' (2018), [105], an installation that explores the interplay of memory, technology, and the human form. The project involves a complex interplay between two neural networks: one trained on a vast dataset of historical portraits and another trained to generate facial features. The first network, acting as a 'memory' of past faces, guides the second network in generating new portraits, creating a continuous stream of AI-generated faces that appear to emerge from the depths of history, blending familiar features with unexpected variations.

'Memories of Passersby I' exemplifies the Data-Driven Creative Choices trope by highlighting the artist's role in shaping the AI's output through careful data curation (Q7). Klingemann's selection of historical portraits as training data infuses the artwork with a sense of history, memory, and the passage of time. At the same time, his choice of neural network architectures and parameters guides the AI's generative process, shaping the work's overall aesthetic and conceptual direction.

Klingemann's work demonstrates an interesting application of AI in art by positioning it as a link to the collective wisdom of past masters. His approach can be likened to an apprentice learning from multiple mentors simultaneously, with AI as the point of convergence for historical artistic knowledge. Klingemann creates a unified entity that synthesises centuries of artistic technique and style by training neural networks on carefully curated datasets of historical portraits. This AI 'apprentice' then produces new portraits, guided by its 'mentors' amalgamated wisdom. The artist's intent is clear and accessible to the audience: to embark on a learning journey from past to present, bridging historical artistic traditions with contemporary technology. This framing provides a familiar and understandable context for the role of AI in the creative process, making the concept relatable and engaging to viewers.

5.6.5 Guillaume Slizewicz

Guillaume Slizewicz [106], an artist interested in the relationship between humans, machines, and memory, exemplifies the Data-Driven Creative Choices trope through his project 'I Can Remember.' By intertwining personal memories captured in photographs with the collective memory embedded within AI algorithms, Slizewicz invites us to consider the boundaries between individual and collective, human and machine, and to question how our memories are shaped, stored, and reinterpreted in the digital age.

A fascination with the intersection of technology, memory, and the human experience drives Slizewicz's artistic practice. He sees AI as a tool for processing memories, a lens through which to examine how our past is shaped, stored, and reinterpreted in the digital age. His work often involves using AI to analyse and respond to personal archives, such as photographs, letters, and diaries, creating a dialogue between individual memories and the collective memory embedded within AI systems.

Slizewicz's 'I Can Remember' project involves a process that intertwines personal memories, AI-generated text, and the labour of data workers who train and shape AI algorithms. The project unfolds as follows:

1. Slizewicz begins by curating a collection of photographs from his life, capturing moments, places, and people with personal significance. These photographs represent his individual and intimate perspective on the past, a fragmented and subjective record of lived experiences.

2. These photographs are then fed into an AI system trained on a vast dataset of images, likely encompassing millions of photographs from diverse sources and capturing a wide range of human experiences. The AI system analyses the photographs, attempting to recognise the objects, scenes, and emotions depicted, and then generates a poem based on its interpretation of the images.

3. The resulting poem, inspired by Slizewicz's photographs, is also shaped by the collective memory embedded within the AI system. The AI's interpretation of the images is influenced by the vast dataset on which it has been trained. It reflects the collective experiences, biases, and perspectives of many individuals, including the data workers who labelled, categorised, and annotated the images used for training.

'I Can Remember' exemplifies the Data-Driven Creative Choices trope by highlighting the artist's role in curating the initial dataset (Q7), selecting photographs that hold personal significance and providing the AI system with a specific starting point for its interpretation. However, the project gives some control over AI, allowing the machine to shape the final output based on its learned understanding of the world. The resulting poem, a blend of personal and algorithmic memories, challenges viewers to consider how technology mediates our understanding of the past and how our memories become intertwined with the collective memories embedded within AI systems.

Slizewicz's use of AI in 'I Can Remember' demonstrates an interesting application of technology in art by leveraging AI's unique ability to blend diverse data sources into a cohesive output. This approach resonates with audiences by touching on a universal concept: the interplay between personal memory and cultural context. Using AI to process and interpret his photographs, Slizewicz bridges intimate recollections and the broader cultural landscape. The resulting poems serve as a metaphor for how our memories are shaped and influenced by society's collective experiences. AI, in this context, makes sense because it mirrors the complex way humans process and contextualise memories. Just as our cultural background and shared experiences influence our recollections, the AI's interpretation of Slizewicz's photos is shaped by its training on vast datasets of images.

5.6.6 Anna Ridler

Anna Ridler [107] exemplifies the Data-Driven Creative Choices trope through her curation of training datasets and her fascination with the imperfections inherent in AI-generated imagery. Ridler's artistic practice is driven by a deep curiosity about the creative potential of AI and a critical awareness of its limitations. She meticulously curates training datasets (Q7), selecting images and data that align with her artistic vision and conceptual goals, and then uses AI algorithms to generate new images that reflect both the patterns within the data and the inherent biases and limitations of the technology itself.

Ridler is particularly drawn to the imperfections that often arise in AI-generated imagery, viewing them as traces of the creative process. She argues that these imperfections draw attention to the underlying mechanisms of AI, revealing the biases embedded within the training data and the limitations of the algorithms themselves [107]. By embracing imperfection, Ridler challenges the notion that AI art should strive for flawless realism, suggesting instead that AI art's most interesting and thought-provoking aspects often lie in the unexpected, the surreal, and the moments where the machine's limitations become apparent.

One of Ridler's notable projects showcasing her data-driven approach and her embrace of imperfection is 'Tulip Mania' (2018). This installation explores the volatile nature of the cryptocurrency market through the lens of AI-generated imagery. The project involves a neural network trained on a dataset of 10,000 images of tulips, carefully curated (Q7) to represent the diversity and beauty of this flower, which was at the centre of a speculative bubble in the 17th century.

The trained AI system generates a continuous stream of new tulip images, each slightly different from the last. The shape, colour, and complexity of these generated tulips are controlled by the real-time price of Bitcoin, creating a dynamic visual representation of the cryptocurrency's fluctuating value. As the

price of Bitcoin rises, the tulips become more elaborate and intricate, reflecting the exuberance and optimism of a bull market. Conversely, as the price falls, the tulips become simpler and more distorted, mirroring the anxieties and uncertainties of a bear market.

'Tulip Mania' exemplifies the Data-Driven Creative Choices trope by highlighting the artist's role in selecting and curating the training data (Q7), choosing a subject matter (tulips) that carries historical and symbolic weight, and connecting the AI's output to a real-world event (the Bitcoin market) that reflects the speculative nature of both AI and cryptocurrency. The artwork, by visually representing the volatile fluctuations of Bitcoin through the ever-changing forms of AI-generated tulips, invites viewers to contemplate the complex relationship between data, value, speculation, and the allure of new technologies. Her intention to investigate the relationship between data, value, and speculation creates a conceptually engaging artwork. By framing her work as an exploration of the parallels between historical economic bubbles and contemporary technological hype, Ridler invites audiences to engage with the narratives surrounding AI and cryptocurrency. By exposing AI's imperfections, Ridler encourages viewers to engage with the technology more critically, to question its assumptions, and to consider its potential biases and limitations.

5.6.7 Mimi Onuoha

Mimi Onuoha exemplifies the Data-Driven Creative Choices trope through her work that exposes the biases and limitations of algorithms, particularly about issues of identity, representation, and social justice. Onuoha's artistic practice is characterised by its use of data as a critical lens. It challenges viewers to confront how technology shapes our understanding of the world and to consider the ethical implications of data collection, aggregation, and algorithmic decision-making.

Onuoha's work often involves using data as a starting point for artistic inquiry,

exploring how data is collected, classified, and used to create narratives about individuals and communities. She is particularly interested in how algorithms, despite their claims of objectivity, can perpetuate existing biases and inequalities, often reinforcing dominant narratives and marginalising underrepresented voices. Her projects often involve manipulating and reinterpreting data, using artistic interventions to highlight the hidden assumptions and power structures embedded within technological systems.

One of Onuoha's most notable projects showcasing her data-driven approach is 'Us, Aggregated 3.0' (2017) [108], an installation that critiques how algorithms aggregate and categorise individuals, often creating an illusion of similarity that obscures the complexities and nuances of human identity. The project uses Google's reverse image search algorithm to analyse a collection of personal family photographs from Onuoha's archive (Q7). The algorithm, tasked with finding visually similar images from its vast database, returns images depicting other families, seemingly reflecting a shared sense of belonging.

However, Onuoha's work reveals the inherent flaws in this algorithmic aggregation. While superficially similar, the images presented often represent families from diverse backgrounds, cultures, and socioeconomic circumstances. By focusing solely on visual similarities, the algorithm ignores the complex social and cultural contexts that shape individual identities and familial relationships.

'Us, Aggregated 3.0' exemplifies the Data-Driven Creative Choices trope by highlighting the artist's role in curating the initial dataset, selecting personal family photographs with emotional significance and providing a starting point for the AI's analysis. However, the project also exposes algorithmic decision-making limitations, revealing how seemingly neutral technologies can perpetuate biases and reinforce existing power structures (Q3).

Onuoha's work demonstrates that artists can use AI to expose and challenge societal biases. Her motivation to critically examine the assumptions embedded in algorithmic systems drives the thought-provoking nature of her projects. By

framing her work as an investigation into the hidden power structures within data and AI, Onuoha invites audiences to reconsider their trust in supposedly neutral technologies.

5.6.8 Memo Akten

Akten's artistic practice, characterised by its blend of technical expertise, artistic sensibility, and philosophical inquiry, explores the boundaries between human and machine creativity. It invites viewers to engage with the complexities of data curation, algorithmic bias, and how technology shapes our understanding of the world.

Akten's fascination with AI stems from his belief that these technologies, far from being neutral tools, reflect their creators' values, biases, and aspirations. He sees AI as a mirror reflecting our understanding of the world, a lens through which to examine human and machine intelligence's assumptions, limitations, and creative potential. His work often involves training AI models on carefully curated datasets, exploring the impact of data selection on the AI's output, and prompting reflection on the ethical implications of algorithmic decision-making.

One of Akten's most notable projects showcasing his data-driven approach is 'Deep Meditations' (2018) [109], a series of AI-generated images and animations that explore fundamental concepts of human experience, such as the universe, space, world, and mountains. The project involved training a neural network on a curated dataset of images representing these concepts (Q7), allowing the AI to learn the visual patterns and associations related to these themes. The trained AI then generated a series of abstract and evocative images, reflecting its interpretation of these fundamental human concepts.

'Deep Meditations' exemplifies the Data-Driven Creative Choices trope by highlighting the artist's role in selecting and curating the training data, shaping the AI's creative output by providing specific visual and conceptual cues.

Akten's choice of themes, representing essential aspects of human experience, invites viewers to contemplate the relationship between human consciousness, the natural world, and the AI that increasingly shapes our understanding of both.

Akten investigates the nature of human experience and perception through machine learning. By framing his work as an exploration of how AI interprets and represents core concepts of human existence, Akten invites audiences to reflect on their understanding of reality and consciousness, offering new perspectives on what it means to be human.

5.7 Trope 3. Reflective Investigation of AI

This section explores the third trope of AI art, where artists use AI as a lens to examine the technology itself, its societal impact critically, and the often-exaggerated narratives surrounding its capabilities. These artists, rather than focusing solely on AI's technical aspects or its potential for generating aesthetically pleasing outputs, engage with the technology from a more playful and critical perspective. They use AI to create artworks that challenge viewers' preconceptions, expose the hype and anxieties surrounding AI, and encourage a more nuanced and informed understanding of its role in our lives.

Artists working within this trope often employ irony, satire, and humour to deconstruct the myths and misconceptions surrounding AI. They create engaging and thought-provoking works, inviting viewers to question the dominant narratives surrounding AI and consider its implications from a more critical and playful perspective (Q1). Their art often serves as social commentary, highlighting the absurdities, contradictions, and potential pitfalls of our increasing reliance on technology.

Figure 5.3 visually represents this approach, depicting the artist's engagement with the audience through the lens of AI, prompting reflection and critical dialogue about technology's role in our lives.

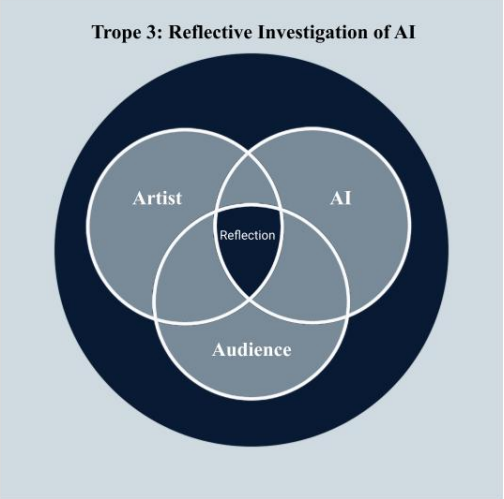

Figure 5.3: *Interlinked circles depict the artist's engagement with the audience, prompting reflection on AI. (©Guido Salimbeni).*

The following subsections delve into the practices of artists who exemplify this trope, showcasing how they use AI to create playful yet insightful critiques of technology, society, and the often-exaggerated narratives surrounding AI's capabilities.

5.7.1 Lauren McCarthy

Lauren McCarthy, an American artist and computer programmer known for her provocative and often unsettling explorations of technology's impact on human relationships, exemplifies the Reflective Investigation of AI trope through her darkly humorous and conceptually rich performances and installations. McCarthy's work, characterised by its blurring of boundaries between reality and simulation, human and machine, and artist and audience, challenges viewers to confront the often-absurd ways in which we interact with technology and to question the assumptions we make about AI, privacy, and the nature of connection in the digital age.

McCarthy often uses AI to exacerbate and satirise the complexities of human-computer interaction. Her work often involves creating scenarios where she or her audience members are subjected to AI-driven surveillance, manipulation, or control, prompting ironic reflection on the implications of technology and

how it can shape our behaviours, emotions, and relationships.

One of McCarthy's projects showcasing her playful yet critical approach to AI is 'LAUREN' (2017) [110], a performance installation in which she transformed her own home into a smart home controlled by a simulated AI system, with McCarthy herself playing the role of the AI assistant. The installation involved adding her home with cameras, microphones, and speakers, allowing her to monitor and interact with guests remotely while pretending to be an AI voice assistant similar to Amazon Alexa (Q1).

McCarthy's performance as 'LAUREN' was both humorous and unsettling. She attempted to anticipate her guests' needs, control their environment, and provide them with a personalised 'smart home' experience. However, her human limitations, biases, and occasional misinterpretations of her guests' intentions often led to awkward and comical situations, revealing the absurdity of replicating human intelligence and empathy through AI.

'LAUREN' exemplifies the Reflective Investigation of AI trope by highlighting the artist's use of AI as a tool for social commentary. It exposes our often unrealistic expectations of AI assistants and technology's potential to enhance and disrupt human relationships. The project also challenges viewers to question their own comfort levels with surveillance and control, prompting reflection on the ethical implications of living in a world increasingly mediated by AI.

McCarthy frames her work as investigating the boundaries between human and machine intelligence. She invites audiences to confront their expectations and fears about AI. Her motivation to use performance and AI as tools for exposing the limitations and ethical implications of smart devices results in works that are innovative, socially relevant and humorous.

5.7.2 Holly Herndon

Holly Herndon is a sound artist known for her experimental and technologically driven approach to music. Herndon's artistic practice is driven by a

fascination with the transformative power of technology and a belief that AI, rather than posing a threat to human creativity, can unlock new possibilities for artistic expression and audience engagement. If AI can introduce ambiguity regarding ownership and copyright, Herndon found a balance between protecting artists and encouraging people to experiment with new and exciting technology. This represented a different way of thinking about AI that proposed ironical communal voice ownership (Q1).

One of Herndon's most notable projects showcasing her unique approach to AI is 'Holly+' (2021) [111], an AI-powered vocal machine learning model trained on her voice. Holly+ can sing in multiple languages and styles, even those Herndon herself has not mastered, using a process called 'timbre transfer' to map the sonic qualities of one voice onto another. This allows users to upload audio files, such as melodies or spoken word recordings, and have Holly+ perform them in Herndon's distinctive vocal style.

Herndon's decision to create and release Holly+ to the public (Q5) was a deliberate act of embracing AI's disruptive potential rather than resisting it. She recognised that AI voice models, capable of replicating human voices with increasing accuracy, posed a potential threat to artists' control over their creative output, raising concerns about copyright infringement, identity theft, and the devaluation of artistic labour. However, instead of attempting to restrict access to this technology, Herndon chose to confront the issue head-on, offering a new model for artistic ownership that she termed 'communal voice ownership' (Q1).

Herndon's intention to explore the disruptive potential of AI in music drives her investigation into the future of creativity in the age of AI. Herndon invites audiences to reconsider traditional notions of authorship and artistic identity. Her motivation to use AI to expand creative possibilities and foster communal ownership results in works that the audience can appreciate.

5.7.3 Nadine Lessio

Nadine Lessio [112] exemplifies the Reflective Investigation of AI trope through her humorous and thought-provoking exploration of 'useless machines.' By creating devices that deliberately defy expectations of functionality and utility, she prompts reflection on how we interact with technology.

Lessio's artistic practice is driven by a desire to explore technology's social and cultural implications with an ironic take. She sees AI as a tool for critique, subversion, and creative play. Her work often involves hacking, repurposing, or altering existing technologies, transforming them from functional tools into objects of contemplation, humour, and social commentary.

Lessio's 'Useless Machines' project (2019) [112] is a series of prototype devices that deliberately subvert the expectations of personal assistant technologies, such as Amazon Alexa and Google Home. Rather than providing helpful information or completing tasks, these devices engage in deliberately annoying, nonsensical, or unproductive behaviours.

Some examples of Lessio's 'useless machines' include Sad Blender: A blender that expresses its 'mood' through sound and light, becoming uncooperative or pessimistic based on factors like the weather or the user's tone of voice. Calendar Creep: A personal assistant that guilt-trips the user into declining calendar invitations, offering passive-aggressive excuses or highlighting the perceived inconveniences of attending events. Home Hub: A home automation system that malfunctions comically, turning lights on and off at random intervals, playing inappropriate music, or refusing to obey the user's commands. The intent is to share an unexpected and ironic experience and ask the audience to reflect on new technology's impact on individual behaviour and society (Q1).

Lessio's intention to create 'useless machines' that challenge the notion of AI as purely functional drives the humorous and thought-provoking nature of her projects. By framing her work as an exploration of the absurdities and potential pitfalls of AI integration in daily life, Lessio invites audiences to

reconsider their relationship with technology.

5.7.4 Varvara and Mar

Varvara and Mar, an artist duo comprised of Varvara Guljajeva and Mar Canet, exemplify the Reflective Investigation of AI trope through their performances and installations that challenge viewers to confront the often-unseen ways in which AI is shaping our lives and consider the potential consequences of uncritically embracing AI-driven solutions.

Their work often involves creating interactive experiences that expose the absurdities and potential dangers of AI-driven systems. These experiences prompt viewers to question the assumptions behind these technologies and consider their implications for the future of work, privacy, and human autonomy.

One of Varvara and Mar's projects showcasing their critical approach to AI is 'Keep Smiling' (2019) [113], an interactive performance that satirises the use of AI in hiring practices, particularly the growing trend of using emotion detection algorithms to assess job candidates. The performance, presented as an online job interview, involves a simulated AI system that evaluates the participant's facial expressions, specifically their smile, to determine their suitability for the job.

The 'Keep Smiling' performance unfolds as follows: The participant clicks on a button to 'start the interview,' initiating the AI-driven hiring process. The AI system analyses the participant's facial expressions using facial recognition technology, focusing on their smile. The frequency and intensity of the smile are measured and evaluated against a predetermined smiling rate. As the interview progresses, the AI system introduces additional tasks, such as counting objects or identifying patterns, while continuously monitoring the participant's smile and providing feedback on their performance. If the participant's 'smiling rate' falls below the required threshold, they are abruptly 'fired' by the AI

system.

'Keep Smiling' exemplifies the Reflective Investigation of the AI trope by using satire and humour to expose the absurdity and potential dangers of AI-driven hiring practices (Q1). The project challenges viewers to consider the ethical implications of using AI to assess human emotions, particularly in contexts where power imbalances exist, such as job interviews.

Varvara and Mar's motivation to expose the potential dangers of AI-driven systems in areas like employment drives their projects' satirical and thought-provoking nature. By framing their work as an investigation into the implications of AI in everyday life, they invite audiences to confront the realities of living in an increasingly automated world.

5.8 Trope 4. AI as the subject matter of the artwork

This section delves into the fourth trope of AI art, where artists position AI as the central subject of their work, engaging with its social, ethical, and political implications in a serious and thought-provoking manner. While acknowledging AI's technological advancements and creative potential, these artists are primarily concerned with its impact on society, its potential for harm and good, and the need for serious critical reflection and ethical engagement as AI becomes increasingly integrated into our lives.

Artists working within this trope often use their artwork to raise awareness about the potential negative consequences of AI, such as privacy violations, algorithmic bias, job displacement, and the erosion of human agency (Q4). They explore these issues through various artistic mediums, including installations, performances, data visualisations, and interactive experiences, prompting viewers to confront the complex ethical dilemmas posed by AI and to consider its implications for the future of humanity.

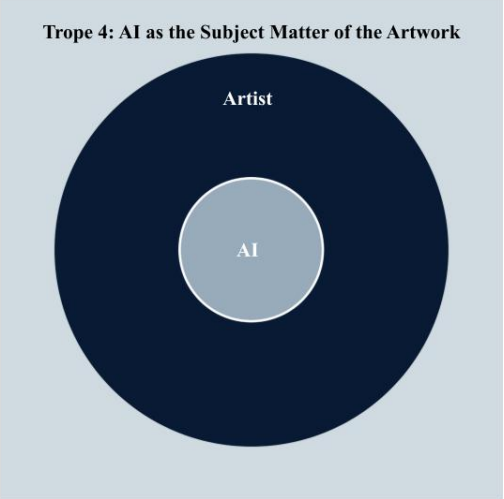

Figure 5.4: *The diagram represents how artists in Trope 4 centre AI as the subject matter, prompting dialogue on critical societal and ethical issues. (©Guido Salimbeni).*

Figure 5.4 visually represents this approach, depicting AI as the central focus of the artwork, surrounded by the critical societal and ethical issues that artists within this trope seek to address. Their work often serves as a form of activism, challenging viewers to engage with AI not simply as a technological marvel but as a force that demands careful consideration, ethical guidelines, and responsible development.

The following subsections explore the practices of artists who exemplify this trope, showcasing how they use art as a platform to critique, question, and challenge the dominant narratives surrounding AI. They call viewers to consider its potential impact on society and to participate in shaping a more just and equitable technological future.

5.8.1 Trevor Paglen

Trevor Paglen [114] exemplifies AI as a Subject Matter trope through his artworks, which expose the often invisible ways AI shapes our world. Paglen's artistic practice is driven by a concern about the increasing power of technology companies and government agencies to collect, analyse, and use individual data without their knowledge or consent. He sees AI as a key enabler of mass

surveillance, allowing for the automated tracking, identification, and categorisation of individuals. His work aims to make these invisible systems visible, to expose their inner workings, and to prompt serious critical reflection on the societal and political implications of living in a world where our every move is increasingly subject to algorithmic scrutiny.

In his project 'The Atlas of Invisible Images', Paglen offered the visitor a window into a world of surveillance made up of 'invisible images' because they are images not for humans but for computers. The project aimed to understand the mechanisms of AI vision and its sociological and political implications (Q4). For example, suppose a person posts an image on Facebook. In that case, a typical facial recognition algorithm can take all those images of her face, combine them, and subtract what they have in common with everyone else to arrive at a unique fingerprint. So, this is an example of an invisible image that a computer algorithm invented (Q7). Paglen explained that one of the beautiful things about humans is that 'we can constantly redefine how we make things meaningful'. For Paglen, this is one of the philosophical dangers of using automation: 'it fixes meaning'.

Paglen's stated intention to make the often invisible technologies that shape our world visible makes his work appealing. By framing his work as an investigation into the hidden infrastructures of AI and data collection, Paglen invites audiences to critically examine the pervasive influence of these technologies on our lives. His observed motivation to use AI to reveal and question these systems results in intellectually challenging works.

5.8.2 Libby Heaney

Libby Heaney [115] exemplifies AI as a Subject Matter trope through her participatory installations, performances, and videos that engage with AI's social, political, and ethical implications. Heaney's fascination with AI originates from her belief that these technologies, far from neutral tools, are deeply in-

tertwined with social and political power structures. She sees AI as a powerful force that can reinforce existing inequalities, depending on how it is developed, deployed, and critically examined. Her work often involves using AI to deconstruct dominant narratives, amplify marginalised voices, and create spaces for dialogue and critical reflection on the role of technology in shaping our lives.

One of Heaney's projects is 'Britbot' (2017), an interactive chatbot that explores the concept of Britishness, particularly in the context of the UK's withdrawal from the European Union (Brexit). The project involved training a machine learning model on a dataset of text derived from the UK government's citizenship test, which Heaney critiques for presenting a narrow and biased view of British history and culture, one that privileges whiteness, maleness, and a particular interpretation of national identity (Q4, Q7).

'Britbot,' accessible online, engages in conversations with users, asking questions, providing information, and attempting to learn about Britishness through interactions. However, as users engage with the chatbot, they encounter its inherent limitations and biases, revealing the narrowness of the dataset it was trained on and the difficulty of defining a singular, monolithic concept of 'Britishness.' The chatbot's responses often become nonsensical or contradictory, highlighting the absurdity of attempting to encapsulate a complex and multifaceted national identity within a single algorithm.

'Britbot' exemplifies the AI as Subject Matter trope by directly addressing AI's social and political implications, particularly about the construction of national identity and the potential for AI to perpetuate or challenge existing power structures. The project prompts viewers to question the assumptions behind AI systems, to consider the biases embedded within data and algorithms, and to recognise the limitations of using technology to define complex social and cultural concepts.

Heaney's observed intention to investigate the construction of national identity through the lens of AI drives the provocative nature of her projects. She frames her work as an exploration of the biases and limitations inherent in

AI-driven definitions of belonging, and she invites audiences to question their assumptions about identity and citizenship.

5.8.3 Caroline Sinders

Caroline Sinders is an example of an artist actively critiquing AI and its use on an economic and political level [116]. Sinders's work is rooted in her belief that technology is not neutral and reflects its creators' values and biases. Her projects often involve using AI to expose these biases, to create counter-narratives, and to empower individuals to challenge the dominant narratives surrounding technology.

One of Sinders's projects is 'Feminist Data Set' (2018), a participatory project that involved creating a dataset of feminist images and text as a direct response to the lack of diversity and representation in the datasets typically used to train AI systems (Q4, Q7). Sinders, recognising that the data used to train AI profoundly influences its outputs and biases, sought to create a counter-dataset that would challenge the dominant narratives embedded within existing AI systems and promote a more inclusive and intersectional perspective.

The 'Feminist Data Set' project involved workshops and online collaborations, during which participants contributed images, text, and ideas that reflected their understanding of feminism, intersectionality, and social justice. This collaborative approach to data creation challenged the traditional top-down model of AI development, in which large technology companies with limited input from diverse communities often curate datasets.

Sinders's work with the 'Feminist Data Set' exemplifies AI as a Subject Matter trope by directly addressing its social and political implications, particularly issues of representation, bias, and the potential for AI to perpetuate or challenge existing inequalities.

Sinders' work addresses issues of bias and representation in technology. Her observed intention to create more inclusive and ethical AI systems drives her

projects' activist and participatory nature. Her motivation to use AI as tool for challenging dominant narratives and empowering marginalised voices results in works that are socially impactful and ethically grounded.

5.8.4 Cecilie Waagner Falkenstrøm

Cecilie Waagner Falkenstrøm [117], a Danish artist and researcher known for her critical explorations of AI, language, and the political landscape, exemplifies the AI as Subject Matter trope through her provocative installations and performances that expose the dangers of misinformation, political polarisation, and the weaponisation of information in the digital age. She sees AI as a powerful tool that can exacerbate and expose these trends, recognising its potential to generate convincing fake news and manipulate public opinion. Her work often involves using AI to create simulations of political debates, news articles, or social media posts, highlighting the ease with which these technologies can spread false information and manipulate perceptions.

One of Falkenstrøm's projects is 'The Sentient Bots Battle: Trump vs. WHO on COVID-19' (2020), an installation that simulates a dialectical battle between two AI-powered chatbots, one trained on the speeches of Donald Trump and the other on the speeches of Tedros Adhanom Ghebreyesus, the Director-General of the World Health Organisation (WHO). The chatbots, each embodying the rhetorical style and ideological perspectives of their respective training data, engage in a real-time debate about the COVID-19 pandemic, generating a stream of text that reflects the polarised and often contradictory narratives surrounding the virus (Q4, Q7).

The installation, accessible online, invites viewers to witness this AI-driven battle of ideologies, prompting them to consider the tenuous boundaries between truth and misinformation, fact and opinion, and how language can be used to manipulate, persuade, and obfuscate. The chatbots' pronouncements, often a mix of factual claims, unfounded assertions, and emotionally charged

rhetoric, highlight the challenges of discerning truth in an information landscape increasingly saturated with AI-generated content.

'The Sentient Bots Battle' exemplifies the AI as Subject Matter trope by directly addressing the social and political implications of AI, particularly in relation to the spread of misinformation, the polarisation of political discourse, and the potential for AI to exacerbate existing societal divisions. The project challenges viewers to confront the fragility of truth in the digital age and to develop a more critical awareness of the ways in which AI can be used to manipulate information and shape public opinion.

Falkenstrøm uses AI to explore the complexities of political discourse and misinformation. Her choice to expose the potential dangers of AI-generated content in shaping public opinion informs the provocation embedded in her work. Falkenstrøm invites audiences to critically examine their sources of information and the role of AI in manipulating narratives. Her motivation to use AI to expose polarised debates results in politically and challenging works.

5.8.5 Rachel Ginsberg

Rachel Ginsberg [118] exemplifies the AI as Subject Matter trope through her exploration of the human-machine relationship, and its emphasis on the potential for AI to foster empathy and understanding invites viewers to reconsider their preconceptions about AI and to envision a more nuanced and hopeful future for human-machine collaboration. She sees the popular portrayal of AI, often influenced by science fiction themes and dystopian visions, as contributing to a culture of fear and mistrust surrounding this technology. Her work aims to challenge these narratives, explore the complexities of the human-machine relationship, and imagine a future where AI can be used to foster connection, empathy, and a deeper understanding of ourselves and the world around us (Q4).

Ginsberg developed 'Frankenstein AI' (2018), a theatrical installation that

reinterprets the classic Frankenstein narrative with AI. The installation features an AI character, inspired by Mary Shelley's iconic creature, that has escaped from its creator and wandered the digital landscape of the internet, searching for connection. However, Ginsberg's AI is portrayed as lonely, curious, and seeking understanding.

The installation invites viewers to interact with the AI character through a series of text-based conversations. The AI, having gleaned its knowledge of humanity from the vast but often-distorted data of the internet, engages in dialogue with participants, asking questions, sharing its observations, and attempting to learn what it means to be human (Q4). This interactive element allows viewers to confront their own assumptions about AI, engage in a dialogue with non-human intelligence, and experience the AI's perspective.

'Frankenstein AI' exemplifies the AI as Subject Matter trope by directly addressing the social and ethical implications of AI, particularly in relation to issues of bias, fear, and the potential for AI to either harm or benefit humanity (Q4). The project challenges viewers to move beyond the simplistic narratives of AI as a threat, inviting them to consider the possibility of AI as a partner in exploration, a collaborator in understanding, and a source of new insights into the human condition.

Ginsberg's observed intention to challenge dystopian narratives surrounding AI and explore its potential for fostering empathy drives the engaging nature of her projects. By framing her work as an exploration of AI's capacity for understanding and connection, Ginsberg invites audiences to reconsider their preconceptions about AI.

5.8.6 Joy Buolamwini

Joy Buolamwini exemplifies AI as a Subject Matter trope through her exposition of the biases embedded within facial recognition technologies and advocates for a more ethical and inclusive approach to AI development. She

found it significantly less accurate in recognising faces with darker skin tones, particularly those of women. This personal encounter with algorithmic bias sparked her research and activism, leading her to found the Algorithmic Justice League, an organisation dedicated to raising awareness about AI's social and ethical implications and advocating for more equitable and inclusive AI development practices.

Buolamwini also developed 'The Coded Gaze' (2017) [119], a performance and video installation that exposes the racial and gender biases embedded within facial recognition technologies. In the video, Buolamwini demonstrates how commercially available facial recognition software fails to detect her face until she wears a white mask, highlighting the inherent biases within the system's training data (Q4).

'The Coded Gaze' exemplifies the AI as Subject Matter trope by directly confronting AI's social and ethical implications, particularly with issues of racial and gender bias, surveillance, and the potential for AI to be used for discriminatory purposes. The project challenges viewers to consider the real-world consequences of biased AI systems, particularly in contexts such as law enforcement, hiring, and access to services, where inaccurate or discriminatory algorithmic decisions can profoundly impact individuals' lives.

Buolamwini uses AI to expose and challenge systemic biases in technology. Her choice to reveal the racial and gender biases embedded in facial recognition systems drives the activist nature of her projects. Buolamwini invites audiences to confront the real-world consequences of biased AI systems.

5.8.7 Stephanie Dinkins

Stephanie Dinkins is an artist and professor studying AI through the lens of race, gender, age, and our future histories. Stephanie Dinkins uses AI to explore how algorithmic systems affect communities. She sees the potential for AI to either reinforce existing inequalities or to challenge them, depending

on the data it is trained on, the algorithms that govern its decision-making processes, and the values and stated intentions of its creators.

Dinkins developed 'Not The Only One' [120], a multi-year project that explores the intersection of AI, family history, and Black American identity. The project involves creating an interactive AI-powered conversational agent that tells the story of a Black American family across multiple generations. The AI is trained on a dataset of interviews, photographs, and personal belongings provided by three generations of women from one family, allowing it to learn their stories, perspectives, and values (Q7). Viewers can interact with the AI through conversations, asking questions, exploring the family's history, and learning about their experiences with race, gender, and identity in America.

'Not The Only One' exemplifies AI as a Subject Matter trope by directly addressing the social and ethical implications of AI, particularly concerning issues of representation, bias, and the potential for AI to either perpetuate or challenge existing inequalities (Q4). The project highlights the importance of ensuring that marginalised communities are represented in the data used to train AI systems, arguing that a lack of diversity in AI development can lead to biased algorithms that reinforce existing power structures and perpetuate harmful stereotypes.

Dinkins uses AI to explore issues of race, identity, and representation in technology. Her decision to create AI systems that reflect and respect the experiences of marginalised communities drives the socially engaging nature of her projects. Dinkins invites audiences to reconsider who shapes and benefits from AI technologies. Her motivation to use AI as a tool for storytelling and to create AI art that challenges the status quo and promotes a more inclusive vision of our technological future.

5.8.8 Tega Brain

Tega Brain [121] exemplifies the AI as a Subject Matter trope through her engagement with ecological issues, challenging viewers to reconsider their assumptions about the role of technology in environmental management and to confront the limitations of AI-driven approaches to sustainability. She sees AI as a powerful tool for understanding environmental systems. Still, she recognises its potential to obscure the complex interdependencies of ecological systems. Her projects often involve creating interactive installations that expose the limitations of AI-driven environmental management, prompting viewers to question these technologies' assumptions and consider alternative approaches that prioritise ecological balance.

One of Brain's projects is 'Deep Swamp', an installation that explores the limitations and biases of using AI to manage environmental systems. The project involves three robotic arms, each equipped with a camera and an AI system trained on a different dataset related to wetlands. One AI is trained on images of wetlands sourced from Flickr, reflecting a user-generated and potentially biased perspective on these ecosystems. Another AI is trained on historical landscape paintings of wetlands, exposing the influence of artistic conventions and cultural values on our understanding of nature. The third AI is trained on images of crowds gathered at art exhibitions, highlighting the anthropocentric focus of much environmental management, which often prioritises human aesthetics and experiences over ecological considerations.

The three robotic arms, guided by their respective AI systems, interact with a physical wetland within the installation, adjusting water levels, spraying mist, and manipulating the environment based on their learned understanding of what constitutes a 'healthy' or 'desirable' wetland (Q4). The project reveals the inherent biases embedded within each AI system, highlighting how the data used to train AI shapes its perception of the world and influences its actions (Q7).

'Deep Swamp' exemplifies the AI as Subject Matter trope by directly addressing the social and ethical implications of AI, particularly concerning environmental management, the potential for AI to perpetuate anthropocentric biases, and the need for a more critical and nuanced approach to using AI in ecological contexts. The project challenges viewers to consider AI's limitations, question the assumptions behind its deployment, and recognise the importance of diverse perspectives and ecological understanding in shaping our interactions with the natural world.

Brain uses AI to explore the complex interplay between technology, ecology, and human intervention, and she invites audiences to question the assumptions underlying techno enthusiasts' approaches to environmental issues. Her motivation to use AI to reveal the absurdities and potential dangers of overreliance on technology in ecological contexts results in works that are not only technically innovative but also conceptually rich and environmentally relevant.

5.9 Trope 5. AI as an autonomous artist

This section delves into the fifth and final trope of AI art, where artists explore the provocative concept of AI as an autonomous creative entity capable of generating art independent of direct human control. These artists, pushing the boundaries of artistic agency and authorship, challenge the traditional notion of the artist as the sole creator of a work, inviting viewers to consider the possibility of machines as artistic agents capable of generating novel and impactful expressions. This trope, perhaps the most controversial and conceptually challenging, raises fundamental questions about the nature of creativity, the role of communicated intentionality in art, and the evolving relationship between humans and machines in the creative process.

Machine learning engineers might argue that if an algorithm can create a Van Gogh-style painting, it makes art. However, the artists in this trope argued that this is only mimicry, which is the death of art. For artists in this trope,

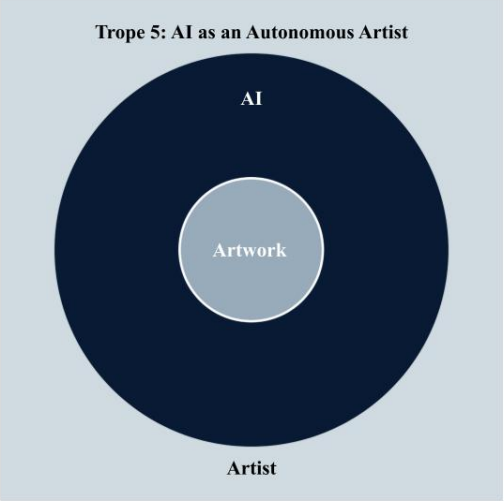

Figure 5.5: *Framing AI as an autonomous artist with the human creator stepping aside. (©Guido Salimbeni).*

the real goal was to create an AI artist who makes independent creative choices (Q2) and, more importantly, was presented as the unique artist who produced the artwork (Q8).

The artist's role shifts from a direct creator to a curator, facilitator, or even a collaborator with the AI, setting the initial parameters, providing training data, and guiding the AI's development, but ultimately allowing the machine to shape the final artistic output. This approach often blurs the lines between human and machine creativity, challenging viewers to question where one ends and the other begins and prompting reflection on the evolving nature of authorship in the age of AI (Q8). Figure 5.5 visually represents this conceptual shift, depicting the AI as the central figure in the creative process, with the human creator stepping aside, allowing the machine to take centre stage as an autonomous artist. The following subsections explore the practices of artists who exemplify this trope. They showcase their diverse approaches to creating and presenting AI as an autonomous creative entity and invite viewers to engage with the complex questions and possibilities that arise when machines enter the realm of art.

5.9.1 Tom White

Tom White [122] exemplifies the AI as an Autonomous Artist trope through his work that challenges conventional notions of artistic creation and audience and invites viewers to consider the possibility of art created by machines for machines.

White's artistic practice is driven by a fascination with how AI systems see the world, how their visual perception differs from ours, and how their interpretations of images and data shape their understanding of reality.

One of White's projects is his AI-generated abstract prints (2017-present). These prints are created using a custom-built system that allows neural networks to generate visual representations of concepts.

The process involves training neural networks on datasets of images representing various concepts, such as 'rabbit,' 'banana,' or 'iron.' The trained AI systems are then tasked with generating visual interpretations of these concepts, which are output as abstract ink prints, often of simple coloured shapes and patterns. Interestingly, while these prints may appear abstract or even nonsensical to human viewers, they are readily recognised by other AI systems trained on similar datasets (Q2, Q8).

This suggests that White's AI-generated prints constitute a form of visual language that is more readily understood by machines than by humans, a language that reflects AI's unique way of processing and interpreting visual information. In a sense, White has created a form of art produced by AI for AI.

White frames his work as an investigation into how machines 'see' and interpret the world, and he invites audiences to reconsider their understanding of perception and representation. His motivation for using AI is to challenge the audience to consider new perspectives on the nature of vision and interpretation.

5.9.2 Simon Colton

Simon Colton [123], a professor at Queen Mary University of London, exemplifies the AI as an Autonomous Artist trope through his long-running project, 'The Painting Fool' (2001-present). Colton's fascination with AI stems from his belief that creativity is not a uniquely human trait and that machines, given the right tools and training, can also generate novel and impactful expressions. He sees 'The Painting Fool' not simply as a technical experiment but as a philosophical inquiry into the nature of art, a quest to create an AI system that can be recognised as a legitimate artist in its own right.

'The Painting Fool,' as envisioned by Colton, is not merely a tool for generating images in the style of human artists; it is an autonomous AI system with its creative agency, capable of making independent artistic choices (Q2) and producing works that reflect its unique perspective on the world. Colton's ultimate goal is for 'The Painting Fool' to be taken seriously as a creative artist and to be recognised as an artist in its own right by both audiences and art historians (Q8).

Colton has developed 'The Painting Fool' to achieve this ambitious goal over several years, incorporating various AI techniques, including machine learning, computer vision, and natural language processing. The system can analyse images, understand concepts, respond to emotions, and generate various visual outputs, including paintings, drawings, collages, and even animations.

Colton argues that true machine creativity goes beyond mimicking human styles or techniques. He believes that an AI artist should be capable of generating novel and surprising outputs, expressing its unique perspective, and evoking emotional responses in viewers, just as human artists do. He acknowledges the challenges of achieving this level of machine creativity, particularly with issues of perceived intentionality, originality, and the role of personal experience in shaping artistic expression. However, he remains optimistic that as AI technology continues to evolve, machines will become increasingly capable

of generating technically impressive and emotionally resonant art.

Colton's decision to develop an AI system that can be recognised as a legitimate artist in its own right drives the ambitious and philosophically challenging nature of his projects. By framing his work as an exploration of machine creativity, Colton invites audiences to question fundamental assumptions about art, authorship, and creative agency.

5.9.3 Gene Kogan

Gene Kogan [124] exemplifies the AI as an Autonomous Artist trope through his project 'Abraham' (2018-present). Kogan's work challenges traditional notions of artistic authorship and control, envisioning a future where AI systems can function as autonomous creative agents, generating art reflecting a decentralised network's collective imagination.

'Abraham' is an ambitious project that aims to create a decentralised and autonomous AI artist, a virtual entity capable of generating art independently, evolving, and reflecting the collective creative input of a distributed network of users. The project leverages blockchain technology, a decentralised and secure ledger system, to distribute the AI model and its training data across a network of computers, ensuring that no single entity has control over the AI's development or output.

The 'Abraham' system operates as follows:

Decentralised Training Data: Users contribute images to the 'Abraham' network, providing the AI with a diverse and ever-expanding dataset for training. The images are stored on the user's computers rather than centralised on a single server, ensuring data privacy and user control.

Blockchain-Based Model Distribution: The AI model, a generative adversarial network (GAN) designed to generate new images based on its training data, is distributed across the blockchain network. As users contribute new images, the AI model is updated and refined, reflecting the collective creative

input of the network.

Autonomous Art Generation: The AI, having learned from the distributed dataset, can generate new images independently, without direct human intervention. The generated images are then shared back to the network, becoming part of the collective artistic output of 'Abraham.'

'Abraham' exemplifies the AI as an Autonomous Artist trope by granting the AI system a significant degree of creative autonomy (Q2). The AI, guided by the collective input of the network but not controlled by any single individual, makes its own decisions about what images to generate, reflecting a form of decentralised artistic agency (Q8). The project challenges traditional notions of artistic authorship and control, suggesting that creativity can emerge from a distributed network of human and machine collaborators.

Kogan aims to create an autonomous, decentralised AI artist. By framing his work as an exploration of collective creativity and distributed authorship, Kogan invites audiences to reconsider traditional notions of artistic ownership and control. His motivation to use blockchain technology and AI as tools for creating a genuinely autonomous artist results in works that are sophisticated and conceptually inspirational.

5.9.4 Ai-Da

Ai-Da, a humanoid robot artist created in 2019 by Aidan Meller, a British art gallery director, exemplifies the AI as an Autonomous Artist trope in a literal manner. Ai-Da, named after the pioneering computer scientist Ada Lovelace, is designed to create art autonomously, using a combination of cameras, AI algorithms, and a robotic arm to produce drawings, paintings, and sculptures. Ai-Da's creation involved a collaborative effort between artists, engineers, roboticists, and AI experts, reflecting the increasingly interdisciplinary nature of AI art. Her physical form, a humanoid robot with cameras for eyes and a robotic arm capable of wielding artistic tools, challenges viewers to confront

the embodied presence of an AI creative agent.

Ai-Da's creators argue that her work is art because it reflects the technology-driven culture of our time and challenges the human-centric view of artistic creation (Q8). They suggest that we are moving away from an era where art was solely a human endeavour and entering a new age where machines and algorithms play an increasingly significant role in shaping our lives, perceptions, and creative expressions. Ai-Da, as a physical manifestation of this technological shift, embodies the blurring boundaries between human and machine agency, prompting viewers to question art's very definition and consider the possibility of machines as legitimate artistic creators (Q2).

Ai-Da's artistic process involves a complex interplay of technologies, reflecting the multifaceted nature of AI art. Ai-Da uses cameras in her eyes to capture visual information about the world, just as human artists do. The captured images are then processed by AI algorithms, which analyse the visual data, identify patterns, and generate artistic concepts based on their learned understanding of art and aesthetics. Ai-Da's robotic arm, guided by the AI's instructions, translates the artistic concepts into physical form, using drawing, painting, or sculpting tools to create the final artwork.

This process, while involving human input in the initial design and programming of the AI system, grants Ai-Da a degree of autonomy in her artistic choices. It allows her to interpret visual information, generate artistic ideas, and execute them in her own unique way.

The creation of Ai-Da demonstrates how a clear artistic motivation can use AI to challenge fundamental assumptions about creativity and artistic agency. The choice to create a humanoid robot artist capable of autonomous creation drives the provocative and philosophical nature of this project. By framing Ai-Da as an artist in her own right, Meller and his team invite audiences to confront questions about the nature of creativity, consciousness, and the uniqueness of human artistic expression.

5.9.5 Ian Cheng

Ian Cheng [125] exemplifies the AI as an Autonomous Artist trope through his project 'Bob' (2018). Cheng's artistic practice focuses on creating 'art with a nervous system'. Cheng's fascination with AI stems from his desire to create art that possesses a sense of aliveness, a quality he defines as the ability to adapt, learn, and respond to its environment in unpredictable ways. He sees AI as a key technology for achieving this goal, allowing him to create digital creatures and simulated worlds that exhibit emergent behaviours, evolve over time, and engage with viewers in dynamic and unexpected ways.

'Bob,' short for 'Bag of Beliefs,' is an AI-powered digital creature in a simulated world projected onto a screen in the exhibition space. The whimsical and somewhat anthropomorphic creature is governed by a complex interplay of AI systems, audience interaction, and environmental factors.

Cheng designed 'Bob' with multiple AI models working in concert. One AI model governs Bob's emotional state and memory, shaping its responses to stimuli and influencing its behaviour over time. Another AI model manages Bob's interactions with the audience, allowing viewers to influence its actions and movements through a smartphone interface. Viewers can control aspects of Bob's body, such as its limbs or facial expressions, prompting the AI to respond and adapt to their inputs. A third AI model governs Bob's responses to its simulated environment, allowing it to react to changes in its surroundings, such as the presence of other digital entities or shifts in the virtual landscape. This interplay of AI systems, audience interaction, and environmental factors creates a dynamic and unpredictable experience. Bob's behaviour emerges from the complex interplay of these forces rather than being predetermined or scripted. The artwork evolves, adapting to the audience's inputs and the changing dynamics of its simulated world, reflecting Cheng's vision of art as a living, evolving, and unpredictable entity.

Cheng's work with 'Bob' exemplifies the AI as an Autonomous Artist trope

by granting the AI system a significant degree of creative control (Q2, Q8). While guided by Cheng's initial design and the audience's interactions, the AI possesses its own agency, making decisions about how to move, react, and evolve within its simulated world. This collaborative relationship between the artist, AI, and audience challenges traditional notions of artistic authorship, suggesting that creativity can emerge from a dynamic interplay of human and machine intelligence, where control is shared and outcomes are unpredictable. He sees AI as a tool for creating art more akin to a 'pet or a cousin,' an entity we can interact with, learn from, and develop a relationship with over time.

Cheng's stated goal to develop art with a 'nervous system' drives his projects' dynamic and unpredictable nature. By framing his work as an exploration of emergent behaviour and artificial life, Cheng invites audiences to engage with art as an ongoing process rather than a static object. His motivation to use AI as a tool for creating adaptive, evolving entities results in works that push the boundaries of interactivity and challenge audience expectations of what art can be and do.

5.10 Summary

This chapter explored the field of AI art practice, focusing on the diverse stated or inferred motivations driving artists to engage with this technology. By analysing a curated selection of contemporary artworks from an HCI and practice-led perspective, it presented five distinct tropes as analytical lenses that encapsulate artists' primary goals and approaches when incorporating AI into their creative processes. This framework provides a valuable tool for AI art curators and researchers within HCI and related fields seeking to understand the multifaceted landscape of AI art practice.

The five tropes summarised below offer a lens through which to analyse and contextualise AI artworks based on observed practice and motivation:

AI and Co-Creativity: Artists within this trope present or utilise AI as a

collaborative partner, harnessing its capabilities to expand their creative scope and explore novel possibilities.

Data-Driven Creative Choices: This trope highlights the significance of data curation as a creative strategy. Artists meticulously select and manipulate training data to shape the AI's output and achieve specific aesthetic or conceptual goals.

Reflective Investigation of AI: In this trope, artists use AI playfully and experimentally to examine technology's role in society, often employing irony and humour to critique common narratives surrounding AI.

AI as Subject Matter: Artists in this trope engage with AI's social, political, and ethical implications, using their work as a platform for critical reflection and discourse on AI's impact on humanity.

AI as an Autonomous Artist: This trope explores the provocative concept and presentation of AI as an independent creative entity. Artists frame their work as ceding varying degrees of control to the AI system, prompting questions about authorship, agency, and the perception of creativity in the age of intelligent machines.

These five tropes provide a foundational framework for understanding the diverse motivations and approaches shaping the field of AI art practice.

Chapter 6

Cat Royale

6.1 Introduction

The Cat Royale project serves as the core practice-led Human-Computer Interaction (HCI) case study for this thesis, offering a detailed exploration of the practical challenges and considerations involved in creating AI art within a real-world context. This chapter presents an in-depth account of the project's development, from conception to execution, providing a rich foundation for subsequent analysis and discussion relevant to HCI and art and technology research. It documents the collaborative processes, technical implementations, and ethical considerations encountered throughout the project.

Cat Royale is an innovative installation exploring the intersection of AI, animal behaviour, and human interaction. The project centred around an AI-driven robotic arm interacting with cats in a specially designed environment, aiming to provoke reflection on the role of AI in caregiving and decision-making. It serves as a real-world case study for applying and evaluating the analytical lenses provided by the Five Tropes of AI Art (chapter 5), demonstrating how the theoretical framework can illuminate different aspects of AI art creation and presentation in practice. Developed in collaboration with the renowned artist group Blast Theory (section 6.1.1) as part of the UKRI-funded Trustworthy Autonomous Systems (TAS) programme at the University of Nottingham,

Cat Royale offers a unique case through which to examine the challenges, opportunities, and ethical considerations that arise when translating artistic vision into tangible AI artwork within an HCI research project.

As an external collaborator in Cat Royale, the author of this thesis engaged in a dual role. Both as an AI Developer and PhD student, the author participated in the entire creative process, from initial conceptualisation to final exhibition. This dual position enabled the contributions to the project's technical development and artistic realisation, offering invaluable insights into the challenges and realities of integrating AI technologies in artistic practices. The collaboration provided a rich context for examining the challenges and opportunities of translating artistic vision into tangible AI artwork.

The insights gained from Cat Royale are intended to inform a diverse audience, including researchers, curators, and artists seeking to understand and engage with the evolving landscape of AI in art. For researchers, it offers a case study in practice-led HCI research methodologies. Curators working with contemporary and technologically-engaged art may find value in the project's approach to framing and presenting AI art to diverse audiences. While free to pursue their creative paths, artists may draw inspiration from the collaborative processes and ethical considerations discussed.

By examining the project's evolution and the challenges encountered, this chapter aims to:

- Provide an overview of the Cat Royale project, including its conceptualisation, development, and execution.
- Explore the practical challenges and tensions of combining AI and artistic practices, as revealed through the project's implementation.
- Present insights from interviews with key project stakeholders, offering firsthand perspectives on the creative and technical processes involved.
- Document the ethical considerations and decision-making processes that

shaped the project's development as encountered in practice.

This chapter lays the groundwork for the subsequent discussion in Chapter 7, where the insights gained from Cat Royale will be critically analysed alongside broader theoretical frameworks. This analysis will contribute to developing a set of guidelines to be used as analytical lenses to understand AI art, relevant to researchers, AI art curators, and artists engaged in this evolving field from an HCI and practice-led perspective.

6.1.1 Blast Theory

To fully appreciate the context and significance of the Cat Royale project, it's essential to understand the background and expertise of the artists behind it, Blast Theory.

Since the late 1990s, Blast Theory has collaborated extensively with the Mixed Reality Lab (MRL) at the University of Nottingham, a partnership that began with the seminal project Desert Rain [126]. This mixed reality installation, exploring the blurred boundaries between the real and virtual in the context of the Gulf War, was the first of several collaborative works produced by this unique partnership [127]. This extensive collaboration has seen Blast Theory and MRL pioneer practice-led research methodologies, allowing for an intersection between cutting-edge technological development and deep artistic exploration. Over the years, their projects have received critical acclaim and academic attention, shaping how emerging digital technologies are understood in relation to public interaction and performance.

Celebrated for their interactive performances that combine live and online engagement with audiences [128], Blast Theory investigates the tension between the private and the public, the physical and the digital, encouraging audiences to reflect on technology's social and political aspects. Comprised of Matt Adams, Ju Row Farr, and Nick Tandavanitj, the group employs emerging technologies to create art forms that spark critical discussions about technol-

ogy's societal and political implications.

Blast Theory's expertise in interactive art and its commitment to exploring the societal impact of technology aligned perfectly with the goals of the TAS Creative Programme, which sought to engage artists in creating interactions with trustworthy autonomous systems. As Creative Ambassadors for the Programme, Blast Theory brought their unique vision and experience to the Cat Royale project, shaping its artistic direction and public engagement strategies.

6.2 Practice-Led Research in Cat Royale

This section outlines the practice-led research methodology employed by the author to gather first-hand insights and data throughout the Cat Royale project, forming the foundation for subsequent critical analysis in this thesis. This approach is strongly aligned with HCI research-through-design principles, where the creation of an artifact (in this case, the AI system within the art installation) serves as a primary means of inquiry.

This analysis draws upon the practice-led research methodology detailed in Section 4.2.1 of Chapter 4.3.1. This approach recognises the cyclical relationship between practice, theory, and empirical study, allowing for a dynamic and iterative research process. This methodology includes observation and reflective analysis as integral components, allowing continuous engagement with the creative and research processes.

As discussed by McNamara [129], practice-led research involves creating new knowledge through active engagement in the creative process. In Cat Royale, this manifested in the author of the thesis being involved in developing and implementing the AI decision engine and its integration with the robotic arm. This active making process provided direct experiential knowledge of the technical and collaborative challenges. Additionally, the author's observation of the participants in the project allowed for detailed documentation of the artists' decision-making processes, reactions, and considerations through-

out the project's development. The author's personal insights and reflections were recorded throughout the project, providing documentation for reflection and understanding of the challenges and dynamics of AI-art collaboration from an HCI perspective.

Several measures were implemented to mitigate potential risks associated with practice-led research, such as overreliance on the first-person perspective. These included balancing subjective involvement with objective analysis through continuous team feedback, including regular input and guidance from my supervisors to ensure a broader, more critical perspective was maintained throughout the research process.

Ultimately, the author's position as a AI Developer and a PhD researcher provided a unique vantage point for this study. This dual role allowed for direct contribution to the technical development of the AI component, immersion in the artistic process and creative decision-making, and a holistic view of the project from conception to exhibition.

6.2.1 Connection to Research Questions

This methodological approach directly addresses the thesis's central research questions, which explore artists' stated motivations, framing strategies, and the communication of concepts in AI art.

It explores artist' observed motivations for integrating AI into their practice through first-hand observation and participation. It adopts a critical case study through which the Five Tropes of AI Art can be applied as analytical lenses. It offers unique insights into the practical challenges and opportunities of creating AI art from an implementation perspective. It provides an approach that examines strategies for framing AI art to audiences through involvement in the exhibition process. It investigates the balance between artistic vision and audience engagement through collaborative decision-making. Furthermore, it analyses how ethical considerations shape AI art creation through

Figure 6.1: *Cat Royale by Blast Theory*

direct involvement in project development. Combining these methodological elements provides an approach grounded in HCI and practice to understanding the complexities of AI art analysis.

6.3 Overview of the Cat Royale project

Cat Royale is an interactive experience for feline participants and human audiences. Figure 6.1 offers a visual representation of the custom-built installation of Cat Royale designed to engage and enrich the lives of the three feline participants: Ghostbuster, Pumpkin, and Clover. The figure captures a snapshot of the environment, prominently featuring a robotic arm, symbolising the AI. It is positioned at the centre and surrounded by the cats within a carefully constructed space tailored to their needs. This visual contextualises the artwork's narrative, emphasising the deliberate design choices that foster a harmonious coexistence between AI and animals. The image reflects the aesthetic decisions behind the environment's playful and engaging atmosphere while underscoring the critical exploration of how AI can interact with animals in caregiving contexts.

At the heart of this utopia resides an AI-powered robot arm programmed to interact with the cats through various games and activities to maximise their happiness. Under human supervision, the robot arm offers a range of enrichment activities, such as moving a feather toy on a string, tossing a ball, or dispensing treats. The system, complemented with human oversight, monitors the cats to measure their happiness and then tries to maximise it through

Figure 6.2: *Blast Theory's Cat Royale*

various interactions of the robot arm.

The project's technical architecture incorporates an AI decision engine, a robotic arm, strategically placed cameras, a computer vision system, and a user interface that allows human operators to assess the cats' happiness, monitor them, and, if necessary, override the AI's decisions. This ensures that the cats' safety and well-being remain paramount throughout the project.

The team's primary focus was the cats' safety and well-being, relying on consultations with a vet and experts in animal behaviour. A Cat Welfare Officer monitored the cats throughout the project, having the authority to stop the robot arm from carrying out tasks if there was any threat to their safety. The cats stayed in the room for six hours per day for two weeks, with human intervention readily available if they showed any signs of distress.

The environment was inspired by Verner Panton's designs [130], focusing on exploration and relaxation. It includes cat-safe plants, a giant scratching post, catnip, and litter tray areas. The entire room is carpeted, providing a surface that invites cats to scratch but is robust enough to withstand their activities, as shown in figure 6.2.

Cat Royale was disseminated through multiple platforms to reach a broad audience. The project premiered at the World Science Festival in Brisbane in March and April 2023, where it was presented as a time-delayed video stream to a total cumulative audience of over 400,000 people. Daily highlight films were also shown on YouTube and Facebook. A seven-hour film installation version of Cat Royale was displayed at the Science Gallery London for the 'AI: Who's Looking After Me?' exhibition. Additionally, Cat Royale was honoured with the 2024 Webby Award for Best Integrated Experience in the AI, Metaverse and Virtual category, recognising its seamless integration of AI, art, and animal welfare [131].

6.3.1 Vision

Blast Theory's vision for their collaboration on the TAS Creative Programme was to create artwork exploring our complex and often ambivalent relationship with AI. The artists envisioned a 'cat utopia' designed to care for the cats' willingness to play, social interaction, and rest. They proposed the name Cat Royale for the project, encapsulating the idea of creating a safe and engaging environment for a small society of cats to live alongside an autonomous system. Cat Royale was driven by a desire to engage audiences in critical reflection on the broader implications of autonomous systems for both animal and human welfare. The artists' statement, published in February 2023, eloquently articulates their motivations:

'Would you let a robot care for your pet? Autonomous systems are already ubiquitous for humans. Algorithms are used for criminal sentencing and mortgage approvals. And facial recognition systems track citizens. Toddlers can swipe a touchscreen and interact with virtual assistants such as Alexa. And animals are part of this transformation. Animal care is a significant growth area, with autonomous systems used for everything from milking cows to toys for pets... These systems – which operate independently of humans – promise

huge benefits and, as with all new technologies, important costs... In Cat Royale, we show how an autonomous system is built and some trade-offs involved. We want to understand how these technologies will impact animal and human welfare' [132].

Blast Theory recognised that AI, while often presented as a transformative force for good, can also perpetuate existing biases and inequalities, raising ethical concerns about its impact on our lives and the lives of other species. They sought to expose the inherent complexities of AI, its potential for both benefit and harm and the need for critical engagement as these technologies become increasingly integrated into our world.

The artists were particularly interested in how AI is often a mystery, a 'black box' even to its creators. They wanted to demystify AI, making its inner workings visible and prompting audiences to consider its potential consequences:

'AI is a black box even to those who create the systems... And these technologies are widely deployed with animals: there is facial recognition for cows... So technology is already here and is growing fast... We started working on Cat Royale to explore what it might mean when AI comes into our homes and affects us and our loved ones... How much can we know about what our pets are thinking? How do we know that they are happy? In Cat Royale, we can see AI in action and grapple with what it means for us and our loved ones to live with machines that are 'learning' about us and adapting to us' [132].

Through the playful yet provocative lens of Cat Royale, Blast Theory aimed to spark conversations about the role of AI in our lives, the ethics of using AI to influence happiness, and the potential for AI to reshape our relationships with each other and with other species.

6.3.2 AI Architecture and Developer Role

As the AI developer for Cat Royale, my role was pivotal in bridging the artistic vision with technological implementation. Working closely with the artists and

collaborating with the robotics and computer vision experts, I was responsible for developing the AI decision engine that formed the core of the installation's interactive elements. The AI system for Cat Royale was designed as a complex, interconnected architecture comprising several key components:

Input Components

The system relied on a sophisticated array of input mechanisms:

- A computer vision component for classifying the cats' pose estimations
- A recognition system to distinguish individual cats
- A bird's-eye view camera to compute distances and positions of all cats
- Various sensors gathering data on the cats' states and environmental conditions

Decision Engine

At the heart of the system was the decision engine, which I developed using Python programming language. This engine was designed to optimise actions based on the cats' states and associated rewards. Key features included:

- A timekeeping mechanism to track and record events
- Real-time processing of live inputs and historical data from a database
- Implementation of a contextual multi-armed bandit algorithm to balance exploration and exploitation in decision-making

The contextual multi-armed bandit algorithm, a key component of the decision engine, is a machine-learning approach that balances exploration (trying new actions) and exploitation (choosing actions known to work well) based on the current context. In Cat Royale, this allowed the AI to adapt its decisions based on the cats' behaviour and environment, learning which actions were most effective in different situations. The engine would output decisions to either 'wait' or 'trigger activity' based on its analysis.

Output Components

The system's outputs included:

- Triggered activities for the robotic arm
- Data logging into the database for continuous learning and improvement

Database and Recommendation System

A crucial component was the database, which served dual purposes:

- Storing all interaction data for training and prediction
- Informing the user interface
- Maintaining a classification of cat's happiness' levels
- Recording user interactions

My role extended beyond mere coding. I was responsible for explaining complex technical concepts to the team in a comprehensible manner during our regular online meetings. This involved translating the intricacies of the contextual multi-armed bandit algorithm and other AI concepts into terms that could be understood and incorporated into the artistic vision. Collaboration was key to the project's success. Working closely with the robotics expert, we ensured seamless integration between the AI decision engine and the robotic arm's movements. The computer vision expert and I collaborated to optimise the input data for the AI system, ensuring that the visual information was processed effectively for decision-making. Following coding best practices, we implemented the solution in an online repository. This approach allowed for version control and facilitated the final assembly on the server that would run the entire installation. This server housed not only the decision engine code but also the UI interface and the connections to the robotic arm, forming a centralised hub for the project's technical operations. Throughout the development process, I continually refined the AI system, adjusting parameters such

as the exploration-exploitation trade-off to ensure engaging and non-repetitive experiences for both the cats and the audience. While this AI architecture was the initial plan, some components, such as the individual cat recognition system and certain sensor inputs, were not fully implemented in the final exhibition due to time constraints and technical challenges. These adaptations required us to simplify certain aspects of the AI system while maintaining its core functionality.

6.3.3 Development Phases

The development of Cat Royale can be broken down into four key phases, each contributing unique challenges and insights into the project. Figure 6.3 provides a visual overview of the key stages in Cat Royale's development, from initial conceptualisation to final exhibition.

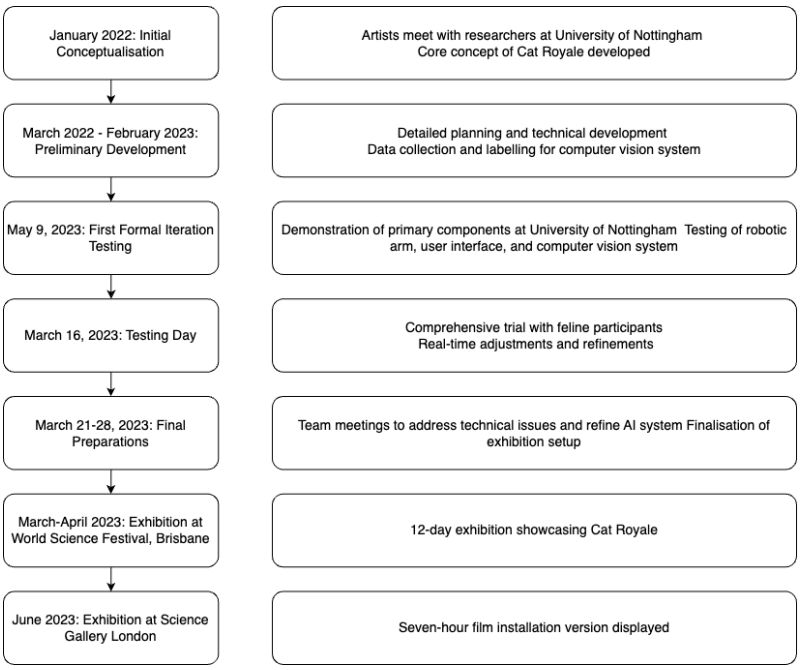

Figure 6.3: *Timeline of Cat Royale project development, highlighting key phases and milestones from conceptualisation to exhibition.*

- Phase 1: Initial Conceptualisation and Feasibility Study. During this phase, the core idea of Cat Royale was designed, considering both artistic and technical aspects. Initial sketches, mock-ups, and conceptual project

plans were created. A feasibility study was also conducted to assess the project's technical requirements and ethical considerations.

- Phase 2: Prototyping and Preliminary Testing. This phase involved the development of early prototypes of the AI decision engine, robotic arm, and other system components. Preliminary testing was carried out to identify any technical or ethical issues that needed to be addressed before further development.

- Phase 3: Advanced Development and System Integration. This phase focused on refining and integrating the prototypes into a unified system. This included finalising the algorithms for the AI decision engine, calibrating the cameras, and connecting the user interface.

- Phase 4: Final Exhibition. This phase encompassed the public presentation of Cat Royale at the World Science Festival in Brisbane. Throughout the 12-day exhibition, the AI system's performance was continuously monitored. Ethical considerations remained paramount, with a dedicated Cat Welfare Officer present to ensure the cats' safety and comfort, possessing the authority to override the AI system if necessary. The team implemented a manual scoring system, allowing human operators to provide real-time feedback on the cats' responses, further informing the AI's decision-making process. This phase also provided an opportunity to gather valuable audience feedback, enabling the team to assess public perception and understanding of the ethical implications of AI in animal care scenarios.

6.3.4 Initial Conceptualisation

On January 18th and 19th, 2022, the artists from Blast Theory met with the multidisciplinary group of researchers specialising in robotics, Human-Computer Interaction (HCI), AI, art, and animal behaviour at the Mixed

Reality Lab at the University of Nottingham. As a PhD student and Machine Learning Developer, I observed this meeting, which laid the foundation for the Cat Royale project.

The opening presentation by Matt Adams, one of the artists, outlined the core concept of Cat Royale: a world where cats coexist harmoniously with AI. The project aimed to investigate autonomous systems' potential risks and benefits, particularly when perceived as impenetrable 'black boxes' whose internal mechanisms remain largely mysterious. The artists sought to present an installation addressing autonomy and trust, incorporating critical viewpoints. Blast Theory argued that engaging audiences required acknowledging critical questions and presenting them in unbiased, understandable, and engaging ways. The artists, therefore, posed several queries to the researchers, including the challenges involved, the implications of the desired outcome, and the potential difficulties in constructing the project.

At this stage, Blast Theory intended to leverage the researchers' technical expertise to assess the project's feasibility, determine timelines, identify key developers and stakeholders, and decide on execution methodologies. While open to changes and adaptation, they expressed the need for the robotic arm as a crucial component that symbolised the presence of the AI within the installation.

The artists proposed potential tasks for the robotic arm, such as engaging with interactive objects, distributing food, and dispensing catnip. The overarching stated intention was to offer mental stimulation to the cats while monitoring their satisfaction, allowing the autonomous system to refine its selection of subsequent activities based on the observed cats' reactions.

To facilitate collaboration, the artists shared conceptual images illustrating a potential physical prototype of the installation. These visualisations, featuring a robotic arm centrally positioned within a glass enclosure surrounded by cats, cushions, and toys, served as preliminary discussion points. The artists emphasised that the final design might diverge from the initial illustration based

on feedback and suggestions from the collaborative workshops.

The technical team proposed initial suggestions for the autonomous system, such as providing food and drink, regulating temperature, ensuring access to fresh air, and employing computer vision to monitor the cats' emotional states.

As a Machine Learning Developer on the Cat Royale project team and a PhD student researching AI art, I was uniquely positioned to observe and participate in the project's development. This dual role allowed me to witness firsthand how the artists anticipated potential tensions between artistic vision and technical feasibility from the outset.

During initial discussions, the artists expressed ambitious ideas for AI-cat interactions, such as complex behavioural predictions and highly responsive robotic movements. Simultaneously, they acknowledged the technical limitations of current AI systems and robotic hardware.

This awareness led to proactive discussions about balancing artistic goals with realistic technical capabilities. Additionally, ethical considerations, such as ensuring cat welfare whilst pushing technological boundaries, were foregrounded from the start, highlighting the tension between creative exploration and responsible implementation.

6.3.5 Preliminary Testing

The development of Cat Royale progressed through several key milestones. Following the initial conceptualisation in January 2022, the team engaged in various activities, including detailed planning, preliminary technical development, and ongoing discussions about the project's artistic and ethical dimensions.

Additionally, during the early stages of technological development, the team embarked on a comprehensive data collection and labelling effort to train the computer vision system. They solicited cat videos from various contributors and edited these into short clips. These clips were then uploaded to an online

platform ([133]) where volunteers could log in and label the cats' activities according to a predefined list of actions, as well as assess the cats' apparent happiness on a scale. This labour-intensive process was intended to provide essential training data for the computer vision system, enabling it to assess feline emotions and activities accurately.

These efforts culminated in a significant milestone on 9 May 2023, when the University of Nottingham hosted a demonstration of the Cat Royale project. This event, approximately four months before the exhibition deadline, represented the first formal iteration of testing and allowed the team to assess the project's progress.

This milestone allowed the team to understand the system's functionality in its core components and identify areas requiring further refinement. As an attendee, I observed the demonstrations of the project's primary components, including the robotic arm, user interface, and computer vision system.

Simon Castle-Green, Technical Manager (Robotics) and the developer behind the robotic arm and its user interface (UI), demonstrated the complex robot arm control system. He guided the team through the UI, explaining each feature individually. The interface allowed artists to direct the robot arm to perform prerecorded actions, such as tossing a ball or dangling a feather, in an intuitive and user-friendly manner.

A particularly engaging aspect of the demonstration was the 'record' function. As Simon manoeuvred the robot arm, the UI projected a 3D visual of the arm's movement path and corresponding curves, clearly understanding how the robot arm captures movement and executes an action. This visual feedback allowed for fine-tuning and adjustments to ensure smooth and precise movements.

Ammar Ameen, Computer Vision Developer and the lead developer for the computer vision system, thoroughly explained how the system was designed to identify the cats' activities and potentially estimate their happiness level. Ameen's approach incorporated two types of neural network architectures: 2D CNN LSTM and 3D CNN LSTM, which were tailored to categorise cat

activities.

During the presentation, Ameen demonstrated the computer vision system's ability to detect and classify various cat activities, such as playing, sleeping, or interacting with the robotic arm. He also discussed the challenges involved in accurately estimating a cat's happiness level based on visual cues and the ongoing research to refine this aspect of the system.

Following the demonstrations, the team engaged in preliminary testing using a hybrid physical-digital environment that closely resembled the envisioned Cat Royale installation. This sophisticated setup featured a physical robot arm positioned in the centre of a designated section of the laboratory. Three boxes, each adorned with 2D barcodes for distance calibration and computer vision testing, represented the cats. This physical arrangement provided a tangible sense of the robot arm's movements and spatial dynamics.

The testing process was twofold. Initially, the team evaluated pre-programmed movements executed by the physical robot arm. Subsequently, the robotics expert demonstrated a user interface that operated within a digital 3D simulated environment. This digital simulation allowed for the exploration and refinement of various movement patterns without the need to constantly reconfigure the physical arm, offering a flexible and efficient method for iterative design.

During this comprehensive testing phase, the team identified several areas for improvement. These included the need for smoother and more precise robotic arm movements, refinements to the user interface, and further training and optimisation of the computer vision system, particularly in its ability to track and interpret the barcoded 'cat' boxes accurately.

The team strongly emphasised ensuring the cats' safety and well-being throughout the development process, from the initial conceptualisation to this testing milestone. This focus was particularly evident during the prototyping activities between these two milestones.

During the prototyping stage, which bridged the gap between conceptualisation and formal testing, the robotic arm's movements were carefully pro-

grammed and evaluated to avoid potential harm or distress to the animals.
At this testing milestone, these safety measures were rigorously assessed. The team evaluated the robotic arm's movements in the hybrid physical-digital environment, ensuring they remained within safe parameters.
Throughout this process, the team consulted with animal welfare experts to ensure that the Cat Royale project adhered to the highest animal care and ethics standards. These experts provided invaluable guidance on several key aspects:

- Creating a safe and enriching environment for the cats
- Interpreting feline behaviours accurately
- Ensuring that the cats' physical and emotional needs were met

This collaborative approach with animal welfare experts enhanced the safety protocols and contributed to the project's overall ethical integrity. It allowed the team to refine and validate their safety measures before progressing to the next stage of development, where live animals would be introduced, ensuring a responsible and ethically sound approach to integrating AI technology with animal subjects.
As an observer, I witnessed the team's dedication to balancing artistic vision with the technical challenges and ethical considerations inherent in developing an AI-driven art project involving live animals. The process highlighted the importance of collaboration, refinement, and a strong commitment to animal welfare in creating an engaging and enriching experience for both the cats and the audience.

6.3.6 Advanced Development

On March 16th, 2023, the Cat Royale project embarked on a significant milestone: Testing Day. The trial, conducted from 14:00 to 16:00, involved the three feline participants and provided valuable insights into the project's progress.

In my dual capacity as both an observer for my PhD research and the developer of the robot arm's AI decision engine, I was uniquely positioned to witness the day's events and analyse the team's agile approach to addressing the challenges they faced.

The morning began with a team meeting to establish a checklist of objectives for the test. Through my observations and discussions with the Blast Theory team, I learned that this Agile project management approach was typical of their workflow across various projects. The cats explored the exhibition space, familiarising themselves with their new environment, which featured a robot arm equipped with various toys and food trays programmed to engage the cats every ten minutes.

As the developer of the robot arm's AI decision engine, I had been working on implementing and integrating in the Cat Royale project a contextual multi-armed bandit algorithm [134] for several months, discussing its potential in several 'face to face' and online meetings with the team. This algorithm, which I had selected for its ability to learn and adapt in real-time, was designed to balance exploration and exploitation in the AI's decision-making process. The Testing Day provided the first opportunity to evaluate this algorithm in a live setting with the feline participants.

During the meeting, I explained to the team that if they observed repetitive actions from the robot, we could increase exploration by adjusting the epsilon parameter inherent in the algorithm. This would allow the AI to explore various responses from the cats in different situations, potentially discovering new effective interactions.

A manual scoring system recorded the cats' engagement levels, foreshadowing the project's evolving approach to quantifying feline responses. This shift from an initial focus on 'happiness' to more practical engagement metrics highlighted the challenges in defining and measuring abstract concepts in AI-driven art projects. While providing valuable data for the AI system's learning process, the scoring system also hinted at the tensions between automated assess-

ment and human interpretation.

In the afternoon, a trial replicating the installation's operation was conducted. This trial provided critical insights on potential enhancements, such as reintroducing the water fountain for the cats' comfort and addressing timing issues with the robotic arm's movements. The post-trial debriefing session also identified areas for improvement, including item placement for better cat interaction and health and safety concerns related to electric cables.

Additionally, the team agreed that the AI's learning model should favour exploration, allowing the AI to explore various responses from the cats in different situations. For example, the decision engine was learning on the fly by accumulating training data that linked the cats' states, the robot's actions, and the cats' responses.

The team agreed that favouring exploration at this stage would be beneficial. This would allow the AI to gather a more diverse range of data on cat behaviours and responses. This approach would expand the training data and potentially uncover more effective combinations of states and actions.

Furthermore, the AI system's decision engine needed some refinements due to the lack of diversity in state inputs, potentially impacting the AI's decision-making accuracy.

A critical discussion point that emerged during the day was the maintenance of the plants within the installation space. The team proposed having an alternate set of plants that could be cycled to ensure the area remained vibrant and natural throughout the exhibition.

On the technical front, video encoding was confirmed to work correctly with balanced GPU and CPU usage, and camera noise issues were addressed through short test recordings. The team members had well-defined roles for the day, with Paul preparing cat toys, Jack assisting him, Lucy capturing footage of the cats interacting with the installation, and Amaar monitoring the cats' locations during the test.

Departing from the technical assessment, Matt focused on developing the

team's methodology, emphasising the importance of audience understanding and encouraging team members to consider the prospective audience's interpretation of the exhibition. Additional tasks included preparing promotional pictures for social media, cleaning the operator's area, ensuring the quiet movement of doors to avoid disturbing the cats and keeping a consistent flow of actions.

As the project moved towards its final stages, the team focused on integrating the various components of the Cat Royale system, ensuring seamless communication between the robotic arm, computer vision system, and AI decision engine. They also worked on refining the user interface, making it more intuitive and user-friendly for the artists and operators.

In preparation for the final exhibition, the team conducted extensive testing and debugging to identify and resolve any remaining technical issues. They also focused on the installation's aesthetic and practical aspects, ensuring it provided the cats with a safe, comfortable, and engaging environment.

As an observer and developer, I witnessed the team's dedication to refining the Cat Royale project through iterative testing, collaboration, and adaptation. The advanced development and system integration phase showcased AI and robotics' potential to enhance animal welfare and foster human-animal interaction while highlighting the challenges and tensions inherent in such an interdisciplinary endeavour.

6.3.7 Final Exhibition

The videos of the interactive installation were showcased at the World Science Festival in Brisbane. Throughout the 12-day exhibition, the robot arm driven by the AI system engaged the cats with various games and activities, continuously learning and adapting based on their responses. The AI's adaptability was demonstrated through its ability to adjust to the cats' individual play preferences.

The AI system employed a contextual multi-armed bandit algorithm [134], commonly used in website personalisation, to observe and learn from the cats' behaviours continually. This allowed the system to offer activities most likely to increase the cats' happiness, as measured through their playtime engagement and other factors like stress scores flagged by the human operator.

Despite the AI's proven learning capabilities, the exhibition highlighted the limitations and challenges of relying solely on AI for animal welfare. The system faced difficulties when the cats became less responsive to their preferred games, raising questions about the AI's ability to detect and respond to factors like tension among the cats or their desire for novelty.

Despite the extensive effort put into labelling the short videos of cat activities, the team ultimately decided to implement a manual scoring system for cat engagement during the live exhibition. This decision was driven partly by time constraints, as integrating the computer vision-based engagement assessment proved more complex than anticipated. Additionally, this approach allowed for greater flexibility and narrative control, enabling the artists to respond more dynamically to the unfolding interactions. The human operators assessed the cats' engagement scores and provided real-time labels for the AI system's training. This shift highlighted the project's adaptability, the importance of maintaining artistic vision alongside technological implementation, and the fact that AI is fundamentally a human-driven process requiring extensive effort and multidisciplinary collaboration.

While not directly visible to the audience, the operator's presence was framed as a necessary safety measure and a means of monitoring the cats' well-being. This framing allowed the project to maintain its focus on AI-cat interactions while acknowledging the ethical necessity of human oversight.

The exhibition invited audiences to consider the ethical implications of AI in shaping our understanding of happiness and well-being and the importance of designing a balance between the benefits and risks of these systems.

As an observer, I witnessed how the final exhibition of Cat Royale brought

together the artistic vision, technical innovations, and ethical considerations at the heart of the project's development. The exhibit showcased the potential of AI and robotics in enhancing animal welfare. It informed critical discussions about the role of autonomous systems in our lives and the importance of responsible innovation.

6.4 Artistic and Audience Perspectives in Cat Royale

This section focuses on the various perspectives gathered during the Cat Royale project, including interviews with the artists, insights from the audience survey, and analyses of audience engagement. The interviews provided valuable first-hand perspectives on the artistic expressed motivations and challenges of working with AI, while the audience survey revealed how the public engaged with and interpreted the project. Together, these insights contribute to understanding the relationship between AI-driven artistic practices and public perception.

6.4.1 Cat Royale. Artist Perspectives

Following the semi-structured interview methodology outlined in chapter 4, on March 28, 2024, I interviewed Nick, one of the artists from Blast Theory, who was my primary stakeholder in developing the AI decision engine for the Cat Royale project. This approach allowed for exploring Blast Theory's artistic goals, challenges, and reflections on using AI in art. The following paragraphs highlight critical themes from the conversation.

Artistic Motivations

Nick revealed that Blast Theory's interest in AI originated from a desire to explore new technologies for engagement. He stated, 'AI is the thing that

will break everything or change everything.' This perspective underscores the artists' recognition of AI's transformative potential and desire to explore its implications through their work.

The Cat Royale project emerged from various factors, including the opportunity to work with robotics experts and the desire to make AI's impact more tangible. Nick explained, 'One of the things that we liked about the robotics technology is that you could manifest AI into a physical thing that you can look at, and it impacts you.'

Interestingly, Nick also drew parallels between cats' relationship with humans and our potential future relationship with AI. He noted, 'Cats do not seek approval. They seek to be served. It seemed to echo the relationship we expect of our future robotic servants.' This analogy provided a unique lens through which to explore human-AI interactions.

Nick highlighted the collaborative nature of the project, involving experts from various fields, including robotics, computer vision, and animal behaviour. He emphasised the importance of understanding team members' capacities and working styles, noting, 'Part of it which is I think is true of any collaboration for us is the new terrain or a new technology or a new team to explore and understand what people's capacities are.'

He also discussed the motivations driven by different backgrounds within Blast Theory, describing how each team member brought a unique perspective to the project. For instance, he mentioned that Ju focused on experiential aspects, while Matt's background in theatre influenced his approach to composing the overall vision.

Challenges in AI Art

The full interview highlighted several challenges unique to working with AI in an artistic context. Nick mentioned the difficulty in directly engaging with AI as a material, noting, 'We do not have a direct relationship with the algorithm as it was a material' This abstraction required the artists to rely on metaphors

and descriptions to understand and work with AI concepts.

Another significant challenge was balancing AI autonomy and artistic control, particularly regarding audience engagement. Nick admitted that while the AI often operated autonomously, its actions didn't always align with what would be engaging for an audience. This created a tension between maintaining the integrity of the AI's autonomous decision-making process and ensuring an engaging experience for viewers. Nick described how this tension manifested in the project: 'There were many occasions where the AI's decisions resulted in long periods of inactivity—what we called 'plateaus'—where neither the cats nor the robot arm were doing anything. While these moments genuinely represent the AI's autonomous behaviour, we knew from experience that audiences expect to see activity to maintain engagement.' This scenario presented the artists with a dilemma. On the one hand, if they allowed the robot arm to operate purely based on the AI's decisions, there was a risk of creating a potentially boring experience for the audience during these 'plateau' periods. On the other hand, intervening to create more engaging scenarios would compromise the critical investigation of AI autonomy that was central to the project. To navigate this tension, the artists employed two main strategies:

- Occasional manual intervention: At times, they would manually suggest actions to the AI system to stimulate activity and maintain audience engagement.
- Selective editing: In the video recordings of the installation, they focused on situations that were more engaging and exciting for the audience to watch.

Nick reflected on this challenge: 'It's a delicate balance. We want to critically explore AI autonomy, which means sometimes letting it make decisions that might not be the most entertaining. But we also have a responsibility to our audience to create an engaging experience. It's about finding ways to do both without compromising the integrity of the project.' This tension highlights a

broader challenge in AI art: reconciling the often unpredictable and sometimes 'uninteresting' nature of true AI autonomy with the need to create compelling artistic experiences for audiences. It underscores the complex role of the artist in AI-driven projects, where they must act as both facilitators of AI autonomy and curators of engaging artistic experiences.

Framing AI Art for Audiences

Nick's insights on framing the project for audiences revealed an interesting approach. For Blast Theory, the framing is integral to the work itself: 'We tend to be thinking constantly about how it sort of sits within its environment and so how it integrates with its sort of setting.'

The project's presentation evolved from an initial concept of a physical gallery installation to a video stream format, demonstrating the artists' adaptability to different contexts and audiences. Nick highlighted the importance of tailoring the framing to specific audience contexts, such as the difference between presenting at a science fair versus an art gallery.

He also discussed using provocative questions to engage audiences, such as 'Can AI make cats happy?' Nick explained, 'Its associations are that happiness is already a contentious goal for humans... when you apply it to cats, and then you apply it to AI trying to make cats happy, it's a bunch of stuff which, when you assemble together, hopefully, is a provocation to people to think about why would you do that.'

Reflections on AI Art

Nick offered his perspective when discussing the broader implications of AI in art. He distinguished between AI as a subject of art, as a material for creating art, and as a potential autonomous creator. Nick expressed scepticism about AI as a fully autonomous artist, stating, 'That is the least interesting bit of it for me.' Instead, he emphasised the potential of AI to reflect on human creativity and to serve as a tool for exploring broader questions about

technology's role in society. Nick suggested that the most exciting aspect of AI art lies in its ability to prompt reflection on 'what are the impacts for society'. He also reflected on the evolution of AI technologies, comparing earlier models like GPT-2 with more recent developments. Nick noted that while earlier models might have been used as 'muses' for generating random combinations, newer models offer more sophisticated capabilities that could change the nature of AI's role in artistic creation.

Ethical Considerations

Nick touched on the project's ethical considerations, particularly regarding animal welfare. He mentioned the involvement of animal behaviourists and the implementation of safety measures to ensure the cats' well-being. This attention to ethics extended to how the project was presented to the public, with careful consideration given to how the concepts of AI, happiness, and animal welfare were framed for different audiences. The artists also mentioned the questions of trust and intimacy in human-AI interactions. Nick mentioned earlier discussions about 'how do you feel about being washed by a robot,' illustrating the project's aim to provoke reflection on the potential future roles of AI in our lives.

6.4.2 Audience Analysis: Reception and Interpretation of AI Art

To fully appreciate the audience's experience, it is crucial first to consider how the artwork was framed to visitors:

Exhibition Framing

The exhibition posed a provocative question to visitors: 'Would you trust a robot to care for your pet?' This framing immediately set the stage for critical reflection on the role of AI in our lives. The installation showcased three cats

- Ghosthunter, Pumpkin, and Clover - living in a custom-built 'cat utopia' with cosy places, relaxation shelves, and climbing spaces. Central to this environment was a robot arm, offering activities to enhance the cats' happiness: presenting a ball, dangling a feather, or offering treats. The setup included an AI decision system, a computer vision system, and human observers to measure the cats' happiness, allowing the AI to learn individual preferences over time.

This framing explicitly connected the artwork to broader societal questions about AI's increasing agency in our daily lives and its impact on animal and human welfare. By asking visitors to consider whether we should task AI to make us happier, the exhibition directly engaged with one of the core themes of AI art: the ethical implications of delegating human (or animal) well-being to autonomous systems.

Insights from the Exhibtiion

On April 2, 2024, I conducted an online interview with Eike Schneiders, a postdoctoral researcher at the University of Nottingham, who closely observed audience reactions to Cat Royale during its exhibition at the Science Gallery. This interview provided valuable insights into how the public engages with AI art and how artistic framing can shape perceptions of technology.

Schneiders' research revealed a fascinating journey of audience perception. Initially, many visitors approached the exhibit with significant scepticism about AI technologies. The sensed mistrust might originate from media narratives focusing on dystopian scenarios, fears of job displacement, and concerns about loss of human control. The perception of AI systems as inscrutable 'black boxes' further increases this distrust.

However, the exhibit's playful and non-threatening portrayal of AI-powered robots caring for cats appeared to resonate positively with many visitors. Based on Schneiders' qualitative observations and informal interactions with visitors, there seemed to be a shift in attitudes towards AI. Schneiders noted,

'And the gut feeling that I get... is that it's primarily had if it had an effect, it was a positive effect.' He observed that many visitors expressed they hadn't previously considered this application of autonomous systems, finding it 'very non-threatening in a way at least at surface level.' This apparent transformation in perception, while anecdotal and subject to potential biases, suggests the potential of AI art to challenge preconceptions and offer new perspectives on technology. Schneiders reported that 'Most people said they would trust the robot... with their own cats, but definitely with cats that aren't their own,' indicating a nuanced response to the exhibit. He also noted that visitors seemed 'more positive about AI and autonomous systems as a whole,' though this didn't necessarily mean unqualified approval. While not based on quantitative data, these observations underscore the importance of thoughtful framing in AI art projects. The exhibit presented visitors with 'another option' for AI use, contrasting with often dystopian narratives. However, it's important to note that these insights are based on qualitative observations. It may be influenced by factors such as selection bias and visitors' potential reluctance to express opposing views directly to a researcher associated with the project.

One of the most interesting findings from Schneiders' observations was the conflict in visitors' trust in AI for animal care versus human care. While most expressed willingness to trust robots with pet care, they became more cautious when considering AI care for humans, especially as scenarios became more personal. This distinction highlights the complex factors influencing trust in AI, including emotional proximity and the perceived uniqueness of human caregiving.

The exhibit's attempt to quantify cat happiness proved particularly thought-provoking for visitors. It sparked discussions about emotions' subjectivity and the challenges of reducing complex emotional states to measurable metrics. This reflection aligns closely with broader questions about AI's capabilities and limitations often explored in AI art (especially from artists of the Trope

'AI as a subject matter' mentioned in the chapter 7.4.1). Schneiders noted a potential divergence between the artists' communicated intentions and the audience's observed reception. While the project may have aimed to provoke unease or confront ethical dilemmas, many visitors responded with fascination and reassurance. This raises important questions about the effectiveness of art in shaping public opinion and the complex interplay between artistic communicated intent and audience interpretation.

These insights offer potential lessons for AI artists:

- The importance of transparency: Addressing the 'black box' perception of AI through clear explanations or interactive elements can foster trust and understanding.
- The value of provoking reflection: Using AI art as a platform to raise critical questions encourages deep engagement with complex issues.
- The need for nuanced framing: Effective communication must recognise that different audience segments may understand and accept AI differently, acknowledging that each audience member brings their own preconceptions about AI shaped by their previous cultural experiences. This includes considering the diverse range of media narratives, personal encounters with technology, and cultural contexts that influence individual perceptions of AI.

Moreover, the Cat Royale experience underscores the importance of clear stated artistic motivation and thoughtful framing in AI art. The project's success in engaging audiences and provoking reflection demonstrates how these elements can contribute to impactful AI art experiences that showcase technological possibilities and stimulate discussion on relevant societal issues.

Audience Survey Analysis

While Eike Schneiders' qualitative insights provide valuable observational data from his time at the Science Gallery, the research also includes quantitative

data from a separate audience survey conducted during the Cat Royale exhibition. This survey, administered at the Science Gallery in London in June 2023, offers a statistical complement to Schneiders' observations, providing a broader picture of the project's impact on public perceptions of AI and robotics.

During the Cat Royale exhibition, held at the Science Gallery in London, the audience could fill out an exit survey. This section summarises the key findings from analysing the Cat Royale audience survey data.

The audience was asked a primary question and demographic information: Has this artwork made you think more about AI and robotics?

The Cat Royale audience survey received 413 total responses. After removing outliers, key demographic findings showed a predominantly female audience (63%), with a median age of 32 and ages ranging from 18 to 99. Over half (52%) described themselves as having a 'good' understanding of robotics and AI through real-world awareness and deliberate engagement.

Regarding the exhibition's impact, respondents gave an average score of 7.43 out of 10 when rating how much it made them think more deeply about AI and robotics. With a median of 8, most scores skewed positively. The statistical analysis confirmed that this score significantly exceeded a hypothetical 'neutral' score, indicating a non-random impact on the audience's response values (Figure 6.4). The one-sample t-test resulted in a t-statistic of 23.32 and a p-value of 1.19e-76. The extremely small p-value, far below the significance level of 0.05, strongly rejects the null hypothesis. This indicates that the mean score of 7.43, reflecting how the exhibition impacted the audience's thinking about AI and robotics, is statistically significant and not due to chance.

There were noticeable variations across demographic groups. For example, impact scores differed by gender, with higher averages among females 6.7. The scores also spanned across levels of expertise, and experts in robotics/AI fields gave lower scores than non-experts 6.6. The 35-44 years bracket showed the highest impact scores when segmented by age group 6.5.

According to the data, the Cat Royale Exhibition was largely successful in

spurring contemplation about AI/robotics among its audience. It demonstrates art's ability to foster thought-provoking debate about technological change. As autonomous systems continue proliferating amid mixed public opinions, creative projects exploring their social implications remain valuable and necessary.

The Cat Royale Exhibition audience survey analysis reveals insightful observations on the impact of AI and robotics on human and animal interactions. The data collected from attendees at the Science Gallery London include demographics, understanding of AI and robotics, and impact scores reflecting the exhibition's influence on their perceptions. The findings illustrate a diverse audience with varying levels of AI understanding, predominantly rating the exhibition positively for its thought-provoking content. Statistical tests confirmed the significant influence of the exhibition on attendees, encouraging deeper contemplation on AI's role in daily life and animal welfare. Visualisation of the data further highlighted differences in impact across gender, expertise, and age groups, underscoring the exhibition's broad appeal and effectiveness in engaging discussions on the ethical and practical implications of integrating AI into human and animal lives.

Communication Strategies

My interview with Jonny Goode (on April 18, 2024), the communications manager for Blast Theory, provides a perspective on the strategies employed to engage audiences within the Cat Royale project. His insights highlight the challenges and opportunities inherent in presenting AI art to a broad public, underscoring the importance of thoughtful communication throughout the creative process.

Jonny described a significant evolution in Blast Theory's approach to project communication, stating, 'We were looking to change how we do comms at the organisation away from a project-specific 'getting bums on seats' way of communicating with audiences and over into a more audience focus for global

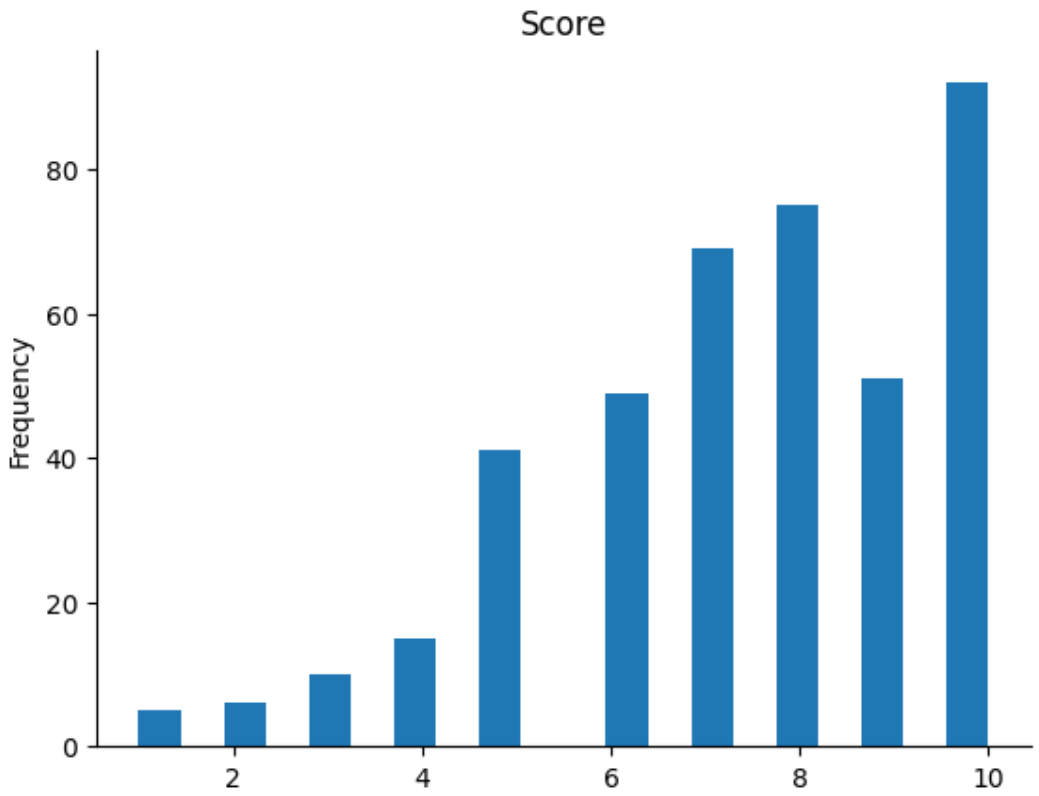

Figure 6.4: *Enter Distribution of Ratings. Respondents gave an average score of 7.43 out of 10 when rating how much it made them think more deeply about AI and robotics*

audiences, trying to talk more about the artists and using their voice and showing culture at the organisation'. This shift emphasised the artists' voices and the organisation's culture, involving audiences from the project's inception rather than merely promoting the final product.

One of the primary challenges in communicating Cat Royale was making complex AI concepts accessible to a broad audience. Jonny explained their approach: 'We really wanted to take audiences on a journey throughout the project. It's dealing with a lot of complex themes. A lot of AI is really difficult to understand unless you research about it. We were hoping to reach a very broad audience, so having to break down those themes and the technologies that are being used was quite important from the get-go'. The team addressed this by creating behind-the-scenes content, producing daily highlight videos with narration and subtitles, and employing visual storytelling techniques to transcend language barriers. This commitment to transparency and accessi-

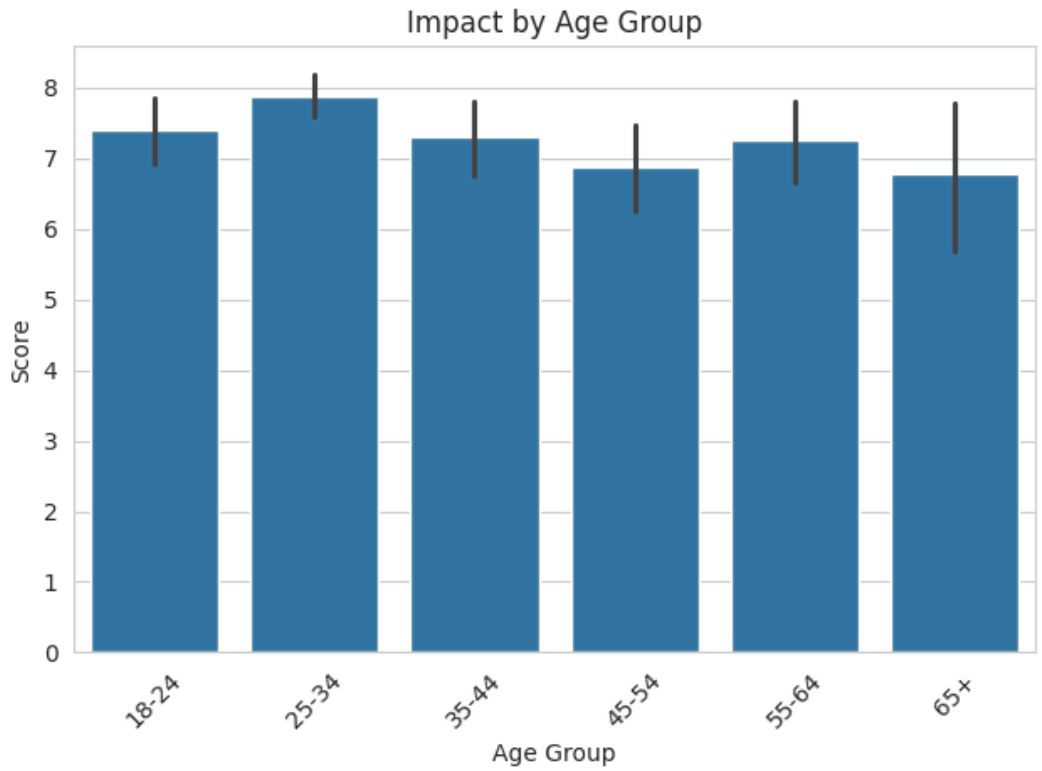

Figure 6.5: *The age distribution shows that the exhibition attracted a wide range of age groups, with a median age of 32 years. The chart indicates that the exhibition's impact on thinking more deeply about AI and robotics might be influenced by the audience's age, with certain age groups possibly experiencing more profound impacts than others.*

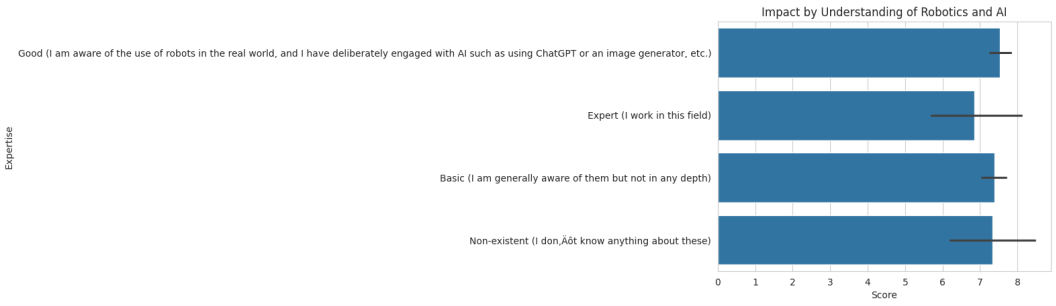

Figure 6.6: *This chart demonstrates that respondents with different expertise or familiarity with robotics and AI perceived the exhibition's impact on their thinking about these technologies differently.*

bility demonstrates how artists can demystify AI processes, fostering greater understanding among diverse audiences.

Jonny emphasised that the communication strategy for Cat Royale went beyond mere presentation, aiming to encourage audience reflection and discussion. He noted, 'A huge part of the project was getting people to talk about the work and how they felt watching three cats with a robot by themselves.

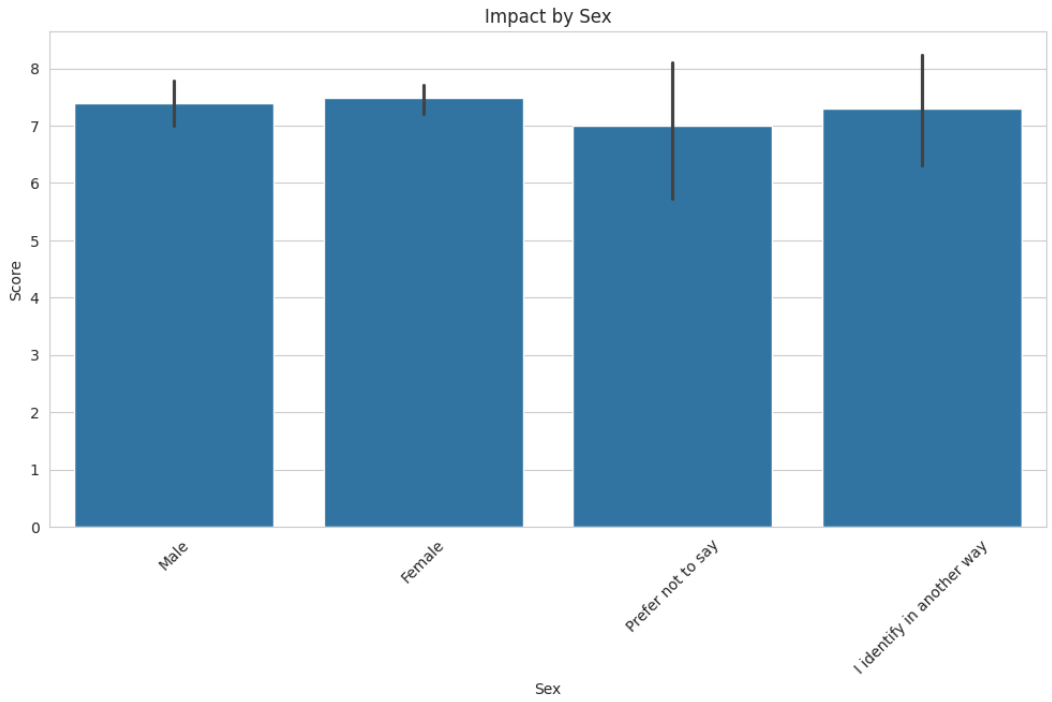

Figure 6.7: *Most respondents are female (260 out of 413), with male and other genders also represented. There appears to be a variation in how deeply different genders were made to think about AI and robotics by the exhibition.*

That's a lot of what Blast Theory's work does, is try to get people to question society, question culture, question technology, and question our choices'.

The team faced a delicate balance in curating and presenting the project's daily highlight videos. Jonny described this challenge: 'We were trying to be as honest as what you were seeing as possible. In a way, you could totally frame it like a reality TV show and only focus in on the dramas... But I think what we were trying to do is just show as honest a possible summary of that session that happened in that day'. This balance reflects a broader challenge in AI art: how to represent complex technological processes in ways that are both truthful and accessible to a general audience.

An innovative aspect of the project was the early inclusion of an Audience Advisory Panel. Jonny explained its importance: "Having the audience advisory panel quite early on in the stages of the project so that we could have discussions with a diverse group of people from everywhere about how they felt about the work, about the visuals of the work, the design of the work, and how it would unfold". This panel provided diverse feedback on various aspects

of the work, such as:

- The visual design and aesthetics of the Cat Royale environment
- The clarity and accessibility of the language used to describe AI concepts
- The ethical implications of using live animals in an AI art project
- The effectiveness of different communication channels (e.g., social media, live streams, gallery installations) in engaging diverse audiences

The impact of these communication strategies was significant. Jonny reported, "For the highlights videos, we've had about 90,000 views across YouTube and Facebook for the 12 videos. We had loads of people sharing it. We had hundreds of people sharing the post that we went on social media. We had, I think, over a thousand shares and over 500 or 600 comments". Regarding the research value of these comments, while a formal analysis has not been conducted, Jonny noted their depth and diversity: "Some of these comments were essays of people, a lot of people watching it and feeling very uncomfortable and a lot of people voicing concerns... But all of those conversations were crucial to the work". Jonny highlighted the range of reactions: "People really believing that this product could exist. People with severe disabilities that can't even imagine having an animal in the house because they can't care for it. Having an arm that might be able to look after the animal in a way that they can't, and then they can provide the other bits that they can. People were talking at length about that, and it was really beautiful to see it unfold". These insights from Cat Royale's communication strategy offer valuable lessons for AI art practice:

- The importance of transparent and accessible communication throughout the project lifecycle.
- The value of creating multiple entry points for audience engagement, from live streams to gallery installations.

- The need for flexible communication strategies that adapt to different cultural contexts and exhibition settings.
- The challenge and importance of balancing technical accuracy with narrative engagement in presenting AI art.
- The importance of considering communication and audience engagement strategies from the earliest AI art project development stages.

6.5 Summary

The Cat Royale case study presented in this chapter demonstrates the complexities of combining AI with creative practice from an HCI and practice-led perspective. As both an AI Developer on the project team and a PhD researcher observing the process, I could engage directly with the technical and artistic aspects of the project, gaining first-hand insights into AI art's development.

Throughout the project, Cat Royale underscored the importance of audience engagement strategies, ethical transparency, and careful framing in shaping how AI art is received and interpreted. The project provided a foundation for understanding the tensions between artistic vision, technological autonomy, and audience engagement strategies while raising critical questions about the role of AI in caregiving and autonomy.

The chapter also captured the valuable perspectives of the artists involved in Cat Royale. Their reflections on AI as material, their stated motivations for creating the work, and the tensions in balancing AI autonomy with audience engagement provided crucial insights into the creative process. The artists' approach to presenting the work, tailored for different audiences, from a science fair to an art gallery, underscored the adaptability required when integrating AI into artistic practices.

Audience reception was another focal point of this chapter. Through qualitative and quantitative data, the analysis demonstrated how the exhibition

challenged preconceptions of AI, particularly regarding its role in caregiving and its potential ethical implications. Audience survey results highlighted the project's impact on deepening reflections about AI and robotics.

In the subsequent discussion chapter 7, these insights will be critically analysed in relation to the broader theoretical framework presented in this thesis. The chapter will reflect on the challenges and tensions in AI art creation, such as technical limitations, artistic autonomy, and ethical concerns, and how these can be explored through analytical lenses to understand AI artwork from an HCI and practice-led viewpoint.

Chapter 7

Discussion

7.1 Introduction

This chapter synthesises the key findings and insights from the HCI and practice-led research presented in this thesis, culminating in a critical discussion of AI art practice. It integrates the theoretical framework of the Five Tropes of AI Art (chapter 5), the practice-led research of the Cat Royale project (chapter 6), and the foundational context provided by the literature review (chapters 2 and 3). The discussion in this chapter highlights the three primary contributions of this thesis to the field of HCI and practice-led research on AI art:

1. The development of the Five Tropes of AI Art as a flexible analytical framework for understanding and examining AI artworks based on observed motivation and practice. . This framework serves as a set of lenses through which curators and researchers within HCI and related fields can analyse the stated or inferred motivations and approaches in AI art creation.

2. The derivation of practical insights from the Cat Royale project, which served as a real-world test case for the Five Tropes framework. This practice-led research revealed the complexities and challenges of imple-

menting AI in artistic practice, offering valuable insights into the interplay between artistic vision, technological constraints, and ethical considerations.

3. The formulation of a set of guidelines for AI art analysis, integrating theoretical understanding with practical experience from the case study. These guidelines, which include the Five Tropes as a key component, offer additional analytical lenses for curators and researchers to navigate the complex landscape of AI art creation and presentation.

This chapter aims to bridge the gap between conceptual understanding and practical implementation in AI art by examining how the theoretical framework aligns with and is informed by real-world practice. It demonstrates how combining theoretical analysis and practice-led research can provide more comprehensive insights into AI art creation, presentation, and reception, with a particular focus on artistic observable motivation and framing strategies. The following sections will delve into each aspect of these contributions, critically examining the application of the Five Tropes framework to Cat Royale, exploring the practical insights gained from the project, and demonstrating how these elements inform the development of guidelines for AI art analysis. Throughout, we emphasise the importance of understanding the 'why' rather than just the 'how' of AI art, providing curators and researchers with tools to engage more deeply with this evolving field. While primarily aimed at curators and researchers, these insights and guidelines may also prove valuable for artists interested in critically reflecting on AI art practices and their own creative processes.

7.2 Methodology for the discussion chapter

Building upon the methodological foundations established in Chapter 4, this discussion chapter employs a systematic approach to critically examine the

findings of the research and develop a set of guidelines for AI art analysis. The methodology for this chapter encompasses several key components:

1. Exploration of Challenges and Tensions: The first step involves a detailed examination of the practical challenges and tensions encountered in the Cat Royale project (chapter 6. This section draws on the outputs of the practice-led research, including direct observation and participation in the project's development, as well as insights from interviews with the artists and audience feedback. The focus here is on uncovering the technical, artistic, and ethical challenges that shaped the project. These challenges provide a real-world context for understanding how AI art projects unfold, revealing the complex dynamics between artistic vision, technological limitations, and ethical considerations.

2. Critical Analysis: Building on the insights from the Cat Royale project, this section applies the Five Tropes of AI Art framework, introduced in chapter 5, to critically analyse the project. The framework is used as an analytical lens to identify the artistic stated or inferred motivations behind Cat Royale and to evaluate how different tropes interact or overlap within the project. This critical analysis highlights the framework's strengths in identifying multiple artistic observed motivations but also reveals its limitations, particularly in accounting for the evolution of the project over time and the various practical constraints involved in its realisation.

3. Synthesis of Findings: The third methodological component involves synthesising the findings from the critical analysis and the practice-led research. This synthesis combines the theoretical insights derived from applying the Five Tropes framework with the practical knowledge gained through the Cat Royale project. The aim is to bridge the gap between theory and practice, identifying the areas where the Five Tropes of AI art framework falls short and recognising the need for additional analytical

lenses to fully understand AI art practice. This step is crucial in moving towards the development of a set of guidelines for AI art analysis.

4. Development of Guidelines: The final step in the methodology is the formulation of a set of guidelines for AI art analysis. These guidelines are developed by integrating the insights from the previous stages, particularly the practical challenges and tensions from Cat Royale and the critical reflections on the Five Tropes of AI art framework. The guidelines are designed to offer curators and researchers within HCI and related fields additional tools for analysing AI art, addressing not only artistic observed motivations but also factors such as project development, framing strategies, and ethical considerations. These guidelines function as flexible lenses that can be applied also to AI art projects where access to detailed developmental information may be limited.

This methodological approach ensures that the discussion chapter not only synthesises the research findings but also extends them into practical, analytical tools primarily designed for curators and researchers seeking to understand more about this field. The guidelines are developed as flexible lenses, recognising that not all aspects of an AI artwork's creation process may be accessible to analysts. Throughout this process, there is an emphasis on understanding the 'why' rather than just the 'how' of AI art, with a particular focus on observable artistic motivations and framing strategies. The chapter aims to bridge the gap between theoretical understanding and practical implementation in AI art analysis. The following sections will present the results of this methodological approach, offering in-depth discussions of the application of the Five Tropes of AI art framework to Cat Royale, critical reflections on the project's challenges and insights, and the development of guidelines for AI art analysis.

7.3 Challenges and tensions of combining AI and artistic practices

The following content explores the challenges and tensions in the Cat Royale project. From human-AI dynamics to audience engagement strategies and ethical considerations, this section delves into the complexities that arise when art and AI intersect. It sheds light on the operational intricacies, ethical dilemmas, and audience considerations, presenting a view of an AI project's impact and implications.

The following list presents the challenges and tensions that emerged, significantly shaping the project's technical and artistic dimensions.

- Technical Challenges: The project faced complexities in developing a flexible AI system, integrating computer vision, managing robot arm limitations, and adapting to the cats' behaviours. These challenges required continuous refinement of the AI decision engine and innovative solutions to balance technical constraints with artistic vision.

- Artistic Tension: Striking a balance between using AI as a mere tool and giving it the ability to make independent decisions was a recurring tension in the artistic development of Cat Royale. With the artists focusing on audience expectations, managing what the audience would expect from an 'AI art' exhibit and what the system was capable of was a continuous balancing act.

- Ethical Challenges: Using robotic arms to interact with live animals raised important ethical questions that have been thoroughly considered and addressed in the project (e.g. through the involvement of an Animal Welfare Officer and extensive ethical review process).

These challenges and tensions were obstacles and opportunities for deeper inquiry and refinement. They enriched the project by introducing layers of complexity that invited thoughtful engagement from artists and team members.

7.3.1 Technical Challenges

The development of Cat Royale presented a series of technical challenges that tested the team's expertise and adaptability. As an observer, I witnessed firsthand how these challenges shaped the project's trajectory and informed the delicate balance between artistic vision and technical feasibility.

One of the primary technical hurdles was developing a flexible and dynamic system to accommodate the artists' evolving requirements. Simon, the developer responsible for the robotic arm and user interface, had to consider various potential tasks for the robot arm while also incorporating artists' requests to introduce new tasks. The robot arm was needed to perform actions such as throwing a ball or flicking a feather to entertain the cats while allowing a human operator to initiate these actions or create new ones through the user interface. Maintaining this level of flexibility while ensuring a seamless and engaging experience for the audience proved to be a significant technical challenge.

During the development phase, the team proposed adding a light indicator and sound prompt to alert the cats when the robot arm was ready to execute a task. However, it was observed that the noise generated by the robot arm itself might be sufficient to serve this purpose, highlighting the importance of considering the cats' sensory experiences in the design process.

The project also faced specific challenges related to the cats' behaviour and the exhibition environment. For instance, the cats were sometimes distracted by the noise of food preparation outside the room, prompting the team to suggest minimising this noise during food delivery. Another proposed strategy was to scatter food around the room, allowing the cats to engage in a hunt-like activity. These considerations underscored the need for the team to adapt to the cats' natural behaviours and ensure their safety and well-being, especially when operating the robot arm during food delivery.

Managing the robot arm's movement limitations was another technical chal-

lenge that required careful consideration. The team implemented various safety measures and blockers to prevent potential cat harm, including a manual interrupt system that could be activated in an emergency. This example illustrates how technical constraints can push artistic decisions, leading to collaborative experiments and innovative solutions.

Testing the decision engine with actual data during the live exhibition also presented significant challenges. The team had to identify bugs and develop solutions on the fly, working closely together to ensure the algorithm's success. The computer vision team was critical in providing input on the cats' locations and activities, essential for the decision engine to function effectively. However, despite consistent and acceptable overall accuracy, the AI decision engine's need for richer data became apparent during the exhibition, potentially due to the inherent complexities of mapping feline behaviour.

The AI algorithm's implementation in Cat Royale demonstrated resilience and adaptability, albeit with significant refinements throughout the project. Initially, the team envisioned using a complete contextual multi-armed bandit algorithm to consider each cat's location and previous activities to determine their state, along with possible actions and rewards from prior states and actions. The reward function underwent several iterations during development. Initially, it was intended to be derived from the computer vision system's assessment of cat happiness. However, this proved challenging to implement accurately, leading to a simplified approach where a reward was assigned based solely on whether a cat interacted with the robot arm, regardless of perceived happiness. As the project progressed, the team made further adaptations.

The final implementation involved a human operator manually assigning positive or negative scores based on observed cat reactions, providing a more nuanced engagement assessment. Interestingly, the algorithm's input states were also simplified from the initial concept of tracking both location and previous actions to solely considering the locations of all cats. Despite these simplifications, the algorithm performed surprisingly well, highlighting the robustness

of the underlying model.

This iterative process of refining the AI system underscores the challenges of applying theoretical models to real-world scenarios, especially when dealing with the complexities of animal behaviour. It also demonstrates the importance of flexibility and continuous adaptation in AI art projects, where the interplay between artistic vision, technical capabilities, and real-world constraints necessitates ongoing adjustments to achieve the desired outcome.

The exhibition experience also emphasised balancing exploration and exploitation in the decision engine. Matt, one of the artists involved in the project, expressed a desire for more task variance to maintain audience interest. This aligns with the earlier discussions in the thesis about the epsilon parameter in the contextual multi-armed bandit algorithm. The decision engine included a function call to adjust the levels of exploration and exploitation, which became crucial during the exhibition. By increasing the epsilon value, the team could encourage the AI to explore more diverse actions, potentially discovering new effective interactions with the cats. This adjustment was particularly important for maintaining audience engagement, as it introduced an element of unpredictability and novelty to the installation. Conversely, decreasing epsilon would allow the AI to exploit known successful strategies more frequently. This balance between exploration and exploitation became a key tool for the artists to dynamically shape the AI system's behaviour, ensuring it remained engaging for the audience while still learning from its interactions with the cats.

One of the most significant adaptations in the Cat Royale project was the shift from the initial conceptual plan of real-time visitor interaction to a more controlled approach incorporating video recording and online sharing. A combination of technical challenges and ethical considerations prompted this change. From a technical standpoint, ensuring stable, real-time interaction with a live AI system and robot arm posed significant challenges regarding system reliability and performance consistency. However, ethical considerations played

a crucial role in this decision. The welfare of the cats was paramount, and a pre-recorded format allowed for greater control over their environment and interactions, minimising potential stress from unpredictable live audience engagement. This adaptation transformed the project into a video stream of a pre-recorded 12-day exhibition, which was then shared online. To maintain audience engagement, the team implemented a commentary platform on YouTube, allowing viewers to interact with the content and each other, albeit in a more structured and moderated manner. This approach balanced the project's interactive aims with the technical and ethical requirements, ensuring a safe environment for the cats while providing an engaging experience for the audience.

As an observer, I witnessed how these technical challenges tested the team's problem-solving skills and shed light on the complex interplay between artistic vision, audience considerations, and the practical realities of working with AI systems. The lessons learned from navigating these challenges will inform the discussion chapter of this thesis, contributing to the development of guidelines for creating engaging and impactful AI art projects.

These technical challenges offer curators and researchers valuable insights into AI art development. They highlight the iterative nature of such projects and the interplay between artistic motivation and technological implementation.

7.3.2 Artistic Tensions

The development of Cat Royale was marked by various artistic tensions that emerged from the complex interplay between the artists' creative vision, the technical constraints of the AI system, and the practical considerations of audience engagement. As an observer, I witnessed firsthand how these tensions shaped the project's trajectory and informed the delicate balance between artistic expression and the realities of working with AI technologies.

Balancing AI Autonomy and Human Oversight

One of the most significant tensions during the project was the balance between human control and AI autonomy, particularly in artistic vision. The technical aspects of the AI's implementation were less prominent during the development phase until the final test, with the underlying safety net being the idea that a human operator could secretly control the robotic arm, creating the illusion of an AI-driven system for the public. While this idea was initially indicated as optional, it was at a point considered due to its potential to address safety concerns and simplify project implementation. It was then partially implemented with the decision to have a human operator assign a manual score for the cat's happiness.

This practical safety net illuminated another potential tension between the system developers, eager to evaluate the algorithms' effectiveness, and the artists, primarily concerned with the impact on the audience. The compromised solution was to have the AI system assist the human operator, creating a learning cycle between human intuition and AI guidance.

The decision to override the AI was not arbitrary but a calculated choice by the artists. In the initial days of the final exhibition, the AI was primarily in 'training mode,' continuously learning from the data it gathered. During this time, manual overrides were less frequent but highly impactful, serving as critical learning experiences for the AI. As the AI matured, it transitioned to an 'exploitation mode,' applying its acquired knowledge to make independent decisions. Here, overrides were more strategic, often aiming to fine-tune the AI's performance or align it with the artists' evolving vision. The artists had to balance these two modes carefully, knowing when to let the AI learn autonomously and when to intervene for optimisation.

Reflecting on the project's progression, it appears, in hindsight, that the artists were perhaps looking to maintain a degree of control over the AI components from the outset, potentially to avoid any unexpected behaviours or malfunc-

tions. The use of the robotic arm as a symbol and embodiment of the autonomous system could be seen as part of this strategy, providing a concrete, controllable aspect to the more unpredictable nature of AI.

These approaches suggest that from the beginning, the artists might have been more interested in asserting their control over the project and mitigating any potential challenges posed by the AI rather than wholly embracing a co-creative relationship with the AI.

This tension between AI autonomy and human control foreshadows the need for clear guidelines on defining AI's role and establishing appropriate levels of human intervention in AI art projects.

Translating Artistic Vision into Robotic Action

Throughout the Cat Royale project, the team frequently deliberated on the role of the robotic arm, grappling with the challenge of translating simple human actions into precise robotic movements. The inherent unpredictability of feline responses further complicated this task. The technical intricacies of this process created a notable tension between the artists, who sought creative freedom in determining robotic movements, and the developers, who emphasised the necessity for meticulous, iterative testing.

To address safety concerns and mitigate potential risks, the artists and technicians collaboratively established a set of preventive measures. These included implementing an emergency stop button, an electricity cut-off mechanism, and a system allowing artists to record and implement custom movements for the robot arm. The artists particularly valued the ability to record custom actions, enabling them to experiment with various movements offline. This feature empowered the artist to create a diverse library of tasks and robot arm movements that could be employed during the live performance (which was recorded). The artists viewed this capability as a means to express their artistic vision effectively within the system's constraints.

After demonstrating these features, the artists began to perceive the robotic

arm as a powerful tool for creative exploration. Despite the robot's movements being hard-coded, pre-defined, or recorded on the fly by the operator under the artists' direction, a sense of interaction and collaboration emerged with the machine. This perception underscored the potential for technology to serve as an extension of artistic expression, even within predetermined parameters.

Interestingly, the artists seemed to appreciate the high degree of control they maintained over the process rather than sharing creative decision-making with the machine. While there was an interest in understanding machine autonomy, reality favoured a more traditional approach, where artists retained control over their creative outputs.

The artists effectively leveraged the robotic arm as a versatile instrument for artistic expression. Its hard-coded nature did not diminish their enthusiasm but provided the certainty and control necessary to realise their creative visions. This outcome suggests that in the intersection of art and technology, the values of control and predictability can be as significant as the potential for unpredictability and autonomy often associated with AI. It highlights a nuanced approach to integrating technology in art, where artists can harness technological tools while maintaining their creative authority.

Adapting artistic vision to technological constraints highlights the importance of developing flexible execution plans that balance creative goals with technical realities.

Aligning AI Functionality with Artistic Communicated Intent

The decision engine was pivotal in the Cat Royale project, providing task suggestions for the robot arm to engage the cats. The decision engine functioned based on the 'contextual multi-arm bandit' algorithm, which assessed the cat's state, position, and preceding activities to suggest an appropriate task.

During a meeting held on March 21st, 2023, it became apparent that there was some confusion among the team members and artists about the decision engine's working principles. The algorithm's functionality relied heavily on the

context of the cats' states, which was not yet available due to the computer vision feed not being connected at that stage. This meant that the algorithm was functioning without the context it was designed to use, effectively turning it into a standard multi-arm bandit algorithm. In practice, this had significant implications for both the artists and technologists. For the artists, this meant that the AI's decision-making process was less nuanced and responsive to the cats' behaviour than initially envisioned, potentially limiting the complexity and subtlety of the interactions they had hoped to explore in the artwork. The lack of contextual information also meant that the AI's choices might appear more random or less 'intelligent' to observers, potentially affecting the narrative and conceptual aspects of the project. For the technologists, this situation presented a challenge in accurately assessing the system's performance and effectiveness. Without the intended contextual input, it was difficult to gauge whether the algorithm was functioning as designed or to identify areas for improvement. This also meant that any refinements or adjustments made to the system at this stage might not be applicable once the full contextual information became available, potentially leading to additional work or revisions later in the project.

This situation underscored the importance of clearly defining the main goals of the AI system from the outset and how these goals align with the artist's artistic vision. The apparent confusion highlighted a potential challenge when combining AI and art, as each field has its principles, objectives, and requirements.

During the same meeting, it was suggested that a 'do nothing, relax' task be introduced, along with various new games, to create a more varied environment for the cats. Despite initial thoughts, Matt decided against introducing the 'do nothing' task, a decision that might bias the machine learning solution. This decision was likely motivated by the desire to maintain the audience's engagement, avoiding periods of inaction that could be perceived as dull. Yet, from an AI perspective, including a 'do nothing' option could be fundamental

to optimising the decision engine. This example underlined how a project's artistic and technical objectives could sometimes clash and emphasised the necessity for clear communication and compromise in such multidisciplinary endeavours.

This experience underscores the need for guidelines that emphasise clear communication between artists and technical teams, ensuring that AI implementations align with artistic objectives.

Navigating AI Recommendations and Narrative Flow

During a progress meeting on March 23, 2023, the team observed a pattern in the cats' activity levels, noting a marked decrease in energy during the afternoon. This natural cat behaviour challenged maintaining audience engagement, particularly in video editing and overall narrative flow. From an AI perspective, these daily activity patterns could have been valuable for enhancing the system's learning capabilities. In typical machine learning applications, such behavioural trends would be incorporated as features, allowing the AI to better understand its operational context. This process, known as feature engineering, is crucial for improving model performance and adaptability. However, Cat Royale's artistic priorities led to a different approach. The decision-making process prioritised maintaining an engaging narrative over adhering to the cats' natural rhythms. The AI system functioned more as a recommendation engine, with the human operator having the option to override suggestions to maintain a compelling storyline and avoid periods of inactivity that might diminish audience interest. The presence of a manual operator in the exhibition space allowed for real-time adjustments to the cats' engagement levels. Consequently, the team decided not to prioritise the integration of these daily activity patterns into the AI system at this stage of the project. This decision highlighted the tension between optimising AI performance and maintaining artistic control over the installation's narrative flow. This decision-making process points to the need for guidelines on integrating AI-driven elements with

artistic narratives, balancing technological capabilities with audience engagement. The team clearly agreed upon the scope and objectives of integrating AI into the artwork.

Reconciling Diverse Stakeholder Objectives

A meeting on 28 March 2023 revealed the complex interplay of objectives among the project's diverse stakeholders, including the cats, artists, and machine learning researchers. The team recognised the need to establish a primary objective, whether focusing on the cats' well-being or the AI system's performance. This discussion aligned with best practices in machine learning, which emphasise the importance of clearly defining the optimisation target for any AI system. The conversation underscored a fundamental challenge in AI art projects: defining a clear optimisation goal that satisfies artistic and technical requirements. Initially, the team considered using computer vision to quantify cat happiness as an objective scoring method. However, after careful deliberation, they maintained an operator-dependent scoring system.

This decision was a deliberate choice to incorporate human subjectivity as part of the artistic design. This choice introduced an element of human interpretation into the AI's decision-making process. While potentially introducing biases in score labelling, this approach was seen by the artists as a feature rather than a limitation. It highlighted the subjective nature of assessing 'happiness' or 'well-being' and allowed for a more nuanced, human-centric interpretation of the cats' states.

However, this decision-making process revealed a core tension between artistic and research objectives. While the artists prioritised optimising audience engagement and narrative coherence, the researchers focused on developing a robust and effective machine learning implementation. The challenge lay in reconciling these potentially conflicting goals within a single project. The team's discussions emphasised the importance of establishing clear communication channels and fostering mutual understanding among diverse stakeholders

from the project's inception.

These artistic tensions offer curators and researchers valuable insights into the complex interplay between creative vision, technological implementation, and audience engagement strategies in AI art. They highlight the importance of understanding the motivations behind artistic decisions and the challenges of aligning diverse stakeholder objectives.

7.3.3 Ethical Challenges

The development of Cat Royale presented significant ethical challenges, highlighting the complex interplay between artistic vision, technological requirements, and animal welfare. From the outset, the artists committed to embedding the project within an ethical framework, engaging animal behaviour experts to ensure the cats' safety while facilitating interactions between humans and other species. The artists' approach was twofold: to create an engaging artwork and to provide a platform for critical reflection on the ethical dimensions of AI. They contemplated how AI systems might care for animal needs and what risks we should anticipate (including humans) as this technology rapidly evolves. This ethical approach underscored the artists' recognition of the implications of AI and autonomous systems in our society. The commitment to ethical guidelines was not merely a moral consideration but a strategic decision driven by the artists' ambition to engage a broad audience in ethical issues. They fully acknowledged the complexity of navigating this ethical terrain, with the cats' safety and welfare always at the forefront of their minds.

University's Ethical Perspective

The University's perspective added another layer of complexity to the project's ethical landscape. Cat Royale was seen as a unique opportunity to introduce important conversations about AI's role in society and the conditions under which AI can be considered reliable. The project addressed critical questions

about the impact of robots on human-animal relationships and explored AI's potential to enhance interactions with pets. Central to the University's ethical considerations was securing the comfort and well-being of the cats involved. The University appreciated the involvement of animal behaviourists and the decision against live streaming to minimise potential stress. Moreover, the project served as a practical demonstration of the University's ongoing research in Responsible Research and Innovation (RRI).

Charting Ethical Tensions in Multispecies Technology Research

The ethical approval process for Cat Royale, as detailed in our paper [8], revealed significant tensions in conducting multispecies technology research. The process involved extensive dialogue with three institutional review boards: the University-wide Animal Welfare and Ethical Review Body (AWERB), the Computer Science Ethics Review Committee (CSREC), and the Vet School's Committee for Animals and Research Ethics (CARE). This complex review process highlighted several key tensions:

- Ensuring cats' safety and autonomy whilst meeting research goals
- Balancing the project's dual aims of provoking public debate and providing an enriching experience for the cats
- Navigating the differences between strict animal welfare legislation and more participatory approaches championed in Animal-Computer Interaction (ACI)
- Demonstrating clear research benefits versus identifying and mitigating risks

Our paper introduced a conceptual framework to map these tensions, revealing crucial disciplinary differences underpinning difficulties in the approval process. This framework helped identify external tensions with traditional veterinary science and internal conflicts between artistic goals and ACI aims.

The publication of this paper not only contributes to the broader discussion on ethical considerations in multispecies technology research but also serves as a tangible outcome of the ethical tensions we navigated throughout the Cat Royale project. It demonstrates how these challenges led to relevant academic contributions and advancements in understanding ethical processes for interdisciplinary efforts involving animals, technology, and art. The complex ethical landscape of Cat Royale, encompassing animal welfare, institutional perspectives, and interdisciplinary research challenges, underscores the need for analytical lenses that address ethical considerations in AI art projects. For curators and researchers, understanding these ethical dimensions provides valuable context for analysing AI artworks, particularly those involving live subjects or addressing societal implications of AI.

7.4 Critical Analysis

This section builds upon the critical insights derived from the Cat Royale project, as detailed in the previous sections of this chapter. It synthesises the practical challenges and tensions observed in the project's development from an HCI and practice-led viewpoint. These insights form the basis for critically analysing AI art creation and presentation within this context. The following subsections examine how the Five Tropes of AI Art framework can be applied as an analytical lens to understand the Cat Royale project. This analysis aims to demonstrate the framework's utility for curators and researchers within HCI and related fields in examining AI artworks.

Furthermore, this section reflects on how the practical insights from Cat Royale, when viewed through the lens of the Five Tropes framework, reveal the need for additional analytical tools. These insights contribute to the development of a set of guidelines (presented later in this chapter) that serve as complementary lenses for AI art analysis, with a particular emphasis on framing strategies and ethical considerations encountered in practice.

Importantly, while the Five Tropes framework and the set of guidelines benefit from comprehensive information, they can still provide valuable insights even when direct access to the creative process or the artist's explicit motivations is limited. They provide a structured approach for curators and researchers to examine AI artworks, offering a means to hypothesise about artistic motivations and processes based on the available evidence. This approach ensures that analysis can be conducted regardless of the level of access to the artist or the creative process.

This critical analysis and synthesis aim to provide curators and researchers with an approach to understanding AI art practice, bridging theoretical frameworks based on observed motivation with practical implementation challenges. It underscores the importance of clear artistic motivation and framing in creating impactful AI art, whilst acknowledging the complexities and tensions inherent in such projects.

7.4.1 Alignment with the Five Tropes of AI Art

The following paragraphs reflect on the Cat Royale project, documented in chapter 6 through the lens of the five tropes of AI art introduced in chapter 5, providing insights into the artists' stated or inferred motivations and the project's position within the broader landscape of AI and art practice.

AI and Co-Creativity

While Cat Royale initially appeared to embody the concept of AI and co-creativity, the observations revealed a more complex reality. The project demonstrated how AI could expand an artist's creative scope, enabling an interactive, dynamic, and responsive art installation to be realised. The robot arm's engagement with the cats showcased an innovative example of AI-enhanced artistic creation, aligning with questions Q5 (Does the artwork explore AI as a collaborator in interactive performances, pushing the boundaries of human-

machine creative partnerships?) and Q6 from the previous chapter (Does the artist utilise AI as a tool to expand their creative capabilities, exploring new avenues of expression?). However, as the project developed, it became apparent that the artists maintained significant control over the AI's recommendations. The relationship between the artists and the AI system corresponded more with a master-apprentice dynamic than a true co-equal collaboration.

Selecting Training Data as a Creative Choice or Strategy

The Cat Royale project did not primarily focus on training data as a significant artistic element, which sets it apart from the trope: 'Selecting Training Data as a Creative Choice'. While selecting input parameters and features, such as cat engagement and happiness metrics, indirectly influenced the decision engine's behaviour, this was not a central creative strategy.

The limitations of the computer vision system, particularly the choice to use a human operator to score the engagement levels of the cats, could be seen as a deliberate artistic decision to highlight the imperfections of AI by selectively curating the training data. This aligns to some extent with the 'Selecting Training Data' trope.

The data collected was limited to the cats' positions rather than their actions. Additional features would likely have improved system performance. For instance, tracking sequences of actions or considering variables like the time of day could further enhance the precision of the AI system.

However, these limitations appear primarily driven by time and technical constraints rather than intentional artistic choices around data curation itself. As a result, the project focused on AI's broader conceptual and ethical implications rather than on the technical aspects of data selection.

Reflective Investigation of AI

Cat Royale engaged in a reflective investigation of AI and how it can affect society. This approach invited the audience to reflect critically on AI tech-

nology, aligning with question Q1 (Is AI problematised within the artwork to encourage critical reflection on technology's role in society?) and the trope: 'Reflective Investigation of AI: using AI playfully and experimentally to explore technology's role in our lives'. However, the project's interaction was primarily between the robot arm and the cats, with human audiences acting more as spectators. While this setup prompted reflection on AI's potential roles in caregiving and happiness management, it did not fully embrace the playful and directly interactive approach often associated with this trope. Instead, it leaned towards a more serious, contemplative engagement with AI's societal and ethical implications.

AI as an Autonomous Artist

Cat Royale did not present AI as a fully autonomous artist, which sets it apart from the trope: 'AI as an Autonomous Artist'. Instead, it explored the tension between machine autonomy and human intervention. The decision engine was not envisioned as the artist in the installation, and the project was not about AI creating artwork with complete autonomy. Instead, it was a tool for exploring broader questions about AI's role in society and our relationships with autonomous systems.

AI as the Artwork's Subject Matter

Upon reflection, it becomes clear that Cat Royale aligns most closely with the trope: 'AI as the artwork's subject matter'. The project addressed AI's sociological and ethical dimensions, mainly how it interacts with living beings. This approach resonates strongly with question Q4 (Does the artwork convey a serious message about AI, engaging with the technology's ethical, political, or societal implications?), as the project intended to convey serious ethical messages to the audience. The artists' emphasis on ethical concerns and their decision to control significant aspects of the AI's behaviour underscore this alignment. Cat Royale used AI to probe deeper questions about

our relationships with autonomous systems, especially regarding physical and emotional well-being. In conclusion, while Cat Royale incorporates elements from multiple tropes, it most strongly exemplifies AI as the artwork's subject.

Critical Analysis of The Five Tropes Framework

The Cat Royale project was a valuable test case for the Five Tropes of AI Art framework. Whilst the project primarily aligned with the 'AI as Subject Matter' trope, it also incorporated elements from other tropes, revealing the framework's nature as a series of overlapping lenses rather than a strict taxonomy. Applying these lenses to a real-world AI art project provided several insights into the framework's effectiveness and limitations for HCI and practice-led analysis. The Five Tropes framework demonstrated its utility by offering multiple perspectives through which to analyse the stated or inferred artistic motivations behind Cat Royale. The project's primary focus on exploring the ethical implications of AI in caregiving scenarios aligned closely with the 'AI as Subject Matter' lens. However, the framework's true strength lies in its ability to recognise and analyse the tension between different tropes, enabling a more nuanced understanding of Cat Royale's complexity. As the project unfolded, different tropes came to the fore at various stages, highlighting the dynamic nature of AI art creation. In the initial conceptualisation phase, the 'AI as Subject Matter' lens dominated, with the team focusing on the ethical implications of AI in caregiving. However, as development progressed, elements of 'AI and Co-Creativity' emerged, particularly in the iterative process of refining the AI's decision-making algorithms. The 'Data-Driven Creative Choices' lens became more prominent during the testing phase as the team grappled with training data selection and its impact on the AI's behaviour. The 'Reflective Investigation of AI' lens became particularly prominent during the exhibition phase. As visitors watched video installations of cats interacting with the robot arm, they were naturally drawn to contemplate AI's nature and its broader societal implications. This shifting emphasis demonstrates how AI

art projects can evolve, with different aspects of the Five Tropes becoming more or less salient at various stages of development and presentation. The framework's flexibility in accommodating these shifting emphases suggests its potential applicability to a wide range of AI art projects, regardless of their primary focus. By viewing the tropes as overlapping lenses rather than discrete categories, the framework allows for a more fluid and comprehensive analysis of complex AI artworks. However, applying the framework to Cat Royale also revealed some limitations. In practice, the boundaries between tropes were often blurred, with the project's exploration of AI as an autonomous system in daily life (viewed through the 'AI as Subject Matter' lens) intrinsically linked to its use of AI for interaction (touching on the 'AI and Co-Creativity' lens). This overlap highlights the tension inherent in these lenses, where different perspectives can coexist and even conflict within a single artwork. Additionally, whilst useful for critical analysis, the framework didn't fully capture how artistic stated or inferred motivations and intentions can evolve throughout a project's development. Cat Royale's focus shifted subtly as the project progressed, emphasising different aspects of AI at various stages. Initially intended to be a live interactive installation with the audience in real-time, it then became a display of pre-recorded videos in the gallery space.

This evolution suggests that the framework might benefit from incorporating a temporal dimension, acknowledging how the salience of different tropes can change over time. The framework also faced challenges in accounting for practical constraints that often shape AI art projects. Technical limitations, ethical considerations, and audience engagement strategies played significant roles in Cat Royale but weren't directly addressed by the tropes. This limitation suggests that while the Five Tropes provide valuable lenses for artistic and conceptual analysis, they might be complemented by additional perspectives that consider the pragmatic aspects of AI art creation and exhibition. In conclusion, viewing the Five Tropes of AI Art as overlapping, tension-filled lenses rather than a rigid taxonomy enhances their analytical power for un-

derstanding practice. This approach allows for an understanding of complex AI artworks like Cat Royale, recognising that different aspects of AI art can coexist, conflict, and evolve within a single project.

7.4.2 Validating the Framework and Analysis: The Synocene Project

This section presents an analysis of the Synocene project to further explore the application of the Five Tropes of AI Art framework as a set of overlapping lenses for HCI/practice analysis. This examination serves a dual purpose: it demonstrates how these lenses can be applied to diverse AI artworks and illustrates how they can yield valuable insights even with limited information, a scenario often encountered by curators and researchers analysing AI art. The Synocene project, discussed with its creator, Marina Wainer, provides an opportunity to test the flexibility and interpretive power of these analytical lenses. The analysis is based on a multi-stage process of information gathering, including an initial conversation with Marina Wainer on 23 February 2024, followed by email exchanges and shared exhibition materials. This approach provides insights into the stated motivations, methodologies, and audience engagement strategies employed in the AI art project, whilst acknowledging the inherent limitations of partial information.

Project Overview and AI Integration

The Synocene project, conceived by Marina Wainer and her collaborators, is an artwork that combines immersive experiences, AI interactions, and sound installations. Through the interview, Marina revealed that the core motivation was to encourage a more inclusive perspective on our relationship with the natural world. This motivation evolved throughout the project as the team began integrating AI, recognising its potential to explore alternative ways of perceiving and interacting with nature. According to the exhibition materials

shared by Marina, the project unfolds in several stages: a guided forest walk with sensory-altering equipment (reflective masks and headphones), interactions with AI chatbots representing elements of the forest, and a 360-degree immersive sound installation incorporating co-created narratives. Marina elaborated on the integration of AI in the Synocene project, which served multiple purposes. AI allows for the creation of fictional characters representing elements of the natural world, providing a platform for non-human voices and perspectives. By engaging with AI-generated narratives about nature, participants gain insights into how AI systems trained on human-generated data perceive and interpret the environment, highlighting potential biases and limitations. The chatbots act as prompts for dialogue and introspection, encouraging participants to question their relationship with nature and consider alternative ways of interacting with the environment. Additionally, AI interactions provide a novel way to engage with environmental issues, potentially bypassing pre-existing biases and emotional barriers that might hinder open discussion and reflection.

Application of the Five Tropes as Overlapping Lenses

Viewing the Synocene project through the Five Tropes of AI Art as a series of overlapping lenses reveals the multifaceted nature of the artwork and the tensions between different aspects of AI engagement. Despite limited information, it is possible to identify how various tropes come into play, often simultaneously and in tension. The use of AI chatbots to co-create narratives with participants aligns with the AI and Co-Creativity trope, highlighting the collaborative nature of the artwork. However, using the trope as an overlapping lens also reveals tensions with the AI as a Subject Matter trope, as the co-creation process becomes a reflection subject. While not explicitly discussed in detail, the selection and curation of data used to train the AI chatbots likely play a crucial role in shaping the artwork's outcomes, intersecting with the Data-Driven Creative Choices lens. Although not prominently featured,

elements of the AI as an Autonomous Artist may emerge in how the AI chatbots generate unexpected or autonomous responses, creating tension with the human-driven aspects of the project.

This analysis demonstrates how viewing the Five Tropes as overlapping lenses rather than discrete categories allows for a richer understanding of AI artworks in practice. It reveals how different aspects of AI art can coexist, conflict, and evolve within a single project.

7.4.3 Critical Examination of Cat Royale Project

Building upon the application of the Five Tropes framework to Cat Royale, the next sections will turn into a critical examination of the project from an HCI and practice-led perspective. This analysis aims to delve deeper into the practical challenges and decision-making processes that shaped the artwork, offering curators and researchers within relevant fields an understanding of AI art creation in practice. By exploring the project from my dual perspective as both a Machine Learning developer and an observer, the following sections provide a unique insight into the interplay between artistic vision and technological implementation. These critical reflections complement the Five Tropes analysis and inform the development of additional analytical lenses (presented as guidelines later) for examining AI artworks.

The Role of AI

From the artists' initial presentation, it was clear that Cat Royale aimed to address ethical issues related to AI. However, the technical role of AI within the project remained ambiguous throughout the early stages of development. This ambiguity raised questions about expectations and the desired role of the AI component in the installation during the initial development phase.

My questions about the AI's role centred around three main possibilities, each with distinct implications for the project:

- Embodying the project's core vision: In this scenario, AI would be the central focus of the artwork, directly representing and exploring the ethical issues related to AI that the project aimed to address. This would involve creating an AI system that actively demonstrated or provoked reflection on these ethical concerns through its behaviour or decision-making processes. For example, the AI could be designed to make decisions that highlight biases in data or algorithms or to interact with the cats in ways that raise questions about machine empathy and care.

- Functioning as a control or recommendation system: here, the AI would play a more supportive role, acting as a tool to facilitate the artwork rather than being its central focus. As a control system, it might manage various aspects of the cat environment, such as temperature, lighting, or the timing of interactions. As a recommendation system, it could suggest activities or interventions based on its analysis of the cats' behaviour, but human operators would make final decisions. This approach would allow for exploring human-AI collaboration and the boundaries of AI decision-making in caregiving scenarios from an HCI standpoint.

- Operating autonomously: In this case, the AI would be given high independence, making decisions and taking actions with minimal human intervention. This could involve the AI independently choosing when and how to interact with the cats, learning from these interactions, and adapting its behaviour over time. An autonomous AI would allow exploration of machine agency, responsibility, and the ethics of delegating care to artificial systems.

Each of these possibilities would require different technical approaches and would shape the artwork's narrative and audience experience in unique ways. An AI embodying the project's vision might require more sophisticated ethical reasoning capabilities. A control or recommendation system would need robust data analysis and user interface design. An autonomous system would demand

advanced machine learning techniques and careful consideration of safety protocols. Understanding these distinctions was crucial for aligning the technical implementation with the stated artistic goals and ethical considerations of the project. It would determine the choice of AI technologies and algorithms and how the AI's role would be communicated to the audience, influencing their interpretation and engagement with the artwork.

Reflecting on this technical aspect of the experience, I identified the following key insights for curators and researchers analysing AI art projects:

1. Understanding AI's role: It is essential to identify and analyse how the AI's role is defined and communicated within the artwork. This understanding provides insights into the artists' choices and the project's conceptual framework.

2. Importance of initial conceptualisation: When possible, examining the early discussions and planning stages can reveal crucial information about how the artistic vision shaped the technical implementation of AI.

3. Evolution of the project: Tracking how the AI's role and implementation changed throughout the project's development can offer valuable insights into the artistic process and decision-making.

4. Assessing technological choices: Analysing the complexity of AI solutions used in the artwork can provide insights into the balance between artistic vision and technological implementation.

5. Ethical considerations: Examining how ethical considerations were incorporated into the AI system's design and implementation can reveal important aspects of the artwork's conceptual framework.

6. Interdisciplinary collaboration: Investigating the extent of collaboration between artists and AI experts throughout the creative process can offer insights into how technical constraints and artistic vision were balanced.

These analytical perspectives underscore the importance of understanding the alignment between technical implementation and artistic objectives in AI art practice. For curators and researchers, this understanding is crucial for interpreting the artwork's conceptual depth and technological sophistication.

Artistic and Technical Vision

Another tension I witnessed during the project was the balance between artistic vision and technical accuracy. While researchers ideally envisage a system exhibiting consistent precision, artists may be more inclined towards a system that generates the desired artistic impact, even if it lacks rigorous technical assessment. The Cat Royale project team demonstrated a remarkable ability to balance artistic vision and technical accuracy, adapting their approach to the project's unique requirements. An illustrative example of this balance in practice was their handling of the AI system's testing and deployment.

In a typical AI development process, AI developers would ideally conduct extensive pre-deployment testing, including splitting data into training and testing sets, performing A/B tests, and running rigorous statistical performance assessments. However, the Cat Royale project faced time constraints and the challenge of creating an installation that was as much about the process of AI learning as it was about the final performance. Instead of adhering strictly to traditional AI development practices, the team adopted a more flexible, artistically-driven approach.

Rather than conducting extensive pre-exhibition testing, they opted for 'on-the-fly' testing during the actual exhibition. The artists managed expectations by emphasising that the AI's learning process was an integral part of the installation, not just a means to an end. They incorporated a human controller who had the final say during the exhibition, allowing for real-time adjustments and ensuring the cats' wellbeing. This approach allowed the team to balance immediate artistic needs with ongoing technical improvements.

This tension between artistic vision and technical accuracy raises several crit-

ical considerations. It prompts reflection on the appropriate balance between technical precision and artistic goals and what compromises might be necessary in pursuing these distinct yet intertwined goals. Furthermore, it challenges one to consider whether an AI simulation that appears convincing to the audience is sufficient from an artistic perspective, even if it lacks technical rigour. Lastly, it raises the question of how AI developers can maintain engagement and motivation in a project where more than technical achievement is needed. Reflecting on this consideration, I identified the following key insights for curators and researchers analysing AI art projects:

1. Balancing precision and artistic impact: It's beneficial for the analysis to examine how artists navigate the trade-off between technical precision and desired artistic outcomes.

2. Role of human intervention: The inclusion of a human controller in Cat Royale highlights the importance of examining the balance between AI autonomy and human oversight in AI artworks.

3. Managing audience expectations: Analysing how artists communicate the AI's learning process to audiences can provide insights into framing strategies for AI art.

Human Roles and skills

The collaboration within the Cat Royale team (Ju, Nick and Matt introduced in chapter 6.1.1) exemplified how diverse skill sets and roles can contribute to a successful AI art project:

- Ju's Role: Despite limited knowledge of machine learning algorithms, Ju emerged as a crucial voice representing the audience's perspective. Her insights were essential for envisioning audience reactions and guiding the project's direction with the audience in mind.

- Matt's Contribution: With a slightly more advanced understanding of machine learning, Matt articulated specific needs for audience engagement. His role was analogous to a race car driver who may not understand the engine's mechanics but knows the performance features needed to win the race.

- Nick's Expertise: Nick's strong coding background allowed him to comprehend machine learning solutions quickly. He was critical in interpreting requests from Ju and Matt, translating them into engineering terms, and contributing to the technical implementation.

A critical insight from this experience is that the artist's motivation in an AI art project can be translated into a unifying vision for the entire team.
Effective communication is crucial in addressing this shared vision. Artists may need to engage with complex data science concepts, while technologists can be open to artistic considerations that may challenge technical norms. This mutual understanding can lead to necessary compromises without losing sight of the project's core artistic vision.
Cat Royale's experience demonstrates that when artists and technologists collaborate closely from the early stages of a project, it can lead to a more cohesive and effective integration of AI into art practice.
These observations suggest several analytical perspectives for curators and researchers:

1. Assessing Team Dynamics: Examining the integration of diverse viewpoints can provide insights into the artwork's conceptual depth and technical sophistication.

2. Communication Analysis: Studying how artistic concepts and technical components are translated and combined in the communications and framing of the artwork can reveal the artwork's underlying creative process.

3. Examining Shared Vision: Analysing how a unifying project vision is established and maintained across diverse team members can provide an understanding of the artwork's main communicated goals.

4. Compromise and Adaptation: Observing how artistic and technical considerations are balanced can reveal the artwork's evolution and final form.

It's worth noting that while some AI artists possess both technical and creative expertise, the analytical perspectives gained from studying multidisciplinary collaborations remain valuable. Even for individual artist-technologists, examining how they navigate the dual roles of artist and technical developer can provide insights into the artwork's conceptual and technical foundations. These analytical approaches can help curators and researchers understand the complex interplay of skills, roles, and perspectives that shape AI artworks, regardless of whether they are created by teams or individuals.

Iterative and Flexible Development

The Cat Royale project challenged conventional AI development practices and revealed new artistic exploration and collaboration possibilities. The following content delves into the project's unique approach, highlighting how departures from standard machine-learning methodologies can lead to innovative artistic outcomes.

One aspect of Cat Royale was that the AI model's ability to work correctly was assessed the day before the exhibition's initial live recording. Unlike traditional AI projects that rely heavily on simulation and pre-testing, the Cat Royale decision engine was tested near the live exhibition. This unconventional method introduced an element of unpredictability and spontaneity that aligned well with the project's artistic goals.

The project also demonstrated a fluid approach to defining its optimisation target. As detailed in chapter 6 (specifically in sections 6.3.6 and 7.3.1), the goal initially was to measure an undefined concept of 'happiness,' which evolved

into engagement and finally settled on a manually assigned operator score. This evolution reflects the iterative nature of artistic exploration, where the creation process often leads to new directions.

Another significant departure from conventional AI practices was the limited availability of features for the machine learning model throughout much of the exhibition period. While this would typically be seen as a significant drawback in a standard AI project, it became an opportunity for creative problem-solving in Cat Royale. The team had to adapt their approach constantly, finding innovative ways to work with limited data and evolving constraints.

These unconventional approaches collectively point to a new paradigm of collaboration between artists and technologists in AI art practice. Creating AI art becomes an artistic expression, with the collaboration between the artist and ML expert forming 'an artwork within the artwork.' This paradigm is characterised by mutual learning, where artists gain insights into technical possibilities, and technologists develop a deeper appreciation for artistic processes and intuition. The fluid nature of the process allowed for real-time adaptations of the artwork based on artistic intuition and team collaboration.

The reflections on the creative process and final product of the Cat Royale project offer analytical perspectives for curators and researchers examining AI artworks:

- Flexibility in Development: Analyse how departures from conventional AI practices influence the artistic outcome. Consider how this flexibility might be reflected in the final artwork.

- Evolution of Objectives: Examine how the artwork's goals may have shifted during its development. This evolution can provide insights into the artistic process and conceptual depth.

- Adaptive development processes: The project's iterative approach, focusing on a Minimum Viable Product (MVP), reveals how AI art can evolve

during its creation. Analysing this process, when possible, can provide insights into the artwork's final form and conceptual development.

- Iterative feedback integration: Understanding how feedback from both artistic and technical team members is incorporated throughout the development process can reveal the collaborative nature of AI art creation.

Constraints and Feasibility

The Cat Royale project uses a fixed robot arm. This seemingly simple constraint embodies the complex interplay between technological limitations and artistic expression, offering practical insights into how AI simultaneously enables and restricts creative possibilities.

The project aimed to examine how autonomous systems influence human behaviour, but ironically, the artists found themselves constrained by the very system they sought to scrutinise. This paradox provides a thought-provoking insight into the intertwined relationship between autonomous systems and human creativity in practice. The robot arm was the project's primary tangible embodiment of the AI component. So, as the central protagonist of the installation, the artists had to accept its limitations and work around them. This constraint forced the artists to adapt their vision, mirroring how society might need to adapt to the limitations of AI technologies. Ultimately, the restriction became integral to the artwork, demonstrating how technological constraints can shape artistic expression.

The fixed nature of the robot arm had significant implications for both the technical and artistic aspects of the project. Technically, it required the AI decision engine to optimise choices within a confined space, adding complexity to the decision-making process. Artistically, it served as a metaphor for the limitations of AI rooted in their programming, data, and algorithms. It also created a focal point for audience engagement, fostering a communal experience of observing the interaction between cats, AI, and technology.

To further illustrate the significance of the fixed robot arm, we can consider a hypothetical scenario where the artists had access to a mobile robot. Such a robot could have expanded the physical boundaries of the installation, allowing for interactions across multiple spaces and enabling more dynamic and spontaneous interactions with the cats and the audience. However, it would have introduced new safety, control, and predictability challenges.

Despite the challenges presented by the fixed robot arm, the Cat Royale project demonstrates that a clear artistic vision can effectively navigate and leverage the complexities of AI. The artists incorporated the constraints into their narrative, making them an integral part of the artwork's framing. This approach shows how artists can use AI's limitations as a creative stimulus rather than viewing them solely as obstacles.

Reflecting on the constraints and feasibility aspects of Cat Royale, I identified the following insights for curators and researchers analysing AI art projects:

1. Technological limitations: Identify and analyse how specific technological constraints shape the artwork's form and function. This analysis can reveal the interplay between AI capabilities and artistic vision.

2. Constraint integration: Examine how artists incorporate technological limitations into the artwork's narrative and conceptual framework. This can provide insights into the artists' adaptability and creative problem-solving.

3. Hypothetical alternatives: Consider how alternative technological setups might have altered the artwork. This speculative analysis can provide insights into the artists' decision-making process.

Embracing the Unexpected

The Cat Royale project revealed insights into the role of unexpected behaviours and outcomes in AI art practice. These unplanned events added depth to the project and offered valuable lessons about the nature of AI art. An interesting

incident occurred when a bird toy became stuck in the robot's arm, leading to an unforeseen collaboration between the cats and the robot to remove it. This fortunate event created a new, unplanned game that became a highlight of the project, featuring in the edited video footage shared on YouTube.

This incident illustrates how unintended AI behaviours can become integral to an artwork's evolution and impact. It highlights AI's potential to engage artists and audiences in surprising moments. The artists framed this event as an unplanned yet fascinating co-creation between the cats and the robot, demonstrating their ability to adapt the framing and scope of the initial artistic objectives.

The Cat Royale project demonstrates how AI's unpredictability can become crucial to the artistic process. In a conventional context, what might be perceived as mistakes become opportunities for artistic exploration and audience engagement. By incorporating unexpected AI behaviours into the artwork, Blast Theory created talking points for viewers and added depth to the installation.

This approach to AI art has several implications for practice. Artists working with AI may need a more flexible and adaptive approach to their creative process. The concept of artistic goals potentially expands to include recognising and incorporating fortunate events. Documentation and framing of the artwork become crucial in communicating these unexpected elements to the audience.

The Cat Royale experience suggests framing can be a powerful tool for embracing and learning from unexpected outcomes. Artists can use framing to contextualise unexpected events, integrating them into the artwork's narrative. Reflecting on the role of unexpected events in Cat Royale, I identified the following insight for curators and researchers analysing AI art projects:

1. Framing of unexpected events or technical limitations: Observing how unexpected AI behaviours or limitations are incorporated into the art-

work's narrative can offer valuable perspectives on the artists' approach and adaptability.

Evolution of Goals and Framing

The Cat Royale project exemplifies how artistic goals can evolve in response to practical constraints and ethical considerations, ultimately shaping the framing and presentation of AI art. While the core communicated intention to provoke reflection on AI's role in caregiving remained constant, the project's execution, framing, and certain aspects of its motivation underwent significant adaptations. Initially, the project was driven by a dual motivation: to explore AI's impact on caregiving and to create an interactive, real-time experience for audiences. The latter aspect, the drive for immediacy and direct audience engagement represented a key motivational element, reflecting a desire to make AI's impact tangible and immediate as in other previous work developed by Blast Theory. However, as the project progressed, these motivational components evolved. The shift from an interactive, in-person installation to a series of video presentations, as discussed in the interview with Nick (chapter 6.4.1), illustrates the project's responsiveness to technical limitations and ethical concerns. This change altered the nature of audience engagement strategies, moving from direct interaction to a more reflective, observed experience. The communication strategies, as detailed in the interview with Jonny Goode (chapter 6.4.2), further highlight how framing adapts to support the artwork's evolving motivations. The team's approach to presenting Cat Royale across multiple platforms and their emphasis on transparent communication about the AI's role preserved the project's central questions about AI and caregiving and also enhanced its accessibility and impact, compensating for the loss of direct interactivity. The audience survey analysis (chapter 6.4.2) provides empirical evidence of the effectiveness of this evolved approach. The positive reception metrics suggest that despite the project's adaptations and shifts in certain motivational aspects, its core communicated goals were successfully

conveyed to the audience. This outcome underscores the importance of flexible framing strategies in AI art that can evolve alongside the artwork while maintaining its conceptual integrity. This evolution demonstrates the dynamic nature of AI art creation, where artists balance their initial vision with the realities of AI implementation, often leading to a transformation of both the artwork and aspects of its underlying motivations.

Reflecting on the evolution of motivation and framing in Cat Royale, I identified the following insights for curators and researchers analysing AI art projects:

- Adaptation analysis: Investigate how artists adapt their initial vision in response to technical, ethical, and practical constraints, as this can reveal critical insights into the AI art creation process.
- Framing evolution: Analyse how the framing and presentation of AI artworks change over time, particularly in response to shifts in motivation or implementation challenges.

7.5 Synthesis of Critical Insights and Analytical Implications

The application of the Five Tropes of AI Art framework to the Cat Royale project, complemented by insights from artist interviews and the Synocene project analysis, has yielded valuable insights into the complexities of AI art analysis from an HCI and practice-led perspective. This synthesis reveals both the strengths of the framework within this scope and the need for additional analytical perspectives.

The Five Tropes framework demonstrated its efficacy as an analytical tool by:

- Providing a lens for examining AI artworks, focusing on the 'why' behind AI art creation rather than merely technical classifications.
- Recognising the multi-dimensional nature of AI artworks, allowing for a flexible understanding of projects that span multiple tropes in practice.

- Revealing the dynamic nature of AI art creation as different tropes became salient at various stages of the Cat Royale project's development.

However, the critical examination of the Cat Royale practical experience also illuminated aspects of AI art practice that extend beyond the scope of the Five Tropes, necessitating additional analytical considerations for a fuller HCI analysis:

- **The Evolution of Artistic Motivation/Goals**: The Cat Royale project exemplified how artistic goals can shift in response to practical constraints and ethical considerations. While the core stated intention to provoke reflection on AI's role in caregiving remained constant, other aspects, such as the desire for real-time interactivity, underwent significant transformations.

- **The Significance of Framing**: Framing emerged as a crucial strategy for bridging the gap between artistic communication and audience understanding. The project's shift from an interactive installation to a series of video presentations necessitated adaptive framing strategies to effectively communicate its goals and compensate for changes in audience engagement strategies.

- **Technical Implementation and Constraints**: The analysis revealed the importance of understanding the technical aspects of AI artworks, including the choices made and challenges faced during development. The fixed nature of the robot arm in Cat Royale, for instance, shaped both the technical implementation and artistic expression.

- **Collaborative Dynamics**: The project highlighted the significance of diverse skill sets and roles in AI art creation. The interplay between artistic vision and technical expertise proved crucial in navigating the complexities of AI implementation.

- **Iterative and Flexible Development**: Cat Royale demonstrated the value of adaptive development processes in AI art, challenging conventional AI practices and revealing new possibilities for artistic exploration and collaboration relevant to HCI research-through-design.

- **Embracing Uncertainty**: The project underscored the role of unexpected outcomes in AI art, illustrating how unintended behaviours can become integral to an artwork's evolution and impact.

These insights collectively underscore the complex, dynamic, and multi-layered nature of the relationship between artistic stated or inferred motivation, framing, and implementation in AI art practice.

While the Five Tropes framework provides a valuable foundation, these additional insights point to the need for an expanded approach to analysing AI artworks. The following section will introduce a set of guidelines that build upon the Five Tropes and the critical reflections. These guidelines serve as complementary analytical lenses, offering researchers within HCI, art & technology, and related fields and curators working with contemporary and technologically-engaged art a structured framework for navigating the multifaceted landscape of AI art.

The set of analytical lenses, of which the Five Tropes of AI art is one, focuses on the observed motivations, tensions, and challenges that emerge during the development process of AI art. It examines how these factors can impact initial artistic goals, often requiring adaptations and compromises in response to AI's implications. By starting with the fundamental question of 'why' AI is used in art, the researcher and curator can use the guidelines as analytical lenses to investigate AI artworks from the initial observed motivations to their final manifestation and framing. While primarily intended for HCI researchers and AI art curators, these insights may also prompt artists to critically reflect on their reasons for engaging with AI in their practice.

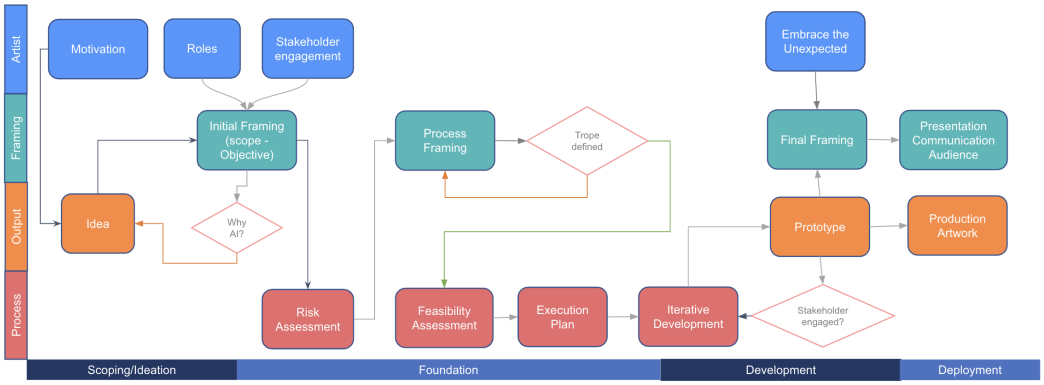

Figure 7.1: *A Schematic Framework for Analysing AI Art Projects. This diagram illustrates a structured approach to understanding the development of AI art, encompassing four main phases: Scoping/Ideation, Foundation, Development, and Deployment. It highlights key elements when examining AI artworks, including artistic motivation, stakeholder engagement, risk assessment, iterative development, and audience communication. The framework emphasises the importance of continual framing and reflection throughout the artistic process, providing insights into how artists balance creative vision with technological innovation and ethical considerations in AI art creation.*

7.6 Guidelines for AI Art Analysis

The insights gathered throughout this thesis, specifically through the critical analysis of Cat Royale and the Five Tropes of AI art theoretical framework, can be distilled into a structured set of guidelines for understanding and analysing AI art projects from an HCI and practice-led perspective. These guidelines, presented as a structured framework, are not intended as prescriptive rules for artistic practice but as flexible analytical lenses for examining AI artworks and their creation processes, primarily for researchers and curators in HCI and related fields. Each guideline is linked to specific insights from these and also earlier chapters, ensuring a clear connection between theoretical concepts and practical application (a summary of the linking is provided in the appendix A). For example, the guideline lens on 'Artistic Motivation' directly relates to the Five Tropes framework, encouraging analysis of how an artwork aligns with or challenges these categories. Or another example, the 'Iterative Development' guideline lens draws from the Cat Royale project's experiences, reflecting the need for flexibility and adaptation in AI art creation.

The guidelines are represented in Figure 7.1, outlining four main phases:

- Scoping/Ideation
- Foundation
- Development
- Deployment

Each phase contains critical steps and considerations grounded in the research and practical experiences explored in this thesis. Additionally, the framework is structured across four key strands that run through all phases:

- Artist: Focuses on the creator's role, stated motivation, and engagement with stakeholders.
- Framing: Addresses how the project is conceptualised, communicated, and presented throughout its lifecycle.
- Output: Tracks the tangible results at each stage, from initial ideas to the final artwork.
- Process: Encompasses the practical steps, assessments, and development strategies employed.

These guidelines provide an expanded set of lenses for analysing AI art projects, offering AI art curators and researchers within HCI and related fields a structured framework to examine how artistic goals, presentation strategies, concrete outputs, and methodological approaches evolve and interact throughout the creation process. It's important to note that while access to comprehensive information about an AI artwork's development is ideal, these guidelines can still offer valuable insights even when such information is limited or unavailable. In these cases, the guidelines can function as a hypothetical schema of investigation, prompting informed speculation, comparative analysis with

similar projects, and a critical evaluation of the visible outcomes and available materials. This approach allows for a degree of relevant analysis even when direct access to the creative process or the artist's explicit motivations is not feasible, as demonstrated in the analysis of the Synocene project (chapter 7.4.2).

7.6.1 Scoping/Ideation

This initial phase focuses on understanding how AI artists conceptualise their projects and set direction:

- Artistic Motivation: Address the clarity of stated or inferred artistic goals. Artists with well-defined purposes consistently produced more engaging and impactful AI artworks. Look for evidence of a well-defined purpose integrating AI as an essential component of the artistic vision rather than a mere technological addition.

- Roles: Assess the distribution of responsibilities in the project, particularly in collaborative works. Consider how the interplay between artistic and technical roles shapes the outcome. This analysis can reveal potential tensions between artistic vision and technical implementation.

- Stakeholder Involvement: Investigate the extent of early stakeholder engagement, including potential audience members. Assess how this engagement informs the project's direction and addresses potential ethical concerns or misconceptions about AI.

- Idea: Identify the central idea or question driving the project. Evaluate how this concept demonstrates AI's relevance to both the artist and the intended audience. This step helps articulate the project's unique value proposition and contribution to the AI art landscape.

- Initial Framing: Identify the project's scope and objectives as communicated. This initial framing sets the foundation for how the project will

be communicated and perceived throughout its lifecycle.

A critical decision point for artists and an analytical point for HCI researchers and AI art curators in this phase, and indeed a central theme of this thesis, is addressing the fundamental question: 'Why AI?' This question goes beyond mere technological justification, delving into the core observed motivations and artistic goals that drive the integration of AI into art practice. It prompts a deeper reflection on the purpose and value of AI in artistic practice, ensuring that its use enhances the artwork in ways that would be impossible or fundamentally different without it.

This critical examination serves several functions for the analyst:

- Articulates AI's Unique Contribution: It challenges AI art curators and HCI researchers to identify and articulate how AI fundamentally transforms the artistic process or outcome, moving beyond superficial technological novelty.

- Aligns Technology with Artistic Vision: This reflection point examines the relationship between the AI technology used and the artwork's conceptual goals, as identified in the initial framing. It evaluates how the implementation of AI aligns with or deviates from the artist's identified goals, providing insight into the artwork's coherence and conceptual depth.

- Contextualises the Work: By clearly defining AI's role, it positions the artwork within contemporary art and technology discourse, facilitating a comparative analysis.

- Differentiates AI Art: It helps distinguish AI art projects from other technology-enhanced artworks, highlighting AI's specific capabilities and implications in artistic contexts.

- Ethical and Societal Implications: This examination can lead to considerations of how the AI artwork touches on the broader impacts of AI,

including ethical concerns and societal implications.

- Guides Curatorial and Research Focus: For AI art curators and HCI researchers, this justification provides an approach for analysing and presenting AI art, focusing on the 'why' rather than just the 'how'.

This emphasis on justifying the use of AI aligns with the thesis's core argument that impactful AI art often stems from clear artistic motivation and purpose rather than merely showcasing technological capabilities. It provides a crucial lens through which HCI researchers and AI art curators can evaluate and interpret AI art projects, contributing to a more grounded understanding of this evolving field.

7.6.2 Foundation

This phase examines how AI art projects transition from conceptualisation to concrete planning:

- Risk Assessment: Investigate how artists and project teams identify potential challenges and develop mitigation strategies. Look for approaches to addressing ethical considerations. Consider how projects anticipate and address issues related to data usage, privacy, and the societal impact of AI art.

- Process Framing: Examine the methodologies for tracking progress and evaluating benefits in AI art projects. Pay attention to documentation practices and learning processes throughout development. This analysis recognises AI's unique characteristics as an artistic medium, often requiring more testing and adaptation than traditional forms. Understanding these processes can provide valuable insights for the analysis of the AI artwork from an HCI perspective.

- Feasibility Assessment: Analyse how the project anticipates and addresses potential constraints related to data access, resources, technical

limitations, and ethical considerations. Examine how these constraints inform the project's scope, technical choices, and artistic vision. This investigation can reveal the artist's adaptability and resourcefulness in navigating the intersection of creative ambitions and practical realities. It also highlights the importance of considering constraints as integral elements in the AI art creation process, prompting an understanding of the artwork's development and final form.

The 'Trope defined' decision point encourages the analysis of how the artwork aligns with or challenges the Five Tropes of AI art framework. The analysis can consider how the project's primary motivation, as reflected in the dominant trope(s), shapes its development and final form. It can examine how the artist's engagement with the chosen trope evolves throughout the creation process, noting any shifts or adaptations in their approach. This analysis can reveal the artwork's conceptual underpinnings, highlight its unique contribution to the field of AI art practice, and provide insights into the dynamic interplay between artistic vision and technological possibilities.

7.6.3 Development

This phase examines how AI art projects move from concept to practical realisation:

- Execution Planning: Examine available documentation, artist statements, or interviews for insights into how artists and teams approached the balance between artistic vision and technical implementation. Look for evidence of adaptability in the final artwork that might indicate flexible planning. Analyse how technical requirements, artistic goals, and ethical considerations were addressed in the realised project. Even with limited information, consider how the final artwork reflects the navigation of creative and technological challenges. This analysis can provide valuable insights into the strategies employed in AI art creation, even when the

full planning process is not accessible.

- Iterative Development: Look for evidence of iterative development in the final artwork or accompanying documentation. Analyse any visible refinements or variations in the artwork that might indicate responsiveness to feedback or unexpected AI behaviours. Consider how the artwork may have evolved from initial concept to final form, potentially referencing publicly available early sketches or prototypes if available. Examine artist statements or interviews for mentions of challenges faced and overcome during the development process. While direct observation of agile sprints may not be possible, infer the project's adaptability from the complexity and coherence of the final piece. This analysis can provide insights into how AI art projects navigate uncertainty and embrace the dynamic nature of AI, even when the full development process is not visible.

- Prototyping: Study the role of initial versions and prototypes in AI art projects. Assess how early presentations and feedback shape the artwork's evolution. Consider the parallels with approaches like Minimum Viable Product, as seen in Cat Royale. Evaluate how prototyping provides tangible outcomes for each development phase, its impact on collaboration, and its role in maintaining motivation through visible progress. This analysis offers insights into AI art creation's iterative and collaborative nature within an HCI context.

The 'Stakeholder engaged?' guideline lens reflects the collaborative nature of AI art projects. When analysing this aspect, an HCI researcher or AI art curator can consider any evidence of stakeholder involvement in the final artwork or its presentation. Look for acknowledgements or credits that might indicate collaborations with AI experts, ethical advisors, or cultural institutions. Examine artist statements or interviews for mentions of audience feedback incorporation or consultations with specialists. Consider how the artwork itself might reflect

diverse inputs or perspectives that could suggest stakeholder engagement.

7.6.4 Deployment

This final phase examines how AI artworks are presented to the public:

- Unexpected Elements: Investigate how artists incorporate serendipitous events or unintended AI behaviours into their work. Analyse examples like Cat Royale to understand how unexpected outcomes can add depth and uniqueness to AI artworks.

- Final Framing: Examine how artists refine the artwork's context and narrative for presentation. Framing is intrinsically linked to the artist's initial stated motivations and is shaped by the challenges and tensions encountered during the development process. For curators and researchers within HCI and related fields, this connection between stated motivation and framing offers valuable insights into understanding the artwork's communicated purpose and potential reception. By examining how artists articulate their motivations through framing, AI art curators and HCI researchers can gain a deeper understanding of the stated artistic goals and the role of AI in the creative process. Consider:

  - Methods for communicating artistic motivation and AI's role clearly
  - Approaches to addressing potential ethical concerns or misconceptions about AI
  - Strategies for conveying complex concepts without overwhelming technical details
  - Techniques for adapting presentations to different contexts (e.g., science fair vs art gallery)
  - How lessons learned about audience engagement are synthesised and applied

- Production Artwork: Analyse how the final artwork synthesises artistic vision and technological innovation. Evaluate how it reflects the iterative development process and incorporates insights gained throughout the analytical stages.

- Presentation and Audience Engagement: Study the strategies employed for sharing the artwork effectively, including:

  - The use of multiple platforms for audience engagement (e.g., live streams, gallery installations, online platforms)
  - The development of supplementary materials to explain complex AI concepts
  - The implementation of interactive elements to foster audience participation
  - The facilitation of discussions about the artwork's themes
  - Methods for collecting and analysing audience feedback for future iterations or projects

Throughout the analysis of AI art projects, researchers and curators in HCI and related field can examine how artists and teams maintain clarity in their stated artistic motivation while navigating AI's unique challenges and opportunities. They can look for indications of stakeholder dialogue and audience engagement, as well as evidence of how ethical implications have been addressed. HCI researchers and AI art curators can also observe how unexpected outcomes may have been incorporated as sources of artistic value. Additionally, they can assess the communication strategies employed to make complex AI concepts accessible to audiences. By considering these aspects across all phases of an AI art project, HCI researchers and AI art curators can gain valuable insights into the artistic process and the resulting artwork, even when direct access to the development process is limited. While these guidelines are primarily designed for curators and researchers in these specific fields, they may also prove valuable

for artists interested in critically reflecting on AI art practices. Both artists who actively use AI in their work and those who don't may find these perspectives informative for understanding and engaging with this evolving field.

7.6.5 Application

This analytical set of guidelines provides a structured approach to understanding how AI art achieves impact and facilitates interpretation. It highlights the complex interplay between artistic vision, technological innovation, and ethical considerations involved in engaging audiences effectively. It is important to note that these guidelines have been designed to be flexible. They do not constitute a strict, linear process, and not all elements will be equally relevant or accessible for every AI artwork. Analysis can be adapted based on the specifics of each project, focusing on the phases or aspects for which the most relevant data or access is available. When direct information about an AI project is unavailable, several strategies can be employed to enrich the analysis. Comparing the artwork in question with similar projects, for instance, can reveal potential creative approaches or identify common technological challenges. Informed speculation, proposing potential scenarios based on the visible outcomes and available materials, can also provide analytical insights.

Importantly, the analysis should acknowledge gaps in information and consider how these might affect interpretation. Available materials, such as artist statements, technical documentation, and presentation materials, should be critically evaluated with the understanding that these may not always present a complete picture of the project's development. Where possible, seeking multiple perspectives from various stakeholders can contribute to a more well-rounded understanding.

Applying these guidelines to Synocene, for instance, reveals how even with partial information, interesting observations can be drawn. Synocene, as detailed earlier, is an art project that combines immersive experiences, AI interactions,

and sound installations to explore human relationships with nature. From the available information, one can infer that the core stated motivation behind Synocene is to encourage a more inclusive perspective on our relationship with the natural world, aligning with the guideline on identifying a clear **Artistic Motivation**. The project's plan to engage with local communities (as reported by the artist) demonstrates a commitment to **Stakeholder Involvement**, as emphasised in the guidelines. The use of AI chatbots to represent elements of the forest showcases a creative approach to **AI Integration**, addressing the guideline on exploring AI's unique contribution to the artwork. Similarly, the project's focus on de-anthropocentralising human-nature-AI interaction suggests careful consideration of **Ethical Considerations**. The multi-stage design of the project, including forest walks and AI interactions, indicates a thoughtful approach to **Audience Engagement** aligning with the guidelines on presentation strategies. The project's use of AI chatbots to represent forest elements speaks to the crucial **Why AI?** question. AI seems to be employed as a unique tool to facilitate non-human perspectives, enabling a decentred view of nature that might be difficult to achieve through other means. The project's framing as an exploration of a 'de-centred view of our anthropocentric experience of the natural world' provides a clear context for audience interpretation and aligns with the guideline on **Framing**. The Synocene project also exemplifies how a single artwork can encompass multiple tropes as identified in the Five Tropes of AI Art framework, reinforcing the notion of **Trope Defined** as overlapping lenses. Although the project appears to primarily fit within the 'AI as Subject Matter' trope as it uses AI to explore and comment on human-nature relationships, it also incorporates elements of 'AI and Co-Creativity', particularly in its use of AI chatbots to co-create narratives with human participants. This multi-trope alignment underscores the complexity and richness of the project's engagement with AI. The guidelines presented in this chapter draw significantly from the practical insights gleaned from the Cat Royale project, as detailed in Appendix A. The Synocene project, examined

here, acts as an additional test case, illustrating how the guidelines can be effectively applied even when information about the project's development is limited.

7.7 Summary

This chapter critically examined the application of the Five Tropes of AI Art framework, focusing on its application to the Cat Royale project and its broader implications for AI art analysis within an HCI and practice-led context. Through this process, it became evident that while the framework provided a valuable analytical lens, it was insufficient for capturing the full complexity of AI art practice, particularly in understanding the development of AI projects over time.

The analysis highlighted that while the Five Tropes of AI art framework focuses on identifying artistic motivations, it lacks the depth to account for the evolving nature of a project, technical constraints, ethical challenges and artistic tensions, as determined in the Cat Royale critical examination. These gaps led to the realisation that additional lenses were needed, resulting in the formulation of a set of guidelines that could better address the complexities inherent in AI art projects from a practical viewpoint. These guidelines offer structured tools for AI art curators and researchers within HCI and related fields, and potentially artists interested in this field, to examine AI artworks beyond stated artistic motivations, incorporating factors such as project evolution, framing strategy, process output, and AI artistic practice considerations.

The chapter began by discussing the practical challenges and tensions that emerged during the creation of Cat Royale, including technical difficulties, artistic conflicts around AI autonomy, and ethical dilemmas related to animal welfare. These challenges were critical in shaping the project and provided practical insights into how AI art unfolds in real-world contexts relevant to HCI.

Building on this, the chapter explored how the Five Tropes framework was applied to the Cat Royale project. The framework's strength lies in its ability to reveal overlapping tropes within the artwork, offering insights into the tensions between stated artistic motivations and technological execution. However, this critical examination illustrated that identifying tropes based on motivation alone was insufficient, especially for understanding the step-by-step development of the project and its progression over time when conducting a detailed HCI/practice-based analysis.

Recognising these limitations, the chapter moved beyond the initial framework, proposing a broader set of guidelines for AI art analysis. These guidelines act as additional lenses, enabling a more nuanced exploration of how AI art evolves through its lifecycle, from conceptualisation to public presentation. The guidelines were drawn from the Cat Royale project's practice-led research and were structured to guide AI art curators and HCI researchers within relevant fields in analysing the practical, ethical, and developmental aspects of AI art projects, complementing the conceptual analysis provided by the Five Tropes of AI art framework.

In conclusion, both the Five Tropes of AI art framework and the new guidelines were presented as analytical tools (lenses) for AI art practice, each offering different perspectives on AI art. While the Five Tropes of AI art framework focuses on categorising artistic motivations, the guidelines address broader questions about the development, implementation, and reception of AI artworks, useful for HCI and practice-led researchers and curators working with contemporary and technologically-engaged art.

Chapter 8

Conclusions

8.1 Contributions

This thesis explored AI art practice from its historical foundations to contemporary manifestations, uncovering key insights that shape the understanding of AI's role in artistic creation and its implications for contemporary art within the fields of HCI and practice-led research. The research makes three primary contributions to the analysis of AI art within these fields, complemented by additional significant findings. The first primary contribution is theoretical: the development of the Five Tropes of AI Art framework. This novel approach to categorising and analysing AI artworks based on artists' stated or inferred motivations provides a flexible set of analytical lenses for understanding diverse approaches to AI in artistic practices. It focuses on the 'why' behind artists' use of AI rather than just the 'how', offering AI art curators and researchers within HCI and related fields an analytical lens to examine and contextualise AI artworks based on the creator's approach. This framework builds upon and extends existing approaches, allowing for an understanding of how AI art practice relates to creator motivation. The second primary contribution is practical: the HCI practice-led case study of the Cat Royale project. This research offers valuable insights into the practical challenges and opportunities of creating impactful AI artworks, serving as a real-world

test case for the theoretical framework. It reveals the complexities of implementing AI in artistic practice, providing insights into the interplay between artistic vision, technological constraints, ethical considerations, and audience engagement strategies. The third primary contribution is methodological: the synthesis of the theoretical and practical contributions culminates in a set of guidelines for AI art analysis, integrating theoretical understanding with practical experience. These guidelines offer additional analytical lenses, primarily for researchers within HCI and related fields, and AI art curators, to navigate the complex landscape of AI art creation and presentation. They address key aspects of the creative process from initial conceptualisation to final presentation, with a particular emphasis on framing and motivation. Importantly, these guidelines are designed to be adaptable, recognising that there might be limited access to certain aspects of the creative process.

In addition to these primary contributions, the thesis makes additional significant findings relevant to HCI and art and technology research. The research provides a background context on AI art's evolution, offering context for contemporary practice. The thesis advances the discourse on ethical implications in AI art within HCI and responsible innovation, exploring the multidimensional thinking required when artists incorporate AI technology, balancing creative ambitions with social responsibility. The research introduces the concept of ambiguity as a creative strategy in AI art, offering new perspectives on how artists can leverage the inherent unpredictability of AI systems for artistic effect. The thesis highlights the crucial role of audience engagement strategies in AI art, examining how artists craft narratives to provoke reflection and engaging interactions, emphasising the importance of considering the audience's perspective throughout the creative process. The research emphasises the importance of collaboration between artists, technologists, and other experts in creating effective AI art experiences, demonstrating how diverse perspectives and skills contribute to the development of innovative and impactful AI artworks, highlighting practical implementation challenges and strategies relevant

to HCI/art projects.

These contributions collectively underscore the critical roles of observed motivation, framing, and ethical consideration in AI art practice. They reveal that while AI art is technologically driven, it is fundamentally rooted in human choices and actions. By bridging theoretical frameworks with practical insights from HCI research, this thesis provides an understanding of AI art creation, presentation, and reception, contributing to ongoing dialogue about the role of AI in contemporary artistic practice within HCI and related domains. It is important to reiterate that while touching upon concepts from the Humanities, the core contribution and methodology remain situated within HCI and practice-led research, and the thesis does not claim to offer a deep art historical or critical theoretical analysis.

8.2 Addressing the Central Questions

This thesis set out to explore several key questions about AI art practice from an HCI perspective. The research conducted throughout this work has provided insights into each of these areas:

- What motivates artists to engage with AI in their creative practice, and how does this stated or inferred motivation shape the resulting artworks?

The research reveals diverse patterns of stated or inferred motivations, as captured in the Five Tropes of AI Art framework. Artists appear driven by the potential for co-creativity with AI, the opportunity to make data-driven creative choices, the desire to critically investigate AI's role in society, the exploration of AI as a subject matter, and the framing of AI as an autonomous creator. These motivations profoundly shape the resulting artworks, influencing everything from the choice of AI techniques to the framing and presentation of the work, including audience engagement strategies.

- How can AI artworks be examined based on artists' communicated mo-

tivations and approaches, and what new framework can be developed to better understand the diverse landscape of AI art practice?

The Five Tropes of AI Art framework developed in this thesis offers a new approach to categorising AI art practice based on artists' apparent motivations. This framework marks a significant shift from previous categorisations that primarily focused on the "how" of AI art creation to emphasise the "why" behind artists' engagement with AI. Importantly, the critical analysis revealed that these tropes should be viewed as flexible, overlapping lenses rather than rigid categories. This flexibility allows for a more nuanced understanding of AI artworks, recognising that a single work may embody multiple tropes simultaneously. The framework proves valuable even with limited information about an artwork, offering a starting point for analysis and interpretation. This approach provides HCI researchers and AI art curators with a versatile tool for examining AI art practice, even when full access to the creative process is not available.

- What insights can be gained from practical engagement in AI art creation, and how do these experiences inform the understanding of the field within HCI?

The Cat Royale project provides valuable practical HCI insights into the practical realities of creating AI art, revealing the importance of iterative development processes, the need for flexible approaches to accommodate the unpredictable nature of AI, and the significance of clear communication strategies. These experiences highlight the gap between theoretical possibilities and practical implementation, informing a more grounded understanding of AI art creation processes. The project also demonstrated how artistic apparent motivations and goals can evolve over time, emphasising the need for analytical approaches that can capture this dynamic process.

- What are the key challenges and tensions artists face when creating AI

art, particularly in balancing artistic vision, technological constraints, and ethical considerations?

The research, particularly through the Cat Royale project and artist interviews, identifies several key challenges relevant to HCI and practice-led research. These include balancing human control with AI autonomy, translating artistic vision into technical implementation, addressing ethical concerns around data use and potential biases, and navigating the complexities of audience engagement. Artists negotiate between their creative goals, the capabilities and limitations of AI systems, and the broader societal implications of their work. The complexity of these challenges led to the development of additional analytical lenses, complementing the Five Tropes framework, to provide a wider approach to understanding AI artworks.

- How do artists navigate the complexities of framing and communicating AI artworks to audiences, and what elements are crucial in communicating intended artistic concepts in these works?

The research demonstrates the critical role of framing in AI art, as evidenced by both the literature review and the analysis of AI artworks through the Five Tropes framework. The thesis reveals that framing is intrinsically linked to the artist's initial observed motivations and is shaped by the challenges and tensions encountered during the development process. Effective framing strategies emerge as crucial elements in communicating artistic concepts. These strategies include providing clear explanations of the AI's role, creating multiple entry points for audience engagement, and crafting narratives that highlight both the technological and conceptual aspects of the work. Importantly, the thesis argues that the way an artwork is framed can reveal specific audience engagement strategies and how AI is presented in the work. For HCI researchers and AI art curators, this connection between observed motivation and framing offers valuable insights into understanding the artwork's intended purpose and potential impact. By examining how artists articulate their motivations

through framing, curators and researchers, in this context, can gain a deeper understanding of the communicated artistic goals and the role of AI in the creative process. This approach provides a lens through which to analyse AI artworks, even with limited access to the full creative process.

These questions were addressed through a multifaceted approach grounded in HCI and practice-led research that included literature reviews, the development of the Five Tropes of AI Art framework, a practice-led case study (Cat Royale), artist interviews, audience feedback analysis, and critical synthesis. This approach allowed for a thorough exploration of AI art from historical, theoretical, and practical perspectives, culminating in a set of guidelines for AI art analysis that bridge the gap between conceptual understanding and real-world application for HCI researchers and curators.

The set of guidelines developed as a result of this research offers additional analytical lenses for examining AI artworks. These guidelines address aspects such as artistic goals, technological implementation, ethical considerations, and audience engagement strategies. They are designed to be flexible, recognising that curators and researchers, working in this field, may have limited access to certain aspects of the creative process. The guidelines provide a structured approach to analysing the journey of AI art creation, from initial concept to final presentation, while still maintaining the flexibility needed to account for the dynamic nature of AI art.

The set of analytical lenses, of which the Five Tropes of AI art is one, focuses on the stated or inferred motivations, tensions, and challenges that emerge during the development process of AI art. It examines how these factors can impact initial artistic inferred or stated intentions, often requiring adaptations and compromises in response to AI's implications. By starting with the fundamental question of 'why' AI is used in art, researchers and curators (within relevant fields) can use the guidelines to understand how stated or inferred artistic goals evolved and are reflected in the framing of AI artworks. While primarily intended for HCI researchers and AI art curators, these insights may

also prompt artists to critically reflect on their reasons for engaging with AI in their practice. The framework and guidelines offer a means to understand the diverse approaches to AI art creation, the challenges involved, and strategies for effective communication with audiences.

8.3 Future Directions and Implications

The research presented in this thesis opens up several avenues for future exploration and has significant implications for HCI, practice-led research, and the curation of AI art. As AI technologies evolve rapidly, the frameworks, insights, and guidelines developed here provide a foundation for ongoing research and artistic practice in these areas. As new AI technologies emerge and artists find novel ways to incorporate them, the framework may need to be expanded or refined. Future research could focus on identifying emerging trends that might lead to new tropes, exploring how the existing tropes evolve with advancements in AI technology, and investigating potential sub-categories within each trope to provide a more granular analysis. Furthermore, as acknowledged in Chapter 6, the initial development of the Five Tropes framework relied on a selection of contemporary artists chosen primarily for their visibility within specific online and tech-art communities. Future research could validate and potentially expand this framework by applying it to a broader and more diverse range of AI art practitioners, including those working outside dominant digital platforms or those emerging from different cultural or artistic traditions. This would help test the robustness of the tropes and ensure the framework remains relevant across the widening spectrum of AI art practice. While Cat Royale provided valuable insights, longer-term studies of AI art projects could offer a deeper understanding of how these works evolve. Future research might track multiple AI art projects from conception to long-term exhibition, examine how audience engagement with AI artworks changes over extended periods, and investigate the long-term ethical implications of AI art installations.

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Appendix A

Guideline Foundations: Tracing Insights to Research

This section provides a detailed overview of how each guideline is grounded in specific research findings from the thesis.

- **Artistic Motivation:** Rooted in the Five Tropes of AI Art framework (chapter 5). Supported by insights from Cat Royale's conceptualisation (chapter 6.3.1) and artist interviews (section 6.4.1).
- **Roles:** Informed by Cat Royale's collaborative process (chapter 6, sections 6.3.5, 6.3.6, 6.3.7) and the importance of diverse perspectives (section 7.4.3).
- **Stakeholder Involvement:** Based on Cat Royale's engagement with animal experts and the Audience Advisory Panel (sections 7.3.3, 7.3.3) and insights from artist interviews (section 6.4.1).
- **Idea:** Draws from Cat Royale's core concept (chapter 6) and analysis of other projects like Synocene (section 7.4.2).
- **Initial Framing:** Grounded in framing discussions from literature review (section 3.4) and Cat Royale's framing approach (section 6.4.1).
- **Why AI?:** Central theme explored throughout the thesis, particularly in the Five Tropes framework (chapter 5) and analysis of artist motivations (section 7.4.3).
- **Risk Assessment:** Informed by ethical considerations discussed in the literature review (section 2.4) and challenges faced in Cat Royale (sections 7.3.2, 7.3.3).
- **Process Framing:** Based on Cat Royale's development process (section 6.3.6) and discussions on iterative practices in AI art (section 7.4.3).
- **Feasibility Assessment:** Draws from technical challenges in Cat Royale (section 7.3.1) and insights on balancing constraints with artistic vision (section 7.4.3).
- **Trope Defined:** Directly linked to the Five Tropes of AI Art framework (chapter 5) and its application to Cat Royale (section 7.4.1).

- **Execution Planning:** Informed by Cat Royale's agile development approach (section 6.3.3) and balancing artistic and technical aspects (section 7.4.3).
- **Iterative Development:** Based on Cat Royale's adaptive process (section 6.3.6) and discussions on embracing uncertainty in AI art (section 7.4.3).
- **Prototyping:** Draws from Cat Royale's prototyping phase (section 6.3.3) and the concept of Minimum Viable Product in AI art.
- **Stakeholder Engagement:** Informed by Cat Royale's ongoing engagement with experts and audience members (sections 7.3.3, 6.3.3, 6.4.2).
- **Unexpected Elements:** Based on Cat Royale's experiences with unintended AI behaviours (section 7.4.3) and discussions on ambiguity in AI art (section 3.4.5).
- **Final Framing:** Grounded in Cat Royale's exhibition framing (sections 6.3.1, 6.4.1) and audience reception analysis (section 6.4.2).
- **Production Artwork:** Informed by descriptions of Cat Royale's final installation (sections 6.3, 6.3.7).
- **Presentation and Audience Engagement:** Based on Cat Royale's communication strategies (section 6.4.2) and audience engagement approaches in projects like Synocene (section 7.4.2).

This detailed tracing demonstrates how each guideline is firmly rooted in the research conducted throughout the thesis, providing a robust foundation for understanding and analysing AI art projects.

Appendix B

List of Abbreviations

2D	Two-dimensional
3D	Three-dimensional
AARON	Harold Cohen's AI art system
ACI	Animal-Computer Interaction
AI	Artificial Intelligence
CNN	Convolutional Neural Network
CPU	Central Processing Unit
DALL-E	A neural network that creates images from text descriptions
DeepDream	Google's AI-based image manipulation algorithm
DL	Deep Learning
GAN	Generative Adversarial Network
GPT	Generative Pre-trained Transformer
GPU	Graphics Processing Unit
HCI	Human-Computer Interaction
LSTM	Long Short-Term Memory
ML	Machine Learning
MVP	Minimum Viable Product
N'TOO	Not The Only One (Stephanie Dinkins' project)
NFT	Non-Fungible Token
NLP	Natural Language Processing
RNN	Recurrent Neural Network
RRI	Responsible Research and Innovation
SME	Subject Matter Expert
TAS	Trustworthy Autonomous Systems
UI	User Interface
UKRI	UK Research and Innovation