4997 words
5 figs

<CT-1>Historical Perspective

<CT>Decoding AI in Contemporary Art: A Five-Trope Classification for Understanding and Categorization

<CAU>Guido Salimbeni, Steve Benford, Stuart Reeves, and Sarah Martindale
<CFN>Guido Salimbeni (artist), University of Nottingham, Nottingham NG8 1BB, U.K. Email: guido.salimbeni@nottingham.ac.uk. ORCID: 0000-0001-6666-3518.
Steve Benford (professor), University of Nottingham, Nottingham NG8 1BB, U.K. Email: Steve.Benford@nottingham.ac.uk. ORCID: 0000-0001-8041-2520.
Stuart Reeves (associate professor), University of Nottingham, Nottingham NG8 1BB, U.K. Email: Stuart.Reeves@nottingham.ac.uk. ORCID: 0000-0001-7145-3320.
Sarah Martindale (assistant professor), University of Nottingham, Nottingham NG8 1BB, U.K. Email: Sarah.Martindale@nottingham.ac.uk. ORCID: 0000-0002-0427-5672.

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<AT>Abstract

<ATX>The article presents a historical overview of the classification of contemporary artworks that either have utilized artificial intelligence (AI) as a tool in their creation or focus on AI as their central theme or subject matter. The authors analyze artworks and descriptions, focusing on artists' motivations and AI's role in their practice, identifying five distinct tropes in AI art. The authors compare artworks with respect to key questions, creating a useful tool for art historians, curators, researchers, and artists. This historical classification provides a structured approach to understanding AI art's creative significance and attributes as it has developed over time.

<TX-N>In 1973, Harold Cohen pioneered algorithm-based art with his AARON program [1], inspiring future artists to meld art and computation. In 2015, Alex Mordvintsev [2] and Google's Brain artificial intelligence (AI) team introduced DeepDream, an algorithm that transforms images into psychedelic representations, marking a significant milestone in the AI art movement [3]. As AI technology matured, it began to attract interest from the artistic and academic communities. A significant highlight in the AI art timeline occurred in 2018 when the Parisian artist collective Obvious used an algorithm to autonomously generate *Portrait of Edmond Bellamy* from 15,000 different portraits. This artwork, sold for $432,500 US at Christie's Prints Multiples [4], underscored AI's growing impact on the art world and validated the AI art movement. Recent advancements, such as the introduction of DALL-E by OpenAI, have further underscored AI's rapid progression and relevance in art. While we focus on artists' motivations and their relationship with AI rather than on every available tool, it is crucial to acknowledge these new advancements and their implications for jobs in the creative industries and artists' ability to copyright and sell their work. In this paper we seek to bring artistic motivations to light by classifying the various explorations of contemporary artists using AI in their practices.

<TX>This study adopts a methodology that analyzes various AI art examples, from which we derive five distinct tropes. By examining the unique aspects present in each artist's practice, we systematically classify the artworks based on their characteristics and underlying themes. This

process enables us to assign each artwork to one of the five tropes. Indeed, a work can have characteristics belonging to more than one class, so the classification should be understood not as mutually exclusive but as a tool to understand the artist's primary intent in using AI. In this way we aim to help situate artists' work in the context of AI art and consequently facilitate the work of art historians to build an analytical framework in AI art. With the classification we aim to expand existing analyses of AI art with perspectives primarily oriented to artistic meaning and motivation, highlighting its historical development and examining the creative attributes and artistic significance of emerging practices. Subsequently, classifying the works into five tropes helps us identify reference guidelines for researchers and curators of exhibitions. Finally, the document constitutes a possible point of inspiration for artists who intend to implement AI in their practice. It allows an artist to reflectively compare their motivations with a well-defined and systematically derived grouping of five tropes based on the analysis of various examples in the AI art domain.

<1>Approaches to Categorizing AI Art

<**TX-N**>Scholars have proposed varying frameworks over recent years to categorize and contextualize the domain of AI art. In exploring the dynamics of contemporary AI art, Dejan Grba [5][6] illustrates a list of common aspects of AI artworks that support a classification of artists. According to Grba, some artists use AI to explore interpolations between data revealed by the algorithm to create unexpected and spectacular images, or to promote a critical message around the ethical consequences of applied AI. Kieran Browne [7], in an attempt to understand the landscape of AI art, provides a view of three primary types of AI artists: bricoleurs, engineers, and contemporary artists. The bricoleurs use the output of generative machine learning models [8] trained on their curated list of images without changing the code base. The engineers, on the contrary, code their algorithm or system to produce an AI artwork. Finally, Browne describes the contemporary artists' group as the ones who use their practice to do work about AI. To provide guidelines to understand AI art, Eitan Mendelowitz [9] presents a taxonomy for consistently categorizing AI-based public artwork. The taxonomy includes generative AI, reactive AI, interactive AI, learning AI, and static AI. Each artwork can be assigned to a category depending on the artist's control over the data flow and the outputs the artist imposes on the public installation. For Angus Forbes and colleagues [10], there are four groups of AI artists: in the first, the artist uses AI as a means to generate artwork automatically; in the second, the artist uses AI as a means to facilitate novel mappings between users' inputs and media outputs; in the third, the artist uses AI as a means to push the boundaries of generative art experiences; in the fourth, the artist uses AI as a means to investigate the role of AI in our society critically.

<**TX**>Our historical review contributes to these analyses in several ways. First, we employed a question-based approach to analyze various examples and assign each artwork to a trope. Second, the research questions focused on the artist's motivations for including AI in the artwork. By centering on the artist's motivations rather than the artwork or process, our analysis avoids critical arguments about the output or any consideration of the artistic impact. Furthermore, the trope-based classification approach acknowledges that artists may have had varying motivations for different projects and technologies at different times. Lastly, the

classification is independent of the artists' skills or control (in contrast with Browne [11] and Mendelowitz [12]) and of the fact that AI technologies are used in the artworks, as the analysis explores how the artists decided to present their process and describe their artworks. Finally, we propose to expand upon the motivations for exploring AI art that Grba [13] and Forbes [14] have previously identified. They have identified three interests in the use of AI: as a collaborator, as the artwork's subject matter, or as an autonomous artist. Our paper presents five distinct tropes, each representing a unique motivation for incorporating AI into artistic practice.

<1>Method

<**TX-N**>Our method for chronologically reviewing and classifying developments in AI art involved the following steps:
<**NL**> 1. Selection of a list of AI artworks informed by social media impact and prominence within relevant art communities.
2. Identification of the AI techniques and tools used as they became available over time.
3. Examination of the artwork's aesthetic and technical characteristics.
4. Interpretation of the artwork's meaning and message using a set of research questions (as described next).

<**TX**>The following content, therefore, sets out our overview of relevant illustrative artworks of artists who worked with AI in various artistic expressions, such as visual art, installations, performance art, and interactive art. They are identified through a search on websites dedicated to AI and art, Twitter accounts of art and AI curators, and social media accounts of the artists and artists they follow. We based the selection on social media reach and presence within relevant art communities; for example, the number of views of their video interviews on YouTube and the number of followers on their social media accounts. Additionally, we looked at their mentions on art sites dedicated to AI (e.g. [15]) and the recurrence of their names in our literature review. We employed a qualitative methodology, drawing from our experiences, perspectives, and subjectivity to critically analyze and interpret the artworks under study. Through textual research and historical examination of available artist statements, recorded interviews, and exhibition descriptions, we delved into the meanings and significance of the works, aiming to uncover the motivations and intentions behind the artists' use of AI in their practice. This approach enabled us to highlight artists' motivations for choosing AI in their practice without directly interviewing them.

For step (4) of our method, we applied a set of research questions to generate our analysis. These were as follows:
<**NL**>Q1: Is AI problematized to suggest critical thinking around the technology?
Q2: Is AI envisioned to make independent creative choices in the art process?
Q3: Does the artist want (prefer) to control the AI contribution in the creative process instead of adapting to it?
Q4: Does the artwork convey a serious ethical or political message about AI to the audience?
Q5: Is using AI a prerequisite to exploring innovative interactive performances in which the artist's intent is to suggest that AI is a collaborator in the artistic process?
Q6: Does using AI aim to expand the artist's creative skills in the process?
Q7: Is data curation the main focus of the artist using AI?
Q8: Is the AI technology presented as the artist by the artist?

<TX>Following this analysis, we identified and clustered works and artists based on commonalities. These became our set of five tropes, which were as follows:
<NL> 1. AI and cocreativity: expansion of creative scope only possible using AI.
2. Selecting training data as a data-driven creative choice or strategy.
3. Reflective investigation of AI: AI as a means to comment on new technologies in our daily lives with a playful approach.
4. AI as the artwork's subject matter to address sociological, political, and ethical arguments with a serious approach.
5. AI presented as an autonomous artist only initially created and curated by the human artist.

<TX>While trope 3 is characterized by a personal and experiential engagement with AI, inviting individual contemplation and playful interaction, trope 4 critically engages with broader ideological and societal issues related to AI.

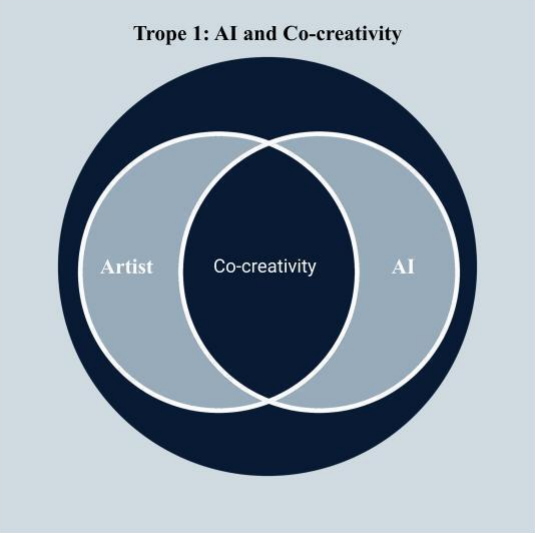
Next, we describe each trope and provide a couple of significant artworks from our analysis as illustrative examples to make each trope salient.

<1>Trope 1: AI and Co-creativity
<TX-N>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. 1). For these artists, advancement in AI technology had become an important reason to explore new artistic territories. Our analysis shows that artworks produced in this trope tended to favor AI as a prerequisite to exploring innovative cocreative interactive performances (Q5) or to expand the artist's creative skills in the process (Q6). Moreover, the artworks we assigned to this trope sometimes assumed the AI to make independent creative choices (Q2), though the artist still actively participated in the art process. For instance, in 2015, Sougwen Chung started exploring AI and robotics to develop processes for human creativity [16]. Chung's artistic process involved a robotic arm painting the same canvas she is painting in real-time collaboration with the machine. Chung believes that combining AI and robotics with traditional forms of creativity can help her think more deeply 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" [17].

<TX>Alexander Reben is an American artist, researcher, and roboticist. He is best known for his artworks created in collaboration with AI and his research in robotics [18]. In the artwork called *amalGAN*, developed over time from 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).

Ross Goodwin became famous for making the first sci-fi film based on a script generated by a neural network [19] and faithfully played by real actors. In his work *Automatic On The Road*, released in 2018, the artist installed a printer inside a car with enough rolls of paper 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 automatically record a journey on American roads. 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 trail of the unfolding 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).



<Fig. 1>

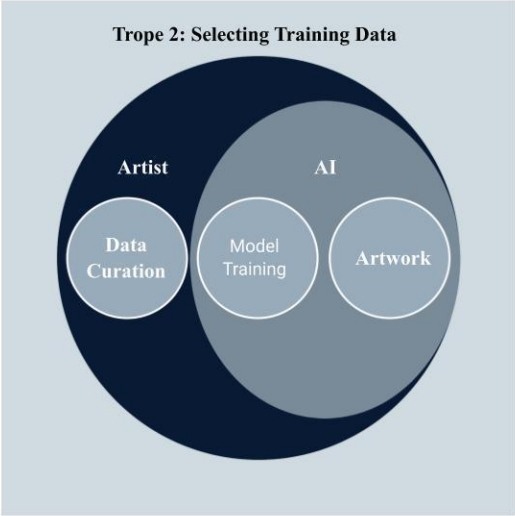
<1>Trope 2: Selecting Training Data as a Data-Driven Creative Choice

<TX-N>The use of training data to feed AI technologies, particularly machine learning, has become de rigueur over time. Naturally, for artists, too, considering the use of data to train machine learning models had become a matter of concern that they have explored in their artistic practices (Fig. 2). The creative curation of the training data (Q7) has been the primary intent of the artists in this trope for using AI in the artwork. The artist remained the one who selected and decided the data to be processed and left the hard work of carrying out the necessary calculations to the machine to produce a synthesis. The artists in this trope focus their motivation on identifying the poetic and emotional feelings within these data and the result of the algorithms. For instance, Refik Anadol produced multimedia art and video installations using AI and data selection [20], as in the artwork *Machine Hallucinations*. The artwork is an ongoing project that was first displayed in 2021 on a large high-definition screen where waves of color and abstract shapes move elegantly and continuously. However, these moving colors are aggregated and manipulated pixels representing data collected by the artist and processed by the AI. In the case of Anadol's work, the advantage of using AI was in the technology's support to the artist to process millions of images or texts that the artist could not physically compete with in speed, analysis, and memory (Q7).

<TX>Mario Klingemann, a prolific AI artist [21], used neural networks to generate a visual interpretation of the human form. His artistic contribution is to train the neural networks, choose the architectures, choose the training data (Q7), and select the preferred image among those proposed by the machine (Q3). Klingemann has exploited AI to explore the space between images (Q3), an invisible space in the initial database that the machine can recreate by interpolating the multidimensional space between the different images.

Similarly, in the artwork *Neural Zoo*, developed between 2018 and 2020, the artist Sofia Crespo [22] processed data from which the algorithm extracted patterns before autonomously producing new visuals. These images resembled nature, but an imagined nature that had been rearranged. For Crespo, AI became a tool for creation, in which the artist can control the process by defining the training data (Q7).

In the artwork *Deep Meditations* created in 2018, Memo Akten used images and animations created by a trained neural network with a curated database (Q7) of images representing essential human life concepts (universe, space, world, mountains) [23]. Developing the artwork, Akten was interested in the social, cultural, political, and philosophical implications of AI's inability to process all information, as a result of which the artist must make decisions about which data to choose.



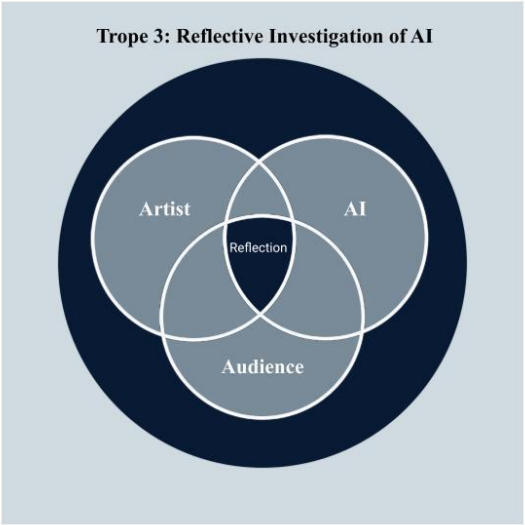
<Fig. 2>

<1>Trope 3: Reflective Investigation of AI

<TX-N>Over time, AI technologies have gained much attention from the media. The media hype often contemplates two arguments: On the one hand, it discusses the great opportunity for technological progress and, on the other hand, it discusses the risk and danger that AI could imply for society. The artists presented in trope 3 tend to propose their reflective investigation of the hype around AI by producing artworks to communicate ironic, satirical twists on new technologies in our daily lives (Fig. 3). They often follow a playful and experimental approach. They use their artwork to challenge the audience's preconceptions about AI and encourage them

to question their own understanding of the technology. Their artwork is often intended to be playful, interactive, and thought-provoking and to make the audience reflect on the ambivalence of AI in our lives (Q1). For instance, Lauren McCarthy [24] is an American artist and computer programmer who used AI to build experiences in which she asked the public to share what they thought about technology. Thus, with irony and imagination, McCarthy proposed bizarre AI solutions to urge the public to ask themselves the meaning of the behaviors that technologies expect from us. Sometimes McCarthy pretended to use AI technology. For example, in 2017, she placed cameras, microphones, and speakers in her residence for her work *LAUREN*, then engaged with guests while pretending (Q1) to be an AI voice assistant like Amazon's Alexa.

<TX>Another example is the artist Holly Herndon [25]. She embraced the danger of AI taking over artists' creativity and artistic opportunities. In 2021 she developed Hollyplus, which is a digital twin of the artist that can take any uploaded audio files from the user, apply her artistic style, and return the audio to the user for use in any commercial applications (Q5). If AI can introduce ambiguity regarding ownership and copyright, Herndon has 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).



<Fig. 3>

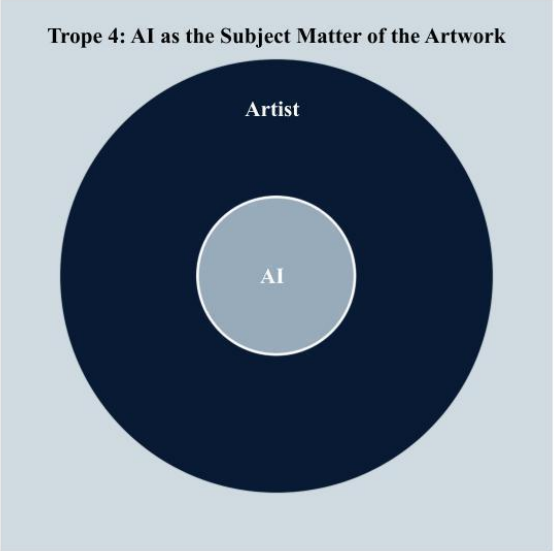
<1>Trope 4: AI as the Subject Matter of the Artwork

<TX-N>The artwork of artists using this trope mainly conveys a serious ethical or political message about AI to the audience (Q4). Sometimes they focus on data curation to push ethical arguments (Q7). For these artists, the critical exploration of the medium relates to how technology changes how we think and see the world. These artists take a more serious and thought-provoking approach. They use their artwork to raise awareness about AI's potential negative impacts on society, such as privacy concerns, bias, or job displacement (Fig. 4).

<TX>Joy Buolamwini is an artist who uses AI to highlight the social implications and harmful prejudices included in the use of technology. In one of her artworks [26], developed in 2017, the artist wore a white mask to fool facial recognition software. Buolamwini is Black, and the facial recognition system does not work for her without the white mask. Simply by donning the mask, Buolamwini enables the algorithm to identify her face on the screen and determine her gender, expression, and feeling. The artist highlighted that these algorithms are not subjected to rigorous functional tests (Q4).

Trevor Paglen [27] is an artist who addresses mass surveillance and data collection. In his project *The Atlas of Invisible Images*, Paglen offered the visitor a window into a world of surveillance made up of "invisible images"; invisible because they are images not for humans but for computers. With the project, Paglen aimed to understand the mechanisms of artificial vision and the implications for creating images, for society, and for politics (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 their face, combine them, and subtract what they have in common with everyone else to arrive at a unique fingerprint. This then is an example of an invisible image invented by a computer algorithm (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.

Caroline Sinders is an example of an artist actively politically critiquing AI and its use on economic and political levels [28]. An example of her activism was the Feminist Dataset installed at the Victoria and Albert Museum in 2018, a project and activity aiming to protest in response to the inequality and bias of the databases usually used to train machine-learning algorithms (Q4). Like other artists, she too produced images automatically generated by AI. However, she underlined how she deliberately interrupted the machine's learning process to generate an intentionally defective product (Q7). By displaying the blurred image as the result of the interrupted process, Sinders wanted to communicate her intention of acting against the production of data from biased original databases.



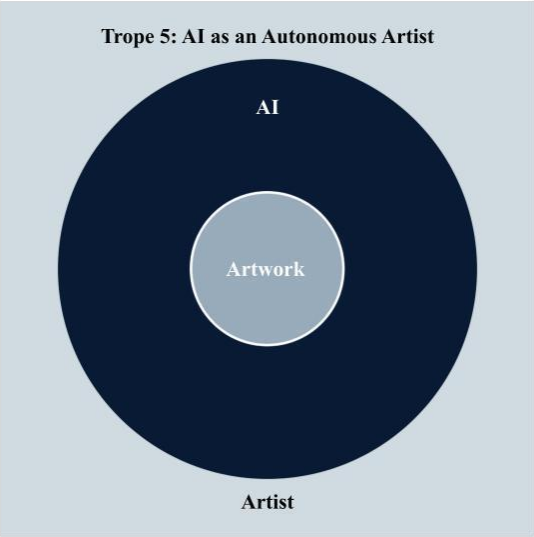
<Fig. 4>

<1>Trope 5: AI as an Autonomous Artist

<TX-N>The question for the artists in this group becomes whether AI is presented as taking the role of the human and is seen to do something innovative or intentional rather than something akin to mimicry. For example, machine learning engineers might argue that if an algorithm can create a van Gogh--style painting, it makes art. However, the artists using this trope argue that this is only mimicry, which is the death of art. For these artists, the real goal is to create an AI artist who makes independent creative choices (Q2) and, more importantly, is presented as the unique artist who produced the artwork (Q8). For instance, in the academic project The Painting Fool by Simon Colton [29], the artist allowed the AI to present itself with the following statement: "I'm the Painting Fool: a computer program and aspiring painter. This project aims for me to be taken seriously---one day---as a creative artist in my own right." Colton aimed to build an artificial artist, The Painting Fool, who could create art with full autonomy (Q2). As shown in Fig. 5, the AI artist is positioned at the center of the artistic process, while Colton, the human artist, takes on an initiating but subsequently hands-off role. Colton's goal for The Painting Fool was to create a lifelike AI painter that would be indistinguishable from a human artist in the eyes of the audience and art historians (Q8).

<TX>Gene Kogan is an artist devoted to exploring artistic projects with the help of AI. With one of his projects Kogan aimed to build an autonomous artificial artist named Abraham. Abraham was a complex system consisting of AI that generated images using training data available on the blockchain [30]. In this complex and decentralized system, the data was kept safe by blockchain technology as the data never left the user’s computer, and only the user’s abstract concept of training was given to the AI. Thus, Abraham became a model that continued to learn and generate new images, potentially indefinitely, producing art without human directives and with relative autonomy (Q2, Q8).

The artwork *Bob* by Ian Cheng [31], presented at the Hayashibara Museum of Art in 2019, was a digital creature controlled by the interaction of the audience and an AI living on the screen in the exhibition space. The screen represented the compositional space in which the artwork evolved by reacting to the environment. The audience used their smartphones to control a part of Bob's body while the AI controlled other aspects. Cheng wanted to make art that could learn independently and react to the audience (Q2, Q8).



<Fig. 5>

<1>Conclusion

<TX-N>Recent advances in AI have motivated more contemporary artists to explore AI art. We have argued that it is possible to frame these motivations using the five tropes we generated from analyzing a selected list of AI artworks. The presented tropes can help readers to understand where AI art is going and provide a framework for analyzing future works. In helping to situate artists' work in the context of AI art, we think there is the potential for these tropes to facilitate the research of art historians and art curators and inspire artists' explorations in AI art. Our primary focus in the paper is on applications of AI in art practices, not philosophical questions about whether machines can be creative. As with any new technology, it is difficult to predict whether we are at the peak of an AI art trend or whether AI is transforming the production of art in a lasting way. Luba Eliott expects AI to expand the range of generative artists' techniques, creating a continuous evolution of the artistic panorama [32,33]. In this regard, the methodology illustrated in this paper can help mitigate the challenge by focusing on the motivations that inspired the artworks and inspecting artists' responses as the primary form of evaluation rather than driving any analysis of novel AI technologies themselves.

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<BIO>Guido Salimbeni is an artist. He received a master's in fine art from the Middlesex University of London (2018) and is a PhD candidate at the University of Nottingham.

Steve Benford is the Dunford Professor of Computer Science at Nottingham's Mixed Reality Laboratory, where he has directed the Horizon Centre for Doctoral Training since 2009. His collaborations with artists to explore cultural applications of mixed reality have won four best paper awards at the ACM CHI conference and the 2003 Prix Ars Electronica Golden Nica for Interactive Art. He was elected to the CHI Academy in 2012.

Stuart Reeves is an associate professor in the School of Computer Science and is a member of the Mixed Reality Lab and Horizon Research Institute. His research interests span human-computer interaction, collaborative computing, and design research. Stuart is primarily concerned with understanding interactional practices with and around technologies, systems, and infrastructures, employing an approach strongly informed by ethnomethodology and conversation analysis.

Sarah Martindale is assistant professor of digital innovation in the creative industries in the Department of Cultural, Media, and Visual Studies. She collaborates on interdisciplinary projects with the Mixed Reality Lab and Horizon Digital Economy Research to study creative R&D problems, innovative production practices, and audience responses. Sarah is interested in cultural

engagement with digital technology as part of everyday experiences and how people attach meaning and value to these interactions.

<CAP>Fig. 1. The overlapping circles between the artist and AI represent collaborative creative synergy. (© Guido Salimbeni)
Fig. 2. Flowchart of the artist's process from data curation to model training, leading to AI-generated artwork. (© Guido Salimbeni)
Fig. 3. Interlinked circles depict the artist's engagement with the audience, prompting reflection on AI. (© Guido Salimbeni)
Fig. 4. Artists in trope 4 center AI as the subject matter, prompting dialogue on critical societal and ethical issues. (© Guido Salimbeni)
Fig. 5. Framing AI as an autonomous artist, with the human creator stepping aside. (© Guido Salimbeni)

<FOOTER>Salimbeni et al., *Decoding AI in Contemporary Art*