

Artificial Intelligence Art Robots: The Future of Technological Art or the End of the Human Artist ?

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Abstract

Purpose: The purpose of this paper is to explore the current state of development of AI art, particularly focusing on the use of robots in artistic creation. The research aims to assess how AI and robotic technologies are reshaping the future of art and their impact on human artists.

Approach/Methodology/Design: The paper conducts a historical analysis of AI's involvement in art creation, examining key developments such as the Dartmouth Conference, the advent of computer-based art. The study references notable artworks and explores various philosophical perspectives on the role of AI in artistic expression.

Findings: The findings indicate that AI and robots have expanded the boundaries of art by introducing new forms of creative collaboration and innovative techniques. However, despite their growing capabilities, AI robots still fall short of human artists in terms of emotional expression, cultural understanding, and social responsibility.

Practical Implications: The paper suggests that future artists will need to gain technical proficiency to collaborate effectively with AI and robots. Additionally, it discusses the implications of AI art on copyright laws, the recognition of authorship, and the potential ethical issues surrounding the use of pre-existing works in training AI models.

Originality/value: This study contributes to the ongoing discourse on AI and art by examining the intersection of technology, aesthetics, and human creativity. It offers new perspectives on how AI and robots can serve as collaborative partners, thereby advancing the field of art in the age of artificial intelligence.

1. Introduction

Artificial Intelligence is rapidly evolving, and its application in the field of art has garnered significant attention and sparked extensive discussion. Artificial intelligence art involves using AI technology and tools to create artworks, including painting, music, and literature, thereby enhancing their creative value. This emerging form of art creation not only challenges the concept of traditional art, but also opens entirely new possibilities for art creation.

The fusion intersection of artificial intelligence and art dates to the 1960s, when early computer artists used algorithms and programs to generate abstract graphics and music. of artificial intelligence and art can be traced back to the 1960s, when early computer artists used algorithms and programmed to generate abstract graphics and music. For example, German artist Frieder Nake and American artist Michael Noll used computer programs to produce numerous drawings (Nake, 1974), laying the foundation for later AI art.

The application of artificial intelligence and robotics in art creation has gradually become a new research hotspot. These technologies have not only driven changes in the way art is created, but also blurred the boundaries between art and technology, and between humans and machines. Nikolić and Tomari explore the interaction between robots and the development of a new type of conversational AI aesthetics, where robots, as mediums of conversational AI, have challenged traditional art practices (Nikolić & Tomari, 2021).

The rapid development of robotics has led to the increasing presence of robots in artistic creation. As early as the 1970s, artist Eduardo Kac began exploring the use of robots in art. In the 21st century, robotic artists such as the 'Ai-Da' robot, developed by a British team, can 'observe' an object through a camera and then paint it with a robotic arm, demonstrating the potential of robots in the art of painting.

Breakthroughs in GAN, Generative Adversarial Networks (Goodfellow et al., 2014), have taken the use of AI in art creation to new heights, and in 2018, French art group Obvious used GAN technology to create Portrait of Edmond Belamy, which was sold at Christie's for the first time. Belamy sold for \$432,500 at Christie's auction house (Christie's, 2018), sparking a wide-ranging discussion on AI art, marking the formal entry of AI-created artworks into the art market from the mainstream side, and prompting a re-examination of the role of AI in the art field.

As Arthur C. Clarke said, 'Any sufficiently advanced technology is, at first sight, indistinguishable from magic' (Clarke, 1973, p. 45). In the context of the increasing penetration of AI in various fields, especially the application of robotics in art creation, in-depth reflection is needed: can AI be regarded as part of technological art? Will its development lead to the end of the traditional role of the artist? What new challenges and opportunities does the emergence of robot artists bring to the creation of human artists?

The aim of this paper is to explore the current state of development of AI art, with a special focus on the use of robots in art and the impact of this trend on the future art ecology. By analyzing the historical combination and status of AI and art creation, the paper hopes to answer the following key questions: will AI and robots replace human artists or form new collaborative relationships with them? The aesthetic value of AI artworks lies in the combination of algorithms and data, as well as in the machine's capture of patterns and structures. This new aesthetic paradigm challenges traditional notions of beauty and prompts a re-examination of what beauty is and who its creators can be?

2.The Making of Art in Artificial Intelligence

Artificial Intelligence as a discipline has its origins in the understanding and modelling of human intelligence. Its technological underpinnings primarily include the fields of machine learning, neural networks, and deep learning (Russell & Norvig, 2016). Machine learning gives computers the ability to extract patterns from data, neural networks process information by modelling the structure of neurons in the brain, and deep learning enables more complex pattern recognition and high-level abstraction with the help of multi-layer neural networks. These technological advances provide a solid foundation for the application of AI in the field of art creation.

The origin of the concept of AI art can be traced back to philosophical reflections on creativity. Philosopher Leo Tolstoy once proposed that 'art is the activity of human beings to convey emotion by means of some external symbol' (Tolstoy, 1897). If machines can understand and express emotions, can they also be artists? This exploration of creative ability provides a

theoretical basis for art with artificial intelligence.

The development of technology further advanced this thinking, and Alan Turing, a pioneer in computer science, posed the question of whether machines can think in his famous paper 'Computing Machines and Intelligence' (Turing, 1950), which evolved into the question of whether machines are capable of creating art with the advancement of technology, and the interplay of philosophy, art, and technology contributed to the Art of Artificial Intelligence's. The interaction of philosophy, art and technology led to the birth of AI art.

Several key stages in the development of art about AI:

1. the Dartmouth Conference in 1956: considered to be the sign of the birth of AI as a discipline (McCarthy et al., 2006). At this conference, scientists discussed machine intelligence systematically for the first time, laying the foundation for subsequent research.

2. Explorations in computer-based art in the 1960s and 1970s: Artists and scientists began to collaborate on the use of computer graphics techniques to generate works of art. For example, Michael Noll and Frieder Nake, among others, used algorithms to create abstract artworks, initiating computer art (Noll, A. M. 1966).

3. the rise of robotic art, with the development of robotics, artists began to use robots to create art. As Patrick Tresset demonstrated in his experiments with his painting robot 'Paul' (Tresset & Leymarie, 2013), AI can mimic or even create artworks like human works through data processing and image recognition. artworks.

4. Deep learning and GAN applications: in 2014, Goodfellow et al. proposed Generative Adversarial Networks (GAN), which provides a powerful tool for AI to generate realistic images and music (Goodfellow et al., 2014). This directly contributes to the possibility of AI artworks entering the mainstream art market.

5. Commercialization and recognition of AI artworks: in 2018, Obvious's Portrait of Edmond Belamy was sold for a high price at Christie's auction house, marking the commercial and social recognition of AI art.

The formation of AI art is the result of the interaction between technological progress, philosophical reflection and artistic exploration, and its course of development reflects mankind's constant pursuit of intelligence and creativity and foreshadows the new direction of future artistic creation.

3.Can Artificial Intelligence Art be a branch of Science and Technology Art ?

The fusion of technology and art has a long history, and every technological innovation in history has brought new possibilities for art. For example, the invention of photography not only changed the themes and styles of painting, but also prompted artists to explore new art forms such as abstraction and impressionism (Benjamin, W. 1936). The development of digital technology has given birth to digital art and new media art, and the development of robotics has provided new tools and media for art.

Technology has brought a new aesthetic experience to art, and the introduction of technological tools has enabled artists to break through the limitations of traditional media to create more diverse and complex works. Art is no longer merely an imitation of nature, but a reconstruction and reproduction of reality through technological means, giving new aesthetic value to the work (McLuhan, M. 1964). As art theorist Clive Bell once said, 'The essence of art lies in the salience of form' (Bell, C. 1914).

Artificial intelligence art form can be regarded as an important branch of technological art,

which brings new possibilities and challenges for art creation, and triggers in-depth thinking about the nature of art and aesthetic value. As the philosopher Martin Heidegger pointed out, ‘The work of art opens up the world’ (Heidegger, 1971), AI art is opening a new world integrating technology and aesthetics.

4. Artificial Intelligence in Art Creation

Robot art is one of the most visually striking and expressive mediums in AI art. Robot art uses robots and technology as a carrier, and through the conversion of art language, expresses human's imaginative thinking. Robots serve multiple roles in art as mediums, materials, and subjects. They are not merely cold tools but also act as a bridge for emotional communication with humans, breaking the traditional mode of simple depiction and reflection of reality in art.

As early as 1956, Nicolas Schöffer, a French artist of Hungarian descent, created the ‘CYSP 1’ robot, which was capable of artistic creation, marking the beginning of the participation of robots in artistic creation. Then, in 1959, the pioneering Swiss artist Jean Tinguely created the Meta-Matic, which caused a great deal of discussion about robots in art at the first Paris Biennale.

In 2011, Patrick Tresset, a robotics expert at the University of London, spent ten years developing a drawing robot named ‘Paul.’ This robot ‘observes’ objects through a head-mounted camera and uses a robotic arm to hold a pen and draw portraits on paper. Paul uses a camera in his head to ‘look’ at the subject and then uses a robotic arm to draw a portrait on paper.



Figure 1 Paul drawing a portrait

Source from: <https://www.illuminateproductions.co.uk/six-robots-named-paul>

American artist Pindar Van Arman's ‘Cloud Painter’ robot, which creates portraits on its own, won the 2018 International Robot Art Competition. Japanese artists Takahiro Yamaguchi and So Kanno have created automated graffiti robots that mimic the art of graffiti with a robotic arm, exploring the improvisational nature of graffiti and interpreting it in new ways (Takahiro Yamaguchi & So Kanno. 2018).

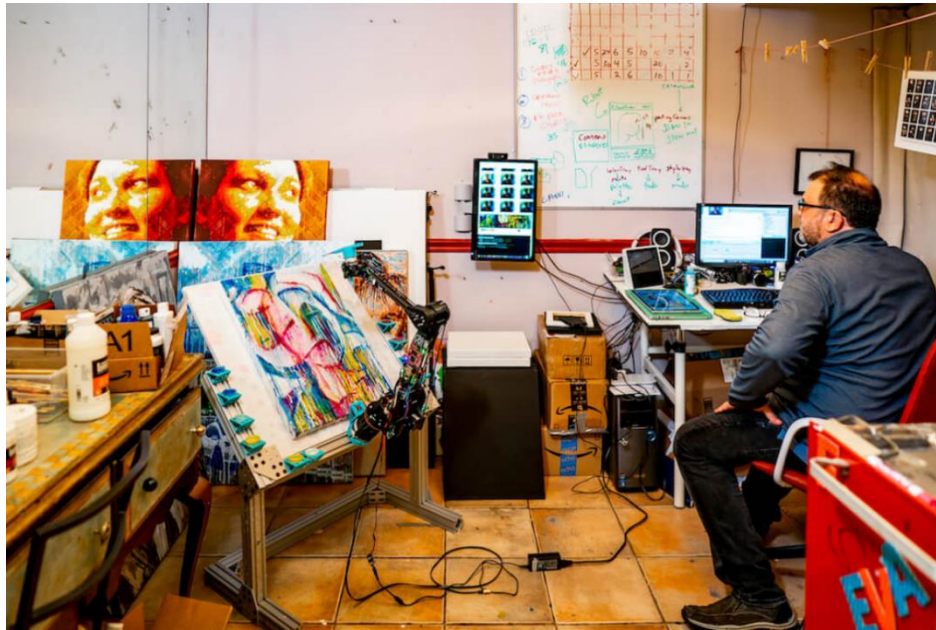


Figure 2 Cloud Painter in the studio

Source from: <https://aiartists.org/pindar-van-arman>

As times change and image technology evolves, Google's Magenta project uses deep learning techniques to allow AI to create paintings that require only a few commands to draw an image under a huge semantic model, exploring the role of machines in the creative creation process (Roberts et al., 2018).

Robots have also achieved remarkable results in the field of sound art and music. The Third Arm, a robotic limb developed by Waseda University in 1980, was used by Australian artist Stelarc in sound art performances, exploring the fusion between the human body and machines. Similarly, Wade Marynowsky's SYNTHESISER-ROBOT, a modified industrial robot, has been employed in sound art performances. by Wade Marynowsky, a modified industrial robotic arm capable of playing music and soundtracks through hardware and software interfaces, giving music new forms of expression with dance-like movements and gestures.

In 2017, ABB's collaborative robot 'YuMi' performed with world-renowned tenor Andrea Bocelli, demonstrating the potential of robots in musical performances. YuMi conducts the orchestra to play classic operas through precise movement control, reflecting the deep integration of robotics and artistic performances. YuMi's precise movement control and orchestra performance of a classic opera demonstrated the deep integration of robotics and artistic performance.



Figure 3 Photo of Andrea Bocelli & YuMi

Source from: <https://www.arabnews.com/node/1160301/science-technology>

5. Robotic Art Exhibition and Multimedia Performance

Robot art has gradually come into the public eye, and various exhibitions and performances continue to emerge. 2002, Artbots organized the Robot Art Exhibition, showcasing robot artworks from all over the world, and in 2015, the Shanghai Biennale's 'Man-Machine Future' themed exhibition explored the possibility of collaborative innovation between human beings and machines.

In terms of multimedia performances, American Bot & Dolly Co. launched a robotic performance installation called 'Box' in 2014. By controlling robotic arms and large displays, combined with moving projection mapping and animation, it creates a fusion of real and digital space. 2017, the VT Pro Design team presented 'Telestron' at the Texas Night Arts Festival in Houston, using robotics and light and shadow technology to create an immersive theatre space. Using robotics and light and shadow technology to create an immersive theatre space, it explored the presence and absence of light, and how light defines space.

6. AI and Art Interaction

Human-computer art is an art form that uses artificial simulation technology as a media carrier and transforms it into an artistic language to express the state of human existence and future imagination. Human-machine art emphasizes emotional communication between humans and machines, transcending the traditional perception of machines as cold, lifeless tools.

This art form focuses on the social history and real living environment of human beings with the help of machines and looks back at reality by exploring the possibilities of the future, breaking the simple depiction of reality in traditional art. Human-machine art not only discusses the impact of artificial intelligence on human beings, but also expresses various ideas and concepts through the medium of robots.

With the development of science and technology, the relationship between human beings and

machines is becoming 'human-machine', and this new relationship raises new ethical issues, how to live in harmony with artificial life and man-made objects. In the future, robots may become the protagonists and carriers of art creation, and the evolution of the relationship between humans and machines will have a profound impact on the subjectivity and creativity of art.

7.Challenges and Reflections on AI Art

With robots having the ability to create on their own, will robots always exist as an appendage to humans? When a robot creates a work, does the copyright of the work belong to the maker or the robot? These are all questions worth exploring in depth.

Artificial intelligence art not only promotes innovation in technology and concept, but also triggers profound thinking about ethics and aesthetics. Will the role of robots in art creation threaten the space occupied by human artists? How should audiences perceive and evaluate works created by robots? What is the aesthetic value of these works? These questions prompt us to re-examine the nature of art and think about how art should continue to develop in the age of artificial intelligence.

8.Will AI robot artists replace human artists?

The application of robots in art creation has raised concerns about whether they will replace human artists, and with the maturity of machine learning, deep learning, and other technologies, AI robots have demonstrated remarkable capabilities in creating art forms such as painting, music, and poetry (Zhan et al., 2019).

Although robots can generate artwork, they do not possess the emotions and experiences of human artists. Artist and researcher Amy Karle states, 'AI can extend human creativity, but it cannot completely replace the unique experience and emotional expression of humans' (Karle, 2020). The art of creation by human artists is more than just a technical creation; it is an emotional expression and a cultural legacy.

Robots can help artists explore new areas of creativity and technical means, with AI acting more like a tool. For example, involve robots in performance and installation art, using AI-generated images or music as a source of inspiration. Enriching artistic expression through collaborative creative modes brings a new experience to the audience. Some surveys have found that, from an audience's perspective, people may value artworks created by humans more, especially those that deeply reflect human emotions and social issues.

There is also a human-centered approach to copyright. In the United States, for example, only the 'author' is entitled to copyright, and the 'author' is defined as a natural person (United States Copyright Office. 2019). The United States Copyright Office (USCO) has once again rejected a copyright application for a work of art made with artificial intelligence. A three-member committee reviewed Stephen Thaler's request to reconsider the office's 2019 ruling that image created by his artificial intelligence "lack the human authorship necessary to support a copyright claim."(United States Copyright Office. 2022) Thus, whether AI technology or robot-generated artwork is controversial in terms of copyright attribution.

Some scholars have argued that AI-generated works should be regarded as products of the public domain, which anyone is free to use (Samuelson, P. 2019). However, this may discourage individuals and organizations that have invested resources in developing AI creation systems. Another view is that AI is viewed as a tool and the copyright of the work belongs to the human creator who manipulated or programmed the AI. This position was reflected in a 2019 ruling by

the U.S. Copyright Office, which denied copyright protection for AI-generated works, citing a lack of human authorship.

In addition, AI robots may use many pre-existing works for training in the creative process, which involves issues of citation and permission to use the works of others, Unauthorized use of copyrighted material may lead to infringement disputes.

9. Conclusion

According to Pattie Maes, a professor at the MIT Media Lab, ‘AI will reshape the role of artists, but it won’t make them obsolete. Instead, it will inspire new forms of art and expression’ (Maes, 2018). Future artists will need a technical background to effectively understand and leverage AI technology in their creations.

Nowadays, AI robots demonstrate impressive capabilities in creating art, but they still fall short of human artists when it comes to emotional expression, cultural context, and social responsibility. In the future, AI robots are more likely to collaborate with human artists rather than entirely replace them. The unique advantage of human artists lies in their keen emotional sensitivity and deep cultural understanding, which AI cannot replicate at present.

Only physical robots equipped with AI technology and the capacity to exhibit some level of independent consciousness or emotional feedback in the art creation process could potentially approach the role of human artists. Such a robot would not only be able to generate works but would also need to understand the social and cultural connotations of the work and assume a social responsibility like that of a human artist. However, this possibility is still out of reach.

AI technology plays a supporting and expanding role in art creation, while the human artist remains the core of the creative process, and the artist's role in the future will change to that of a fusion of technology and creativity, working in concert with AI to promote art to new heights.

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