AIGC and Human Collaborative Creation Model: A New Paradigm of Digital Art

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Abstract. The rise of Artificial Intelligence Generated Content (AIGC) is reshaping artistic creation through human-machine collaboration. This paper outlines AIGC's technological evolution and its application in generative and performance art, with a focus on Generative Adversarial Networks (GANs). It highlights a co-creation model where human creativity is supported by AI's computational power. AIGC enhances efficiency, stimulates inspiration, and fosters interdisciplinary art education. However, the paper also emphasizes the need for critical frameworks to address ethical concerns, such as data privacy and cultural homogenization. Ultimately, AIGC expands artistic boundaries while prompting new reflections on authorship and creativity.

Keywords: AIGC; GAN; human-machine collaboration; generative art; AI ethics

1 Introduction

In recent years, the rapid evolution of Artificial Intelligence Generated Content (AIGC) has brought profound changes to the field of artistic creation. From early rule-based generation models to the capabilities of deep learning algorithms such as Generative Adversarial Networks (GANs), AIGC technologies have transformed from simple tools into participants in the creative process, capable of producing complex images, texts, and performances. As artificial intelligence becomes increasingly integrated into artistic practice, traditional boundaries between creator, medium, and artwork are being redefined.

This technological shift has raised important questions within both the artistic and academic communities. While AIGC can improve creative efficiency, expand aesthetic approaches, and broaden access to artistic expression, it also challenges established notions of authorship, originality, and cultural identity. The emergence of machine-generated content prompts a critical reevaluation of the role of human agency in artistic creation.

This paper examines the collaborative creation paradigm between humans and AIGC. It first outlines the technological development and artistic applications of AIGC, with an emphasis on GANs and their impact on generative art. It then analyzes how

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human-AIGC interaction reshapes the creative process through complementarity and co-creation. Finally, it addresses the ethical, educational, and cultural challenges that arise from this paradigm, and proposes a critical framework to guide its future development. This study aims to contribute to a deeper understanding of how AIGC is reshaping the landscape of digital art while reaffirming the importance of human creativity.

2 Research Background

The development of AIGC can be divided into three main stages. The first stage began in the 1950s, during the embryonic phase of artificial intelligence technology. At that time, computer technology was still immature, and content generation primarily relied on predefined rules and templates. The generated content was relatively simple, requiring manual configuration of numerous complex rules, resulting in fixed and monotonous outputs.

The second stage emerged in the mid-1990s, marking the entry of AI into the machine learning phase. Researchers began training models with large datasets, equipping computers with enhanced autonomous learning and reasoning capabilities, gradually replacing the earlier rule- and template-based approaches. Language models trained through machine learning could automatically generate text resembling human writing styles. During this stage, AI-generated content saw significant improvements in richness and diversity, enabling adaptation to various needs and progressively optimized outputs.

The third stage commenced in the mid-2010s, with the rapid advancement of deep learning technology, leading to a leap in AI's generative capabilities. Deep learning methods substantially enhanced artificial intelligence's ability to generate realistic multimedia content, such as images, audio, and videos.

3 AIGC Technology and Its Applications in Art

3.1 AIGC Technology

3.1.1 What Is GAN.

GAN, or Generative Adversarial Network, consists of two components: the Generator and the Discriminator. The most notable feature of GANs is their ability to create surrealistic images, videos, music, and text. GANs can learn features from training images and utilize these learned patterns to imagine their own new images. By enabling computers to mimic any data distribution, they can be trained to generate worlds resembling various domains in our own—images, music, language, and prose.

3.1.2 GANism.

The latest GAN technology can achieve complex formal remixing by modifying the generator or discriminator networks, such as Golan Levin and Lingdong Huang's Ambigrammatic Figures(2020) [2]; or by inserting filters in higher network layers and manipulating activation maps to interfere with the image formation process, as seen in Terence Broad's Teratome (2020) [3].

Due to GANs' relatively limited autonomy in selecting training datasets or statistical models of latent spaces, they are more often regarded as tools for imitation rather than genuine engines of creativity. Consequently, works produced through GAN operations using similar techniques often exhibit universal or even repetitive visual characteristics. Many of these works, on an aesthetic level, show little difference from early glitch art, which incorporated technical malfunctions as one of its aesthetic dimensions.

Moreover, the popularity of GANs has further exacerbated the misuse of the term "generative art," reducing it to a descriptor for computational practices involving randomness, complexity, or machine learning frameworks. The neglect of generative art's diversity and its long history [4] undermines its broader cultural context and fosters an uncritical fascination with AI-driven artistic practices.

However, as Lev Manovich pointed out, if we take Van Gogh's *The Starry Night* as a style reference image to generate output, we might indeed obtain a painting with a similar style. Yet style is a form that can exist independently of the content of the work—artists like Van Gogh did not actually possess a "style" in the conventional sense[1]. The visual variations we observe in Van Gogh's paintings emerge in response to different subjects—the sky and trees transform in distinct ways. Thus, images generated through style transfer that mimic Van Gogh's style fail to truly capture the core logic of his artistry. This limitation similarly applies to other works produced using this method.

3.2 AIGC Art Applications

3.2.1 Performative Aesthetics.

Song Wenzhong's robotic projects, such as "Drawing Operations Unit: Generation 2" (2017, funded by Bell Labs), share certain similarities with Roman Verostko's algorithmic composition experiments from the 1980s to 1990s. Verostko integrated his coding experiments with the operations of his drawing machines, creating subtle interactions between them and their surrounding material environment; whereas Song Wenzhong reveals a kind of "spiritualized power" through the dramatic effects of her collaboration with robots, thereby mystifying the manual drawing process.

Similarly, Huang Yi's robotic choreography work "HUANG YI & KUKA" (sponsored by KUKA since 2015) features a dance between Huang Yi and the industrial robot "KUKA," whose programming he personally wrote. Combining dance art with mechanical science, it spectacularly demonstrates metaphors of harmonious human-machine interaction while safely conveying these metaphors to a comfortable audience. Since 1976, Stelarc's performance piece "Ping Body" (1996) has emphasized the existential anxiety and uncertainty arising from the shared participatory responsibility among the artist, technology, and audience, as all three exert a degree of manipulative

influence on one another. These AI-driven performance works boast exceptionally high production values and aesthetics that align with contemporary audience tastes, largely avoiding unfavorable comparisons with their predecessors. Their persuasiveness relies on our innate anthropocentric perspectives, short-sighted retrospection, and susceptibility to spectacle.

3.2.2 Installation Art.

Pioneering AI artist Harold Cohen attempted to translate and derive certain components of human visual decision-making into a robotic painting/drawing system. His relationship with mechanical creative agency remains ambiguous, while playfully engaging with anthropomorphic rhetoric. A highly popular branch in contemporary AI art involves iterations of Cohen's approach, where artists "teach" their robots how to paint, exemplified by Pindar Van Arman's Painting Robots or Joanne Hastie's Abstract Paintings. Over the past decade, Pindar Van Arman has designed five series of art-related robots. As a new addition to this lineage, BitPaintr employs artificial intelligence to achieve portrait painting with brushes on canvas. The robot collects raw material from photos uploaded by users, analyzes the images using color values, and then begins painting. BitPaintr has already produced portraits of iconic figures such as Gandhi, Einstein, George Washington, Benjamin Franklin, and Martin Luther King Jr.

Bastian Anton and other exemplary artists, such as Naoi Naoko and Anna Ridler, regard artificial intelligence as both a technology worthy of critique and a complex socio-political entity. They recognize that authorship intertwined with technology carries multi-layered abstract meanings. They point out that regardless of how complex or counterintuitive the tools implementing these elements may be, the crucial aesthetic components—such as decision-making, evaluation, and selection—are ultimately human-driven and deeply rooted in society. From these well-intentioned reminders, we can further contemplate how to balance the collaborative creation between humans and AIGC.

4 The New Paradigm of Collaborative Creation between AIGC and Humans

4.1 Definition of Collaborative Creation

Human-machine collaboration refers to the cooperation and coordination between humans and machines, with the core objective of significantly enhancing work efficiency and creativity by combining human cognitive advantages with machine computational capabilities[6]. Within this collaborative framework, humans primarily take charge of decision-making, innovation, and solving complex problems, while machines predominantly undertake tasks such as data analysis, pattern recognition, and efficient computation.

This human-machine collaboration is not merely a simple technological integration but also involves information exchange and mutual understanding between humans and machines. By fully leveraging the respective strengths of both humans and machines,

this collaborative model markedly improves work efficiency and accuracy. Furthermore, the human-machine collaboration model fosters complementarity between the two, enabling machines to handle large volumes of tedious and repetitive tasks, while humans can devote more attention to innovation and solving complex problems.

4.2 The Symbiosis between AIGC and Artists

At the current stage, human-machine collaboration is no longer simply AI-led, but encompasses two models: human participation in optimization and correction, or human creativity leading with AI-assisted generation. Theoretically, the realization of human-machine collaboration can be summarized as the principle of "complementarity and synergy." Its effective implementation relies on the organic integration and mutual support between humans and machines in their respective areas of strength. Through efficient communication and cooperation, human-machine collaboration brings us higher work efficiency, more precise outcomes, and more innovative value creation.

Driven by the era of human-machine symbiosis, art design and artificial intelligence have reached a convergence point, where designers and computers coexist, continuously generating innovative ideas and applications. In the field of art design, the evolution of human-machine relationships can be divided into three periods: 1. Humans manipulate physical machines, with machines receiving one-way commands and obeying; 2. Interaction between humans and computers, involving bidirectional communication and driving; 3. Human-machine collaboration, where both form an integrated whole and perceive external contexts.

Both humans and machines participate in the design process. Designers first collect data and conceptualize semantic contexts, then use computers to construct design models, which automatically generate art design works after algorithmic computation. Thus, tasks that once required years of meticulous effort can now be swiftly accomplished with the aid of artificial intelligence, greatly simplifying designers' work. Currently, AI injects boundless vitality into the innovation of art design, enriching its visual language and diversifying its methods.

Humans and technology have become inseparable. This relationship is not about speed competition or mutual exclusion but rather about reliance, utilization, and mutual advancement (designers' openness to AI and their continuous learning of innovative capabilities are prerequisites for enhanced creativity; the deeper the level of human-machine collaboration, the more prominent the novelty of creative outcomes). Therefore, artificial intelligence will not replace designers but will instead provide opportunities to rethink design and drive the emergence of new design concepts and forms. Leveraging this trend necessitates both the courage to disrupt conventional paradigms and the wisdom to maintain a measured equilibrium with the past.

4.3 The Efficiency Enhancement and Inspiration Stimulation of AIGC in Creative Generation

In a certain sense, AIGC is a "generalist." It dabbles in various fields but lacks the human capacity for knowledge integration, in-depth exploration, and humanistic concern. However, in the initial stages of creation, AIGC can provide creators with the foundational framework for ideas, upon which creators can then explore creative pathways.

Taking AI text writing as an example, one of the most prominent features of AI writing is its powerful data processing and analytical capabilities. AI can swiftly provide relevant background information, trends in technological development, and the latest research findings in cutting-edge technologies. By learning from and analyzing vast amounts of textual data, AI can extract the essence of writing across different styles and themes, thereby assisting creators in finding inspiration more efficiently during the writing process.

In addition to providing inspiration in terms of content and style, AI writing also offers convenience to creators at every stage of the writing process. AI can automatically generate article frameworks and outlines, helping creators better organize their thoughts, while also providing detailed formatting and structural suggestions to ensure logical rigor and clear hierarchy in the writing [5].Furthermore, AI's grammar-checking and text-polishing functions significantly enhance writing efficiency and quality. In every aspect, it allows us to focus more on the creative thinking itself.

5 Future Prospects: The Continuous Innovation of AIGC and Digital Art

5.1 The Impact of AIGC on Art Education and Creative Talent Development AIGC

Provides personalized learning experiences for education. Through deep learning and big data analysis, AIGC can accurately capture students' learning habits, interest preferences, and knowledge mastery levels, thereby tailoring customized learning plans. This personalized teaching approach not only enhances learning efficiency but also stimulates students' motivation to learn. With the assistance of AIGC, classroom interactions become more diverse and engaging, as technologies like virtual reality and augmented reality immerse students in an ocean of knowledge, allowing them to experience every learning scenario firsthand. Additionally, AIGC can offer timely feedback, helping students quickly correct mistakes and consolidate their learning outcomes.

Under traditional educational paradigms, various disciplines often exist in isolation, lacking necessary interdisciplinary integration and interaction. However, with the vigorous development of AIGC technology, an emerging cross-disciplinary teaching model has emerged. This model aims to facilitate the mutual permeation and integration of knowledge systems and core concepts across different disciplines, thereby providing learners with a more comprehensive and holistic learning pathway.

5.2 Establishing a Critical Framework for AI Art

With the continuous evolution of artificial intelligence technology, AI art has emerged as an innovative force that cannot be underestimated in the field of artistic creation. It has not only subverted the traditional paradigms of artistic production but also given rise to unprecedented collaborative creation models. However, within this emerging creative paradigm, we are also confronted with numerous ethical and cultural challenges of a serious nature.

The primary issue lies in the fact that the creative process of AI art involves large-scale data collection and processing, which in turn raises ethical controversies concerning data privacy and copyright. How to ensure that the data utilized by AI in creation is both legally compliant and properly authorized, as well as how to strike an appropriate balance between artistic creation and data privacy protection, has become a pressing issue requiring deep reflection. Furthermore, the collaborative creation model of AI art poses significant challenges to traditional artistic concepts and cultural identity. AI art often integrates diverse cultural elements and styles, and while this cross-cultural fusion stimulates innovation, it may also lead to risks such as cultural homogenization and the blurring of cultural identity. How to promote the healthy development of AI art while respecting cultural diversity is a cultural challenge we must address.

To address the aforementioned challenges, it is particularly crucial to establish a critical framework for AI art. This framework should encompass ethical scrutiny of the AI art creation process, clear guidelines on data usage and copyright protection, as well as in-depth analysis of the cultural value of AI art. With this framework, we can more comprehensively evaluate the value and significance of AI art, thereby promoting its healthy development at both ethical and cultural levels.

6 Conclusion

The integration of AIGC into artistic creation marks a transformative shift in both the methodology and philosophy of art-making. Through the complementary collaboration between human creativity and machine intelligence, a new paradigm of co-creation is emerging—one that enhances productivity, broadens aesthetic possibilities, and redefines the boundaries of authorship. While AIGC technologies such as GANs have demonstrated impressive capabilities in generating visual and performative art, they also present challenges related to ethics, originality, and cultural identity. These tensions underscore the urgent need for a critical framework to guide the responsible development and application of AI in the arts. Looking forward, the continuous innovation of AIGC will not only influence artistic practices and educational models but also inspire deeper reflection on the human role in a technology-augmented creative landscape. Rather than replacing artists, AIGC serves as a catalyst for reimagining art, enabling novel forms of expression and collaboration in the digital age.

References

1. Lev Manovich. Artificial Intelligence Art and Aesthetics[J]. Film World, 2023(03):4-24
2. Levin, G.; Huang, L. Ambigrammatic Figures. Golan Levin's GitHub Repository. 2020. Available online: https://github.com/golanlevin/AmbigrammaticFigures (accessed on 30 November 2021).
3. Broad,T.Teratome.Terence Broad's Website.2020.Available online:https://terence-broad.com/works/teratome (accessed on 30 November 2021).
4. Boden, M.A.; Edmonds, E.A. A Taxonomy of Computer Art. In From Fingers to Digits: An Artificial Aesthetic; MIT Press: Cambridge,MA, USA, 2019; pp.23–59. Quaranta, D. Surfing con Satoshi: Arte, Blockchain e NFT; Postmedia Books: Milano, Italy, 2021.
5. Sui Mingzhi. On the Copyright Protection Model for AI-Generated Content—Taking China's First "AI Text-to-Image Case" as an Example [J]. Publishing & Printing, 2024(4):11-19.
6. Zhang Mu, Gu Qunye, Tian Jinliang. The Opportunities and Challenges Brought by AIGC to New Media Art Education. Youth Journalist. 2024 (03).

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