

Creating Digital Art by AI Art Generators

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Abstract

In the era of rapid technological evolution, artificial intelligence (AI) has emerged as a transformative force in digital art creation. AI Art Generators powered primarily by Generative Adversarial Networks (GANs) and Diffusion Models enable users to produce complex, high-quality visual content by simply providing text prompts. Tools such as OpenAI's DALL-E, Midjourney, Stable Diffusion, and Adobe Firefly illustrate this paradigm shift by bridging advanced algorithms with user-friendly interfaces that make creative production accessible to the general public.

This article explores the fundamental principles behind these systems, focusing on how GANs and Diffusion Models differ in architecture and image generation logic. Unlike traditional graphic design software, which relies heavily on the artist's manual skills and iterative design processes, AI Art Generators automate tasks that were once labor-intensive. This automation democratizes artistic production but simultaneously raises critical questions about originality, authorship, and the role of human craftsmanship in the digital age.

The widespread adoption of AI-generated art has sparked global debates about intellectual property rights, ethical training datasets, and the potential misuse of artists' works without consent. Recent lawsuits involving

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Midjourney and Stability AI highlight the need for clearer legal frameworks that balance technological innovation with respect for creators' rights. The paper argues that AI should not be viewed solely as a replacement for human creativity but rather as a powerful collaborator that expands the boundaries of visual expression.

By examining the technical foundations, creative implications, and ethical challenges surrounding AI Art Generators, this article contributes to an interdisciplinary understanding of how emerging technologies are reshaping artistic practice and cultural production. It calls for collaborative strategies among artists, developers, and policymakers to ensure that AI-driven creativity evolves responsibly and inclusively in the years to come.

Keywords : AI Art Generators, Generative Adversarial Networks (GANs), Diffusion Models, Digital Art Ethics, Creative Collaboration

Introduction

The evolution of digital art has been deeply intertwined with the advancement of computing technology. In the 1980s and 1990s, artists began employing basic software such as Adobe Photoshop, CorelDRAW, and Microsoft Paint to produce two-dimensional graphics. These tools enabled digital painting, photo retouching, and layout design. The development of high-resolution monitors and graphic tablets significantly enhanced the realism and precision of digital artworks (Paul, 2015).

By the early 21st century, digital art transitioned into a new phase marked by three-dimensional (3D) animation, lighting simulation, and virtual reality (VR). Artists utilized software like Autodesk Maya, Blender, and Unity to render immersive environments. This era witnessed the emergence of interdisciplinary expressions—ranging from media art and interactive installations to data-driven visualizations (Lovejoy, 2004; Tribe & Jana, 2007).

Despite such technological sophistication, digital artistry still required extensive manual skill. Artists had to master composition, color theory, and narrative design, resulting in a time-intensive creative process. However, a turning point arrived with the application of artificial intelligence (AI), particularly in fields like machine learning and computer vision. Technologies such as Generative Adversarial Networks (GANs) and Diffusion Models enabled machines to learn artistic patterns from massive datasets and generate original imagery based on simple text prompts (Goodfellow et al., 2014; Ramesh et al., 2021).

Importantly, local research has explored how these techniques are practically adapted in Southeast Asia. Athiwat Thammawatsiri, Phisit Kotsupho, and Phatcharabot Rittem (2024) demonstrated how GANs and AI art generators can be used to preserve cultural identity and innovate contemporary Buddhist art

The emergence of AI art generators including OpenAI's DALL·E, Midjourney, Stable Diffusion, and Adobe Firefly has revolutionized how digital artworks are conceptualized and produced. These tools can rapidly create complex images based on user-provided prompts, thereby democratizing access to creative production and reducing the time and technical skill previously required.

DALL·E, first launched by OpenAI in 2021 and later refined into DALL·E 3 (available via ChatGPT Plus and Bing), uses transformer-based architecture and introduces prompt comprehension features with content filtering and watermarking (OpenAI, 2023). Midjourney, released as an open beta in 2022, quickly gained popularity on Discord for its distinctive visual style. It has since evolved to version 7 as of April 2025. In contrast, Stable Diffusion, built on open-source principles and trained on LAION-5B, enables local image generation and fine-tuned control over inpainting and outpainting processes (Stability AI, 2023). Adobe Firefly emphasizes legal safety by relying exclusively on licensed Adobe Stock and public domain content, offering creators image protection systems (Adobe, 2024).

While AI art tools unlock new possibilities, they also introduce unresolved questions. First, there remains a gap in understanding the artistic and contextual precision of AI-generated imagery. While technical aspects of GANs and diffusion models are well-documented, less is known about how well these tools replicate the aesthetic sensitivity and interpretive depth of human artistry (Elgammal et al., 2017; McCormack et al., 2019).

Second, ethical and legal concerns have surfaced, particularly around copyright infringement and unauthorized data usage. In 2023–2025, Midjourney and Stability AI faced lawsuits over the use of artists' works without consent, highlighting the urgent need for global regulatory frameworks (AP News, 2023). Additionally, fears persist that AI-generated art may devalue craftsmanship and endanger traditional creative professions especially for emerging artists raising philosophical questions about authorship, originality, and creative intention in the AI era.

This article aims to address these gaps by providing a comprehensive overview of AI art generators: their underlying technologies, artistic implications, ethical debates, and future trajectories. It seeks to bridge the divide between scientific insight, aesthetic theory, and social impact in the context of AI-driven creativity.

AI Art Generators: Concepts and Technologies

In addition, next-generation AI Art Generators have integrated **prompt engineering** techniques that allow users to specify image details more precisely, including color palettes, artistic composition, and visual style. They also leverage **Natural Language Processing (NLP)** to interpret symbolic and contextual meanings within the user's text prompts. This capability enables AI Art Generators to go beyond simple image replication and produce new, highly customized artworks that reflect contemporary concepts and individual user identity (Ramesh et al., 2021).

1. How AI Art Generators Work: Generative Adversarial Networks (GANs) and Diffusion Models

AI Art Generators apply Artificial Intelligence (AI) and Deep Learning to create original digital artworks. A key approach is the **Generative Adversarial Network (GAN)**, which consists of two main parts: the *Generator* and the *Discriminator* (Goodfellow et al., 2014). The Generator produces new images from random noise that mimic real data, while the Discriminator distinguishes whether an image is real or fake. Through this adversarial training, both parts improve over time, enabling the Generator to produce highly realistic, complex outputs. GANs are widely used to generate hyper-realistic portraits, contemporary digital art, and experimental graphic designs.

Another popular technique is the **Diffusion Model**, which works by gradually adding noise to an image until its details are completely erased, then training the model to learn how to remove the noise step by step in reverse, producing a clear image according to a given text prompt (Ramesh et al., 2022). Notable tools such as DALL·E and Stable Diffusion demonstrate this method by turning short text descriptions into unique, highly detailed images.

By combining GANs and Diffusion Models, AI Art Generators have become powerful tools for expanding the boundaries of digital creativity. They allow artists to merge human imagination with AI's computational power to create art beyond traditional limits (Goodfellow et al., 2014; Ramesh et al., 2022).

2. The Underlying Technologies

The underlying technologies behind AI Art Generators combine cutting-edge innovations that enable systems to learn, generate, and process complex data to produce digital artworks with high accuracy. A fundamental pillar is the **Deep Neural Network (DNN)**, which mimics the structure of the human brain using layers of *artificial neurons* capable of recognizing patterns in images, sounds, and texts (LeCun et al., 2015). The key advantage is the ability to learn directly from massive datasets through repeated training without relying on fixed rules.

Another critical enabler is **parallel processing with Graphics Processing Units (GPUs)**, which significantly accelerates model training and large-scale data processing (Raina et al., 2009). Today, cloud computing services and specialized hardware such as Tensor Processing Units (TPUs) play a major role in pushing the limits of next-generation models.

Additionally, advanced **algorithms** like the *Attention Mechanism* and *Transformer Architecture* have become the backbone of modern AI art systems such as DALL·E or Stable Diffusion, which can accurately link text prompts to images in flexible, creative ways (Vaswani et al., 2017).

In summary, the technologies behind AI Art Generators are not just about models alone but rather an integrated system of advanced neural networks, high-performance computing, and smart algorithms that enable limitless possibilities for contemporary digital art (LeCun et al., 2015; Vaswani et al., 2017).

3. Difference from Traditional Graphic Software

AI Art Generators differ significantly from traditional graphic software like Photoshop or Illustrator. Instead of manual pixel-level control, they rely on AI models trained on large datasets to learn visual patterns (Elgammal, 2019). Subsequently, these systems generate new images based on **text prompts or image inputs**, eliminating the need for detailed manual configuration. This AI-driven approach lowers the barrier for non-experts to produce complex artworks. In contrast, traditional graphic software requires users to specify every line, color, and composition detail, making creation heavily dependent on user skill (Mazzone & Elgammal, 2019).

The Impact of AI Art Generators on Digital Art

AI Art Generators have significantly transformed the digital art landscape. They enable people without deep artistic or design skills to create unique artworks by converting text prompts or data patterns into images within

seconds (McCormack et al., 2019). This shift democratizes art production and opens up new markets such as NFT art and interactive media (Elgammal, 2019).

However, this technology also raises questions about **authorship and artistic authenticity**. When works are generated by AI, it becomes debatable who should be considered the true creator, and the risk of duplication or unauthorized reproduction increases (Mazzone & Elgammal, 2019). While many traditional artists see AI as a tool rather than an artist in itself, this ethical debate will likely remain central to the evolution of digital art.

1. The Transformation of Artistic Creation Processes

The rise of **AI Art Generators** has transformed the process of artistic creation. Where traditional art relies heavily on manual skills and detailed composition, artists today can generate ideas and instruct AI systems through text or input data instead (Elgammal, 2019). This means artists no longer need to draw every line or mix every color by hand but can focus more on conceptual design and selecting outputs from AI quickly and flexibly (McCormack et al., 2019).

Moreover, the creation process has shifted toward **iteration, experimentation, and modification**. AI models can generate multiple image variations within seconds, allowing artists to test new ideas without the long production time required by traditional methods (Colton et al., 2015). This opens up a new dimension for art-making beyond the physical studio, extending into the digital realm and online communities where artists and AI co-create continuously.

2. Expanding Opportunities for Emerging Artists

The emergence of **AI Art Generators** has opened doors for emerging artists to create artworks more easily without requiring advanced technical or manual skills typical of traditional art systems. AI tools allow new artists to experiment with ideas and produce works quickly, lowering material costs and barriers to entry. Additionally, digital platforms such as NFT marketplaces enable them to share and sell their works globally (Mazzone & Elgammal, 2019). As a result, emerging artists can generate income and gain recognition without fully relying on conventional galleries or agencies. This trend decentralizes art

production and broadens creative opportunities for newcomers (McCormack et al., 2019).

3. Reducing Technical Skill Barriers

One major advantage of **AI Art Generators** is their ability to reduce the technical skill barriers that have traditionally limited access to digital art creation. In the past, producing high-quality digital art required strong drawing, design, and specialized software skills. Today, artists and general users can generate artworks simply by typing a prompt or idea into an AI system, which then processes and creates new images automatically (McCormack et al., 2019). This empowers newcomers or those without design backgrounds to experiment freely, shortens the learning curve for complex tools, and opens up creative opportunities for everyone (Mazzone & Elgammal, 2019).

Copyright and Ethical Issues

Although **AI Art Generators** expand the creative possibilities of digital art, they also introduce complex legal and ethical challenges. A major topic of debate is **ownership rights** over AI-generated works. Many AI models are trained on vast datasets that often include copyrighted photos, paintings, or designs (Elgammal, 2019). Using these works without consent to train AI models may unintentionally infringe on the intellectual property rights of original creators (McCormack et al., 2019). At present, many jurisdictions do not clearly define whether the rights belong to the artist providing the input, the model developer, or the platform owner (Vincent, 2020).

Ethical considerations add another layer of complexity. The automation of image creation by AI challenges the value of originality and craftsmanship that traditionally define art (Mazzone & Elgammal, 2019). Some fear that automated production could marginalize professional artists or flood the market with mass-produced, soulless works. Furthermore, AI can be misused to produce *deepfake* images or sensitive content that violates privacy or manipulates facts, raising serious legal and moral concerns (Vincent, 2020).

To address these risks, scholars and artists advocate for **shared ethical standards**, such as source attribution, digital provenance certification, clear disclosure of the AI model used, and proper credit to original creators whose works contributed to training (Elgammal, 2019; McCormack et al., 2019). Therefore, copyright and ethics are central issues that must be resolved for AI art to grow responsibly and fairly in the creative industries.

Future Trends: Advancing AI Art Generators, Human–AI Collaboration, and Impacts on Art Education

1. Advancing AI Art Generators

AI Art Generators will continue to improve, especially through next-generation models like Diffusion Models and Generative Adversarial Networks (GANs) combined with fine-tuning and style transfer techniques (Ramesh et al., 2022). These advancements will allow artists to generate highly detailed, custom-styled works. In the future, integration with AR/VR will enable immersive art experiences that bridge the digital and physical realms (Goodfellow et al., 2014).

2. Human–AI Collaboration

Another major trend is human–AI collaboration. Artists increasingly use AI to generate drafts, experiment with colors, or create complex compositions, which they then refine and interpret to produce unique pieces (Elgammal, 2019). This shifts AI's role from a mere tool to a creative partner, expanding the artist's conceptual process without replacing their human insight (McCormack et al., 2019).

3. Impacts on Art Education and Skills

Art education will need to evolve to keep pace. Future students will learn traditional techniques alongside prompt engineering, AI ethics, and digital copyright awareness (Vincent et al., 2021). New-generation artists will act as

Creative Directors who guide AI's output rather than manually creating every detail. This hybrid skill set—combining data handling, narrative design, and system thinking—will prepare artists to create contemporary works that resonate in a fast-changing digital world.

Conclusion

The rapid advancement of AI Art Generators represents a significant milestone in the ongoing evolution of digital art. By integrating powerful machine learning models such as Generative Adversarial Networks (GANs) and Diffusion Models, these systems have made it possible for anyone—regardless of traditional artistic training—to create highly detailed, compelling visuals using simple text prompts. This paradigm shift has not only democratized creative production but has also fundamentally transformed the roles of artists, designers, and creative industries more broadly.

Leading examples such as DALL·E, Midjourney, Stable Diffusion, and Adobe Firefly illustrate the diverse technological paths this field has taken. DALL·E's transformer-based architecture demonstrates how diffusion models can generate contextually accurate images that align closely with textual descriptions. Midjourney, with its community-driven evolution, emphasizes stylistic experimentation and user collaboration. Stable Diffusion stands out for its open-source model, which empowers users to run and fine-tune AI image generation locally, raising both innovation and legal questions. Meanwhile, Adobe Firefly highlights the importance of copyright-safe AI training data and responsible usage by leveraging licensed assets from Adobe Stock and public domain collections.

However, despite their immense potential, AI Art Generators pose unresolved challenges that require urgent attention. Concerns about copyright infringement, the unauthorized use of artists' works for training data, and the lack of clear international legal frameworks highlight significant gaps that the creative

community, policymakers, and technology developers must address. Equally important are philosophical questions surrounding authorship and originality: if an AI can autonomously generate images that rival human-made art, how should society recognize the human element in the final output?

This article argues that rather than viewing AI as a replacement for human creativity, it should be approached as a powerful creative collaborator. When used responsibly, AI Art Generators can expand the boundaries of artistic expression, accelerate ideation, and inspire new forms of hybrid human-machine creativity. Yet, achieving this balance requires robust ethical standards, transparent data practices, and meaningful legal safeguards to protect artists' intellectual property and ensure fair recognition of their contributions.

Ultimately, the future of AI-driven art depends on a collaborative effort between artists, researchers, developers, and policymakers to establish frameworks that encourage innovation while upholding artistic integrity. As AI continues to redefine how art is imagined and produced, embracing it as a co-creator—rather than a competitor—will be key to shaping a more inclusive and ethically grounded digital art landscape.

Recommendations

1. Develop clear ethical guidelines for AI training datasets.
2. Create international legal frameworks for authorship and copyright.
3. Promote AI literacy and prompt engineering in art education.
4. Implement transparency and attribution for AI-generated works.
5. Encourage collaboration among artists, developers, and policymakers.

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