

A Case Study of Creative Art Based on AI Generation Technology

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Abstract

In recent years, with the breakthrough of Artificial Intelligence (AI) technology in deep learning algorithms such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAE), AI generation technology has rapidly expanded in various sub-sectors in the art field. 2022 as the explosive year of AI-generated art, especially in the creation of AI-generated art creative design, many excellent works have been born, which has improved the work efficiency of art design. This study analyzed the application design characteristics of AI generation technology in two sub fields of artistic creative design of AI painting and AI animation production, and compares the differences between traditional painting and AI painting in the field of painting. Through the research of this paper, the advantages and problems in the process of AI creative design are summarized. Although AI art designs are affected by technical limitations, there are still flaws in artworks and practical problems such as copyright and income, but it provides a strong technical guarantee in the expansion of subdivisions of artistic innovation and technology integration, and has extremely high research value.

Keywords: *AI Generation Technology, Deep Learning Algorithms, AI Art Design, AI Painting, AI Animation Production*

1. Introduction

1.1 Research Background

As a new form of contemporary digital art, AI-generated art creation designs is mainly derived from the continuous development of artificial intelligence technology in the 1950s. The early forms of AI technology mainly focused on logical reasoning, expert systems, machine learning, natural language processing and other aspects. With the continuous expansion of AI technology, at present, AI technology has been widely used in many fields such as medical care, financial services, e-commerce, manufacturing, transportation and logistics, education, agricultural science and technology, art, and so on [1]. In recent years, with the breakthrough of AI

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technology in deep learning algorithms such as GANs and VAE, it has provided strong technical support for the application and expansion of AI technology in the field of art and design creation [2].

1.2 Research Purpose and Composition

The purpose of this study is to analyze the production methods and artistic characteristics of AI artworks through the study of the application cases of AI generation technology in the field of artistic creativity design, and to summarize the advantages and problems compared with traditional artistic creation. This study aims to explore and analyze the application potential and effect of AI in the field of art design through the study of creative design cases of AI-generated art. Figure 1 below is the research flow chart of this study.

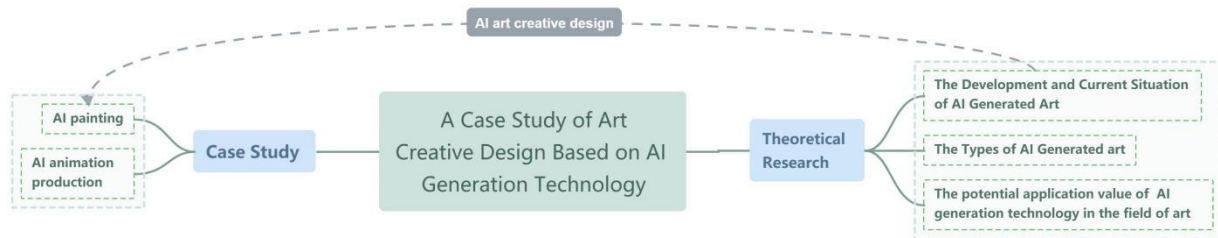


Figure 1. Research Process

2. Theoretical Research on AI Generative Art

2.1 The Development and Current Situation of AI Generated Art

In Figure 2, the origin of AI-generated art can be traced back to the 1950s. Under the joint research of computer experts and engineers, simple geometric figures and music can already be generated. Until the mid-1960s, as artists began to join the ranks of AI creation research, AI generated works of art began to gradually diversify and commercialize under the bidirectional integration of technology and art [3].

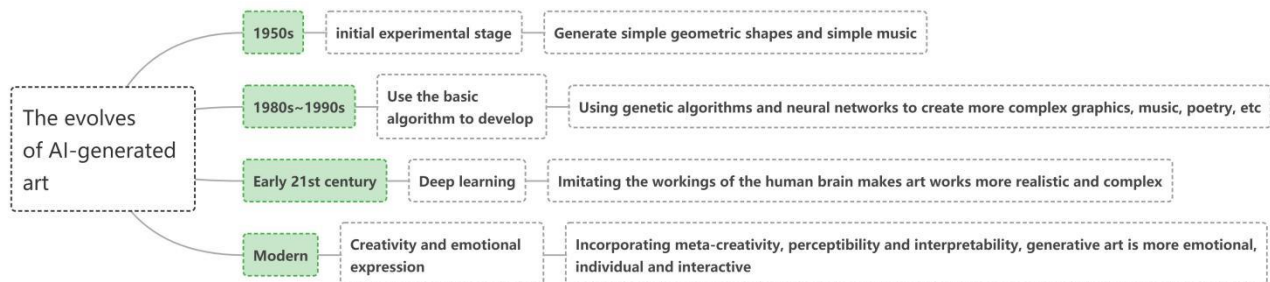


Figure 2. The Development of AI Generated Art

With the advancement of computer technology and the pursuit of artistic creative design content, AI-generated art after the 21st century has begun to develop in multiple directions such as emotion, automation, efficiency, and interactivity. In recent years, the rise of various AI art creation tools has provided artists with new creative methods and platforms. Due to the problems of copyright and interests when using AI to generate art, there are many evaluations and controversies about AI generated art in the society. Professionals are also conducting in-depth research and discussions.

2.2 The Types of AI Generated art

The continued expansion and extension of AI generation technology in the field of art makes the types of AI generation art also diversified. At present, it has been widely applied to sub industries such as AI painting, AI imaging, AI music, AI sculpture, AI poetry, and other art fields. Especially at the Christie's auction house in 2018, after the painting Portrait of Edmond Bellamy generated by AI technology brought huge benefits, the value of popular AI art industries such as AI painting was valued and widely used In the creation of commercial and personal enthusiasts.

2.3 The potential application value of AI generation technology in the field of art

As the current new generation of digital technology, AI has shown strong technical advantages and application prospects in various fields such as medical surgery, machinery manufacturing, transportation, aerospace, etc. But its creation in the field of art is still in its infancy [4]. AI technology takes intelligent algorithms as the core and integrates core technologies such as deep learning algorithms, neural network structures, natural language processing, speech recognition and more. Through the integration of digital art, interactive art, installation art, new media art and other diversified art forms [5], construct an art creation spaced with integrating innovation, scale and speed of artistic creation, personalized art experience, and expansion of artistic influence. These values to a certain extent help artistic creators expand their creative fields and enhance the efficiency of artistic creation.

3. The Study of AI Art Creative Design Case

Putting aside the potential for AI technology in other fields, in the process of cross-media art communication, AI connects with art activities through creative cooperation, creative assistance, artistic expression expansion, artistic research and exploration, etc. [6]. In the area of algorithms, under the influence of deep learning algorithms such as GANs, make the AI has shown outstanding capabilities in image generation and creative expression of AI art [7]. This study is based on deep learning frameworks such as GANs in AI, analyzes and studies the cases of artistic creative design in the two application directions of AI painting and AI animation production.

3.1 AI painting

Since October 2018, auction of an AI generated portrait painting “Portrait of Edmund Bellamy” at Christie's in New York sold for an astonishing price of \$432000, the AI painting method of the form of “Text Generation Picture” has begun to be used by the artist plunges into the study of the creative process [8]. Figure 3. For August 2022, American game designer Jason Allen used the AI drawing program Midjourney to generate an AI painting "Space Opera House" (“Théâtre D'opéra Spatial”) after nearly a thousand attempts. And this work won the champion of the digital art category in the art fair held in Colorado, USA [9]. As an overseas landmark event of AI art, whether it is color, composition or artistic innovation, it has reached the strength of traditional hand-painted paintings, and even surpassed traditional painting methods.

With the assistance of the AI painting programs, AI painting can be divided into three generations, namely the first generation represented by Disco Diffusion launched in March 2022, the second generation represented by midjourney in June 2022, and the third generation represented by STABLE DIFFUSION in August 2022. With the advancement of AI technology, the quality and speed of artwork generated by AI painting programs







have been rapidly improved. Among them, the AI painting program midjourney, which runs in the form of a painting chat robot on the server of the chat software Discord, has become the most widely used AI painting art creation tool due to its simple operation, accurate and beautiful generated works, fast generation speed, and rich and realistic images.



Figure 3. AI painting “Théâtre D'opéra Spatial”

Table 1 is the traditional famous paintings *Mona Lisa*, *Girl with a Pearl Earring* and *The Scream*, through used the AI painting tool midjourney, comparison of the characteristics of AI paintings created with different purposes.

Table 1. Comparison of Traditional Famous Paintings and AI Paintings

Name	Traditional famous paintings	AI Painting	Creative Purpose	Comparison of works features
'Mona Lisa'			Copy a high-definition version of Mona Lisa.	<ol style="list-style-type: none"> 1. Have extremely high similarity. 2. Traditional paintings have a sense of age, while AI paintings are clearer. 3. Compare with traditional painting, AI painting has deviations in detail processing and cannot achieve exactly the same effect.
'Girl With a Pearl Earring'			Change the Girl's face to Chinese.	<ol style="list-style-type: none"> 1. Have extremely high similarity. 2. The face of "Girl with a Pearl Earring" was successfully replaced with an Asian face 3. Traditional paintings have a sense of age and traditional hand-painted artistic sense. The digitalization of AI paintings is more serious
'The Scream'			Transforming the characters of 'The Scream' into 3D models.	<ol style="list-style-type: none"> 1. The similarity between character images and facial expressions is extremely high. 2. Traditional paintings are more artistic, while AI paintings are more interesting and realistic

3.2 AI Animation Production

The field of animation production based on AI generation technology is still in the exploratory and research stage compared to the universality of AI painting. Nevertheless, artists in the animation production industry are still trying to combine AI-generated image technology with traditional animation production methods to explore the possibility of AI-generated art being applied in the animation field. Among them, on January 31, 2023, the AI-generated animated short film *The Dog & The Boy* jointly created by Netflix, WIT STUDIO and Rinna was officially released [10]. This is also the first attempt on AI generation technology in the field of animation production. Although the content of the animation short film is only 3 minutes, it also confirms the possibility of the development of AI technology in the field of animation production.

The AI animated short film *The Dog & The Boy* were produced using a combination of traditional and digital technologies. In the process of character production and design, the traditional animation production method is still retained, while in the background production processes of the animation, the form of AI real-life generated images is used to create, and then through color adjustment and other post production techniques, combined with traditional production content to form a complete animated short film with the participation of AI technology.

Figure 4 is the scene image of the AI animation short film *The Dog & The Boy*. The content of the scene is the real world location. Therefore, it looks more realistic than traditional hand drawn, creating a sense of local atmosphere and immersing the audience in the story. This also lets the production team to create an AI-animated short film that is both visually stunning and emotionally resonant.



Figure 4. AI animation short film *The Dog & The Boy*

4. Research results

Although the artistic creative design based on AI generation technology has ushered in an explosion, there are still some technical and reality problems, and it is still lacking in popularization in the art field. Through research, it has been found that when using AI art creation tools for art designs, the work efficiency has been extensively improved, and accelerated the speed of artistic creation. AI works of art can integrate different artistic styles, and create artistic and creative to design works of integrated styles according to the needs of artists. And many AI-generated art works have reached a point where hand-painting cannot be completed or takes a long time. The accessibility of AI-generated art, also enables AI art enthusiasts in various fields to quickly integrate into the art creation circle. Because AI art creation tools still have technical deficiencies, many AI artworks have many flaws in detail or the digitalization phenomenon caused by the overly realistic

content is too serious. For example, although the background production of AI animation short film *The Dog & The Boy* has brought new technical experience and shock, it has also become a point of contention for many viewers because it is too realistic visually.

5. Conclusion

The practical application of AI generation technology in the field of painting has gradually matured. In addition to the economic benefits brought by the auction of AI paintings, its application in game development, virtual reality and augmented reality application development, interior design and architecture has improved the efficiency of commercial art creation. Especially in the development of game characters and scenes, it can quickly generate realistic virtual scenes and characters, reduce the difficulty of artistic creation, and present a stunning visual experience for the audience with unique artistic visual effects and artistic quality. Apart from technical limitations that result of flaws in the content of AI art creative design works and the inability to generate details entirely according to the designer's wishes, there are still controversies over practical issues such as intellectual property, copyright, and ethics [11]. Through the research of this paper, the practical problems and technical limitations of AI art are put aside, the AI animation derived from AI painting reflects the scalability of AI technology in other art fields. New media art developers can better try a new art expression and content research with the help of AI art creation tools, and continue to explore the development potential of the intersection and integration of art and AI technology in various design subdivisions.

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