Research on the Innovation of Art Design Products Based on the Concept of "AI" Boundary

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Abstract. With the gradual expansion of the field of artificial intelligence applications, human exploration of the unknown world and the limit field is also deepening, and people's lives and production methods have undergone tremendous changes. In the era of artificial intelligence, art will undoubtedly be greatly impacted, but more importantly, we need to see the new changes brought to art by the technological development in the era of artificial intelligence. Therefore, this article describes the development status of intelligent technology and art product design, and discusses the application examples of artificial intelligence technology in the art field. On this basis, with the concept of artificial intelligence boundary as the core, the innovative methods in the field of art product design are studied in depth.

Keywords: Boundary Concept, Collaborative Design Method, Artistic Innovation

1. Introduction

After more than 60 years of development, artificial intelligence has completed the leap between the two realms of learning and innovation, and has realized the closed loop of human creation in a unique, efficient, accurate and stable way. The innovative work of artificial intelligence first blossomed in the field of art creation, and it is now expanding to various practical fields at a rapid rate. Artificial intelligence and innovative design represent science and art respectively. They are constantly merging with each other. Under the background of integration of arts and science, art creators in various fields can well improve the efficiency and quality of design through artificial intelligence.

2. The development of artificial intelligence and art design

2.1. Overview of artificial intelligence

The concept of artificial intelligence, as people usually call it, is to use machines to achieve all tasks that can only be achieved with the help of human intelligence at present. At present, artificial intelligence
can be divided into strong artificial intelligence and weak artificial intelligence [1]. Strong artificial intelligence is like in science fiction movies. Machines can not only communicate with the world like humans, but also learn, reason and solve problems by themselves. However, due to technical limitations, computers do not fully possess the above capabilities, so the so-called weak artificial intelligence has appeared. Weak AI refers to AI that can only solve problems in specific fields, and it is difficult to reach the leading level in all fields. This is what experts call "transfer learning". The invention of the first neural network Perceptron in 1957 made the industry's attention to the artificial intelligence rise significantly, and artificial intelligence reached its first climax. The second climax of artificial intelligence is the BP algorithm. The emergence of this algorithm makes it possible to train large-scale neural networks, because the neural networks used in real tasks can only be trained with BP algorithm.

2.2. Overview of art product design

In the context of integration of design dematerialization and design model innovation, there are more and more needs and considerations in art design, and the boundaries of design objects are becoming more and more blurred and the content is more complicated. In addition, due to the continuous emergence of various media communication methods, it is difficult to solve the complex digital survival problems of modern society with the knowledge and skills of traditional single subjects. With the concept of intelligent design, art design is not only the expression of artistic creativity, but also more scientific. On the whole, the development of art design can be divided into two aspects, one is the innovation of the art design concept, the other is the improvement and optimization of design tools.

3. Integration of artificial intelligence and art design

3.1. The unique relationship between artificial intelligence and art design

Art design integrates knowledge from multiple fields. It contains not only aesthetic expression, but also logical thinking in philosophy [2]. Therefore, it is not only the process of artists' creation, but also the process of logical thinking. Because of this, under the promotion of the new era, art design and artificial intelligence have found a convergence point, and a series of ideas and applications of the combination of artificial intelligence and art design have emerged. As can be seen clearly from Figure 1, the art design process after the integration of artificial intelligence is greatly simplified. For example, intelligent computer graphics can be simulated as a series of mathematical operations, in which cognitive science and artificial intelligence provide a concept library for describing and designing graphics, and then automatic graphics can be realized according to the calculation model. The design method driven by artificial intelligence is one of the problems being discussed in the art circle. It can help designers get rid of the tedious design steps in some aspects. In the environment of artificial intelligence, whether it is the engineering design to find solutions to complex problems, or the art design of painting, artificial intelligence and design show good coordination.
3.2. The significance and advantages of AI technology in Art product design

Artificial intelligence also plays a role in the field of art production [3]. With the help of artificial intelligence, artists' creative thinking can generate very specific works of art, such as painting works generated by in-depth learning algorithm, artificial intelligence music composition, artificial intelligence poetry creation, which are all created with the computer as a creative tool under the promotion of our human subjective consciousness, which is the combination of human creativity and human writing design code.

1) AI technology can generate architectural design scheme. In June 2017, the artificial intelligence platform including intelligent design, building algorithm and big data analysis was officially launched. When users use this platform, they don't need to arrange the building layout, calculate the building quantity and draw the plan. They just need to input the demand, base conditions, plot ratio and other parameters, and the system can generate tens of thousands of plans based on them. Through the intelligent screening function after strengthening learning, the system can recommend multiple different design plans to users. It used to take a week or two to design, but now it can be finished in seconds.

2) Using artificial intelligence to create art posters. On April 27, 2017, Alibaba officially launched a new artificial intelligence system at the UCAN conference, which was specifically used to make posters. This system freed tens of millions of designers who stayed awake all night to retouch pictures. The work of "Lu Ban" consists of four components: designing the framework, selecting materials, acting, and evaluating network feedback.

3) Using artificial intelligence to design high-end clothing. On August 25, 2017, the Amazon announced an artificial intelligence algorithm for clothing design. This algorithm can automatically generate clothing styles by analysing a bunch of pictures, and then apply it to new clothing design projects. The Amazon's AI system will also carry out big data mining, analyse the new styles of clothing appearing on social media, and then actively create unique and tailor-made fashion products for users.

4. The innovative design method of art products based on AI boundary concept
Artificial intelligence has a significant impact on the art design industry. Compared with traditional design methods, art design integrated with artificial intelligence technology is more convenient and lower in cost \[4\]. At the same time, auxiliary tools led by artificial intelligence can make artists' creative quality and creative efficiency have been improved.

4.1. The collaborative design method under complex and diverse data

One of the most significant characteristics of the era of big data is quantitative thinking \[5\]. However, as an interdisciplinary subject integrating innovation and science, driven by huge and diverse data, the traditional design is obviously unable to cope with data processing. At the same time, there are a lot of repetitive work in the traditional design process. The designer's work time allocation percentage in a day is shown in Figure 2. Therefore, it is particularly important to use computers to deal with repetitive or fixed operations in batches.

![Figure 2. Designer's daily time allocation](image)

Efficiency is another important focus in big data thinking. The efficiency problems under the influence of big data are mainly manifested in fast data updating and short updating period. Although the traditional design has good performance and exquisite details, it takes too long for some "fast food" needs, and the energy consumption is not proportional to the demand. For example, posters and banners commonly used in the advertising industry or e-commerce often do not need excessively refined effects, but need to convey the needs as much as possible through a concise form of expression, so in this case, training the computer for smart poster design can help Designers deal with these rapid design tasks.

4.2. The personalized design method based on user psychoanalysis

On the one hand, design shapes the product image, on the other hand, it is a process to meet the needs of users. Nowadays, the society is rich in material and mature in technology, and the user group's expectation and demand for design products have changed a lot. The traditional way of design is more excellent in appearance, but consumers in the current era prefer its content and experience, so the design point of view has also shifted from the traditional focus on the surface of things to the level of both usability and practicality.

User needs are satisfied through the interaction between users and design products, that is, the subjective behaviour of users \[6\]. Traditional design tends to be more inclined to visual characteristics, the design concept and interaction mode of products, while modern design is not only a process of creation, but also adds a lot of extensible elements. In order to make designed products more targeted and practical, designers, decision makers and manufacturers need to collect user behaviour and other
information more effectively, improve the "temperature" of designed products, and show their concern for users.

4.3. The innovative design method of integration of fashion, culture and technology

Fashion is synonymous with vitality and competitiveness, and the advancement of artificial intelligence is subtly affecting the fashion circle. On the one hand, there will be more non-apparel users in fashion design, on the other hand, fashion brands can also use intelligent analysis technology to maintain understanding of sales trends, thereby adjusting marketing models and reducing unsalable products. With the change of people's aesthetic concept and consumption concept, fashion is no longer limited to those exaggerated and unique designs. More and more people consider integrating traditional cultural elements into fashion design, so as to better integrate traditional culture. The introduction of artificial intelligence makes the cultural inheritance more vibrant, and also makes the integration of traditional culture and modern society more adequate.

5. Conclusion

Artificial intelligence does have a certain impact on traditional art and traditional artists, but it also has a positive impact. The advancement of science and technology has not only caused a new spark between technology and art, but also promoted the generation of new art forms. At the same time, the integration of artificial intelligence and art design has also broken the pattern of traditional art, which gives art a more promising future. The endless creativity of artificial intelligence is amazing. With the change of people's aesthetic concept, the development of art will be closely combined with artificial intelligence. In this context, human beings are fully capable of creating a better "intelligent art" in the future.

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