Application of CAD in Modern Reconstruction of Chinese Traditional Lacquer Art

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Abstract: Under the background of the rapid development of modern science and technology, traditional lacquer art is in urgent need of modern transformation. From the perspective of modern reconstruction of traditional lacquer art, combined with the specific situation, this paper puts forward several ideas and ways of computer-aided design (CAD) in the development and application of lacquer art. By using virtual reality technology, 3D printing technology and computer style transfer algorithm, modern technology and traditional lacquer art are combined to explore the possibility of modern reconstruction of traditional lacquer art.

1. Introduction

Chinese traditional lacquer art has been the representative of China's advanced productivity and advanced tool technology since ancient times, condensing the highest achievements of China's culture and technology in various periods. With the rapid development of modern science and technology, facing the new challenges of the new era, the development of Chinese traditional lacquer art is facing many difficulties. As an important part of cultural and creative industries, it needs to adapt to the requirements of the digital era for transformation, introduce more scientific and technological innovation, and take the road of combining science and technology with art.

Computer-aided design plays an important role in the modern transformation process of traditional lacquer art. In practice, it can be intervened from the following aspects. First of all, virtual reality (VR) technology can be used to immerse in the experience of traditional lacquer art culture and explore the conjunction between traditional and contemporary cultural values. Secondly, 3D printing technology of lacquer matrix, as a new molding technology, can improve the production efficiency of lacquer products, and bring new technical means and development space for the development of lacquer. Thirdly, we can use the computer style transfer algorithm to explore the application of artificial intelligence in the innovation of surface pattern decoration of lacquer art through the collection of lacquer art techniques, the use of style transfer, and the computer molding calculation of lacquer art products [1].

Reasonable use of modern computer technology can improve the production and promotion of lacquer art, make lacquer art better show the spirit of the times, and help the inheritance and development of lacquer art. Chinese traditional lacquer art has a special significance for contemporary China. On the one hand, traditional Chinese lacquer art carries the important mission of recording history and inheriting culture, and plays a special role in the protection, inheritance and continuation of culture, and plays an important role in cultural representation. Traditional Chinese lacquer art also creates a window for foreign cultural exchange, which enables the world to understand China and plays a special role in the communication of international relations and cultural output. On the other hand, Chinese traditional lacquer art has great economic potential. On the way to the transformation of cultural and creative industries, there is a broad development world, which meets the growing spiritual and cultural needs of people.

2. Virtual Reality (VR) Technology Provides A New Way for the Modern Reconstruction of Traditional Lacquer Art.

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Virtual reality technology, referred to as VR technology, can play the role of immersive experience in the simulation of real space in the modern inheritance of traditional lacquer art, using advanced computing equipment to reproduce the highly realistic traditional way of life. By VR technology, users can interact with objects in the digital environment by means of visual, auditory, tactile and other sensory experience with the help of necessary equipment, so as to appreciate the charm of traditional lacquer art. In the creation of specific scenes, C4D, Unity, Maya and other software can be used to create the three-dimensional space of traditional lacquer art cultural scenes, making the users easier to perceive the charm of traditional lacquer art, explore the conjunction of traditional culture and modern cultural values, and achieve better cultural inheritance. Virtual reality technology can be widely used in museum virtual project, lacquer goods experience shop, etc. It is easier to have a full range of sensory experience of products in three-dimensional space. The multi-sensory experience created by virtual reality technology has many advantages in realizing the modern reconstruction of traditional lacquer art. First of all, it is easier to be understood by the public than simple text elaboration or commodity display. In the virtual space created by VR, the experiencer can well experience the charm of traditional lacquer art from the perspective of ancient creation, explore the reasons why traditional lacquer art has become a necessity of daily life, and find the root from the environment where it was born. Secondly, interactive experience can also stimulate the conceptual thinking activities of the experiencer. After experiencing the sensory experience brought by virtual lacquer products and traditional cultural environment, through the thinking process of association and reasoning, the reappearance scene in daily life can be predicted, so as to truly realize the realistic promotion of lacquer products. At the same time, the creation of virtual environment can also stimulate the curiosity of the experiencer, which can greatly mobilize the interest of the participants in this multi perception immersive experience. Finally, virtual reality technology also plays a certain feedback role. Through the virtual application preferences of many participants, designers can find a more acceptable design direction in traditional lacquer art, realize the optimization, elimination and redesign of traditional lacquer art products, and better adapt to the needs of modern fashion people.

In the field of modern reconstruction of traditional lacquer art, virtual reality technology can be applied to three aspects: museum-assisted exhibition of lacquer art relics, lacquer art commodity experience shop, lacquer art teaching. In museum application, the creation of virtual lacquer can make visitors experience the charm of traditional lacquerware and expand the intensity of lacquer knowledge dissemination. Visitors can contact exhibition objects closely through holographic projection and gesture interaction, and learn more about the details of traditional lacquer products through rotation, amplification and reduction. Because the unearthed lacquerware requires a high preservation environment, even a lot of lacquerware is still immersed in liquid, difficult to repair and reproduce, so it is very important to restore the original appearance of lacquerware by 3D scanning and modeling technology. Then, the computer-simulated lacquerware can be displayed to visitors by virtual reality technology, finally realizing the modern display with high technology. In the application of lacquer art shop, virtual reality technology is used to create a traditional living space. The advantage of this virtual experience is that it is free from the restriction of exhibition space and can create experience environment to the greatest extent, enabling consumers to experience lacquer art in virtual environment, promoting the return of traditional lacquerware to modern life, simultaneous interpreting and recognizing the values of traditional lacquer culture. Lacquer art culture developed from Chinese traditional art of creation has been closely related to people’s life at the beginning of its development. The blending and combination of specific utensils in the use constantly affect people’s thinking mode and behavior habits. Virtual space is to create such a blend environment, make daily lacquer build a bridge between life and art, and feel the temperature and beauty of life in practical lacquer. In terms of lacquer teaching and inheritance, participants can choose and experience in a wider range. Students can use virtual reality technology to experience the process of making lacquer products, learn a series of process flow from collection to production of lacquer, and from mold making to decoration of lacquerware. Virtual experience combined with practical teaching can not only broaden the knowledge structure of students, but also

establish a complete lacquer art cognitive system. Especially in the collection of lacquer raw materials, students rarely have the opportunity to go into the lacquer forest to practice the collection of lacquer. They often have a mysterious sense of the material. Through the virtual reality technology to create the relevant space, combined with text knowledge and teaching practice, we can achieve a better purpose of lacquer art teaching.

In order to better convey the value orientation of traditional lacquer art, we need to pay attention to the process construction when building the virtual reality model. First of all, we need to build the product model through the collection of materials, selection of display effect, system design, 3D scanning, 3D modeling and a series of processes. The design and development of the system can use foreign virtual reality technology software platforms such as Multi Genv EGA (real-time virtual reality for common vision and visual simulation applications), SGI Open GL Performer (strong scalability), World2World, etc. The Chinese platform also can be used, such as VR-Platform 3D interactive simulation platform independently developed by Beijing Zhongshidian Digital Technology Co., Ltd.

3. 3D Printing Technology Improves the Production Efficiency of Modern Lacquer Products

The development and evolution of traditional lacquer art is inseparable from the innovation of tools. The modern application of tools is the foundation to support the modernization and reconstruction of traditional lacquer art. The traditional manual production restricts the modernization and transformation of lacquer art. In order to build a modern and perfect lacquer art production process, the introduction of advanced computer production technology is imminent. Traditional lacquer production is divided into two processes: matrix production and surface modification. In matrix production, modern technology can be used to improve the production efficiency of lacquer products. For example, 3D printing technology can be used to make lacquer art tire bottom. As a new molding technology, it can improve the production efficiency of lacquer art, bring new technical means and development space for lacquer art.

3D printing technology is based on digital modeling, and then uses specific materials to build the shape of the object through the machine layer by layer. 3D printing technology is a new development mode of cultural and creative industry in which technology is applied to lacquer art. It shortens the production cycle of lacquer art products and reduces the labor cost of lacquer art product design and production. At the same time, it also breaks the limitations of lacquer art product matrix design, so that designers' creativity can be brought into full play. It no longer needs to consider the tedious and feasibility of matrix production, promotes the scheme to quickly form a commercial production scale and reduces complex processes and links [2].

In the process of 3D printing lacquer matrix, there are three common methods. The first FDM is to use PVC, ABS, metal wire and other composite materials, melt them at high temperature, and print according to the computer plan through layer-by-layer extrusion. This mode uses cheap material, has simple operation and low cost, but the molding speed is slow, not suitable for large-scale lacquer products. The second SLA is a 3D printing technology that appeared early and is widely used. Its main raw material is photosensitive resin, which has fast molding speed and high accuracy, but the cost of materials is high. The third SLS mainly uses powder materials, such as ceramic powder, polymer powder, etc., which can print products with high mass density and high precision [3].

4. Application of Computer Style Transfer Algorithm in Lacquer Art Innovation

Style transfer is a research focus in the field of computer graphics processing in recent years. It can be used in the pattern decoration of lacquer products. Reasonable use of style transfer algorithm can not only collect and save the traditional techniques of lacquer art, but also automatically transform the photos or images according to the reference image of lacquer art effect, so that the photos or images present the style of the reference lacquer art effect. This makes it easier to show the decorative effect of the surface of lacquer art. When designing products, designers who do not

understand the traditional lacquer art process can also better develop and design. The style transfer algorithm of computer plays a very good guiding role in the design of lacquer cultural and creative products, which is convenient for the design and application of lacquer surface decoration graphic effect. In the traditional pattern decoration effect of lacquer art, the style transfer algorithm based on image optimization can be used. The algorithm mainly obtains the content and style information from the content image and style image respectively, and then carries out image reconstruction to combine the two. It first collects several main techniques of traditional lacquer art, such as gold depiction, carving, covering lacquer, dill painting, inlay, etc., then collects the picture effects presented by different techniques, and then collects a large number of traditional lacquer decorative patterns. For the deep learning of artificial neural network, the more information, the higher the accuracy of analysis and reconstruction. Next, it summarizes the style image effect formed by various techniques, uses the style transfer algorithm to simulate the lacquer art effect. Using style transfer algorithm to realize the stylized simulation of traditional art of modern image is a new idea of introducing artificial intelligence technology into traditional lacquer art, which is bound to provide a broader development space in the modern reconstruction of traditional lacquer art.

5. Conclusion

Studies have shown that virtual reality technology, 3D printing technology and computer style migration algorithm will provide unlimited possibilities for traditional paint modernization.

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