

Digital Restoration and Production of "Qing Dynasty Flower Bonsai"

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Abstract

The Qing Dynasty flower bonsai is a digital restoration creation carried out through a complete digital media technology 3D modeling design process. It uses digital copying to replicate the complex handicrafts of the Qing Dynasty, such as the kiln transformation glaze pot jade lotus bonsai and the jade pot jade crabapple flower bonsai, allowing people to feel the charm and texture of the cultural relics on the computer screen. This creation will start from the role and significance of 3D digital restoration technology in the protection and development of cultural relics, as well as the promotion of ancient material culture. It will combine the emerging next-generation modeling technology with the aesthetic characteristics of ancient culture to produce model works that not only conform to the aesthetic characteristics of The Times of the cultural relics themselves but also meet the preferences and requirements of contemporary people.

Keywords

Digital media technology, Cultural heritage protection, Ornamental plant bonsai.

1. Introduction

China is an ancient civilization with a history of five thousand years. Cultural relics are the material culture of history, an important carrier of a rich and long history, a witness to the excellent Chinese culture and the spirit of history, and a bond that maintains national relations[1]. Protecting cultural relics and making their development conform to the development of The Times is an inevitable choice. This is conducive to inheriting China's excellent historical culture and improving the level of China's cultural development. Strengthening the national spiritual strength and maintaining cultural exchanges among countries are of positive and significant importance[2].

Strengthening the protection and preservation of cultural relics is conducive to the scientific research of archaeology in our country, thereby promoting the progress of modern cultural science and technology. The development of modern research on technical aesthetics and other aspects in our country cannot be separated from the knowledge collection based on the past historical culture. Strengthening the protection of cultural relics, delving deeply into the superb ancient craftsmanship and classic contemporary aesthetics of cultural relics, extracting their essence, and promoting the development of China's handicraft techniques, aesthetics and other artistic aspects is an inevitable trend of The Times[3]. This time, taking the important collection category of Qing Dynasty flower and bonsai located in the Palace Museum in Beijing as an example for creation, the focus will mainly be on the popular court flower and bonsai art of the Qing Dynasty. Through digital media technologies such as 3D modeling, texture mapping, and rendering, the Qing Dynasty flower and bonsai will be digitally restored, and finally, video and image displays will be made through rendering methods. During the creative process, efforts will be made to highlight the artistic sense, aesthetic appeal and classical charm of the cultural relics, thereby playing a more intuitive role in showcasing the charm of ancient culture. In the

long run, the development of digital cultural relics is conducive to the dissemination and development of ancient heritage culture and digital exhibitions of cultural relics in various regions.

2. Theory of Creation

Since the early Qing Dynasty, the cultivation of bonsai has flourished for a period of time. Many poets have praised bonsai highly, and some works have also discussed the art of bonsai. During the Qing Dynasty, a new type of lifelike bonsai emerged in the court life. It was artificially made by imitating natural landscapes with various precious materials[4]. Although this kind of lifelike court bonsai also pays attention to the artistry of layout and composition, it places more emphasis on the preciousness of materials and the symbolic meaning of landscape themes. In the court furnishings of the Qing Dynasty, lifelike bonsai made of gold, jade and jewelry were used to set off the magnificence of the court's living environment. In the northern regions where cold and hot seasons are distinct, these flowers, fruits, plants and trees in bonsai are always bright and eye-catching, often carrying obvious auspicious meanings and becoming an indispensable part of court culture. The bonsai preserved in the Forbidden City include those made in the Qing palace, those presented by local officials and those given by princes and ministers. These bonsai, due to their different production locations, reflect the aesthetic styles and craftsmanship characteristics of various regions. Due to the abundant resources of the Palace Museum, the bonsai made by the Qing Palace Museum were often piled with a large number of pearls and gemstones, with exquisite craftsmanship, beautiful landscape design and grand style, and were often of great value.

Before undertaking this digital restoration creation, it is necessary to have a profound understanding of the production process of digital cultural relic restoration, appreciate the significance of new era technology to the development of ancient material culture, and collect a large number of pictures and text information of Qing Dynasty flower and bonsai cultural relics, thereby understanding the size, material, style, age and history of the cultural relics. Therefore, what needs to be done is not only to realistically replicate the original cultural relics, It is also necessary to endow cultural relics with a style that combines the new era with ancient aesthetics, thereby creating unique digital restoration works that conform to the world cultural trend and follow classical aesthetics[5].

3. Production Process

3.1. Creative preparation

Theoretical research needs to provide documentary materials and specific picture and cultural relic data for creation. It is necessary to have a detailed understanding of the history, size, appearance and material of the cultural relics, thereby forming the overall framework of the creative process, preparing the required skills and software, and making a production plan. The creative process is mainly divided into three stages: the initial construction, the mid-term texture mapping, and the post-rendering, editing and production. How to complete the comprehensive display of cultural relics within the limited time, reflect the artistic style of the cultural relics, and at the same time restore the material structure and materials of the cultural relics is the key point of this production. The early-stage data collection, prop design and modeling production, the mid-stage extensive material drawing and texture mapping production, as well as the post-stage rendering, lighting, editing, 3D animation and other production processes all have a solid theoretical and practical foundation.

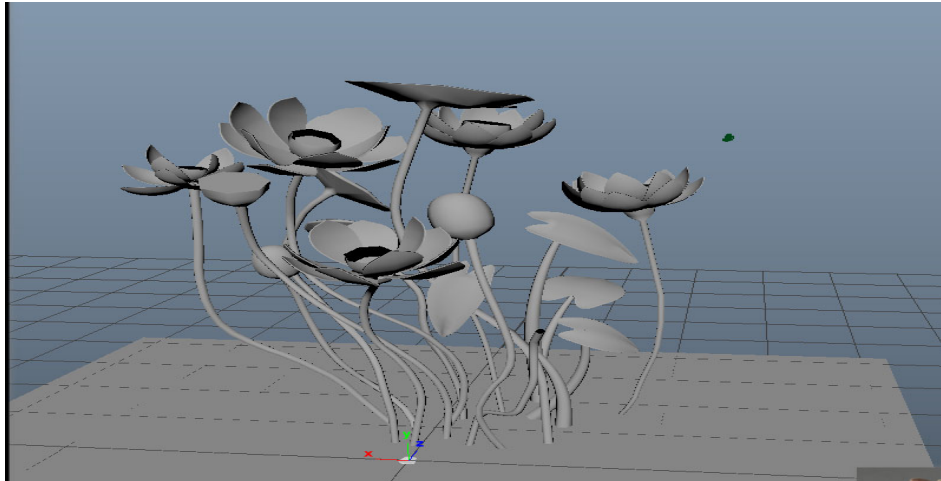


Figure 1. The Making of Maya

3.2. Pre-production

The most crucial part in the early planning and overall framework construction process is first to select cultural relics. Searching for feasible materials mainly relies on the cultural relic databases on the official websites of major museums in our country. The complexity of the structure and texture of the cultural relics affects whether the finished product meets the standards of the graduation project. Whether the time allocation for each step from modeling to the later stage is uniform. Whether the design can be completed on time and with quality, while also taking into account the performance of the computer, the Qing Dynasty flower bonsai, which has a complex branch structure, is chosen. However, the effect can be achieved with fewer facets by using soft and hard edges. The jewelry flowers in bonsai can also bring a fresh and luxurious color atmosphere. Secondly, after choosing the materials, start to copy the pictures of the cultural relics to build the basic type. The modeling is mainly made through software such as MAYA and 3DMax. Since this production is a digital restoration, it is necessary to replicate the exact structure of the cultural relics one-to-one. At the same time, the perspective problem caused by the camera used to shoot cultural relics should be considered. The production of flower branches mainly involves using spline lines and circular extrusion to form a cylinder, and then scaling the points, lines and surfaces to adjust it into a natural shape. When making branches, the focus should be placed on adjusting the curve angles of the branches from different perspectives, as well as avoiding overly hard edges that may cause distortion of the effect. Finally, apply a soft edge effect to each side's circular edge, which can achieve a false smooth effect with the least number of surfaces and reduce the operating pressure on the computer. The creation of flower petals and leaves first involves drawing the ideal shape in ps. Then, from the top view or front view perspective, edge shaping is carried out to create a plane and pull out the appropriate thickness. After that, the model is imported into Zbrush or the soft selection in MAYA is used to adjust the model to a more natural, irregular and soft shape. During the early production process, the biggest technical issue that cannot be ignored is the UV unfolding. The arrangement effect of UV has a significant impact on the texture baking and drawing of the model. Therefore, different material balls were given to models of different materials, and the materials of each component were drawn separately in the middle stage. This not only reduced the pressure on the computer CPU but also ensured the texture quality of the work. Finally, after arranging and combining the completed model materials and reasonably grouping them, import them into rizom for UV expansion. Then, texture creation can be carried out.

3.3. Mid-production

The mid-term production mainly involves the drawing and adjustment of textures through Substance Painter and PS. Before drawing textures, it is necessary to conduct material analysis for each material that is about to be copied. The glazed pot jade lotus bonsai mainly consists of jade lotus, porcelain lotus leaf, metal lotus branch and glazed flower pot. To reduce the burden of later rendering, some models of similar materials are placed in the same UV and then textures are drawn separately. The texture of lotus flowers mainly uses low-brightness colors, low-roughness materials and high-roughness dust materials, and creates some uneven noise points to make it more realistic. The patterns of lotus leaves are mainly hand-drawn to ensure the unevenness of line strength and a natural feel, and finally the dirty marks are drawn. The concave and convex points on the lotus branches are mainly created into uniform and clear patterns through the combination of black masks and filling effects. Finally, the production of the flowerpot employs a large number of bright color gradations, the superimposition of noise and uneven stripes, and the drawing of natural stains. The color of the jade pot and the jade crabapple flower bonsai has a more complex watercolor gradation effect compared to the jade lotus flower bonsai. The crabapple petals need to be combined and gradated with different shades, saturations, and warm and cool colors. This effect can be created by using different brushes. The same applies to the drawing of leaves, and hand-painted lines are added. After the texture drawing work is completed, the rendering work can be carried out. During the mid-term production, some rather challenging issues emerged. The model contains a large number of jade-like components, and the jade-like materials are mainly reflected through subsurface scattering materials. However, SSS materials require good computer equipment support, especially the CPU capability. Therefore, in order to reduce the burden of rendering and improve the production efficiency, The secondary surface materials are mainly reflected through different transparency stickers and curvature generators. The drawing of this texture has enabled me to accumulate more experience in material drawing.

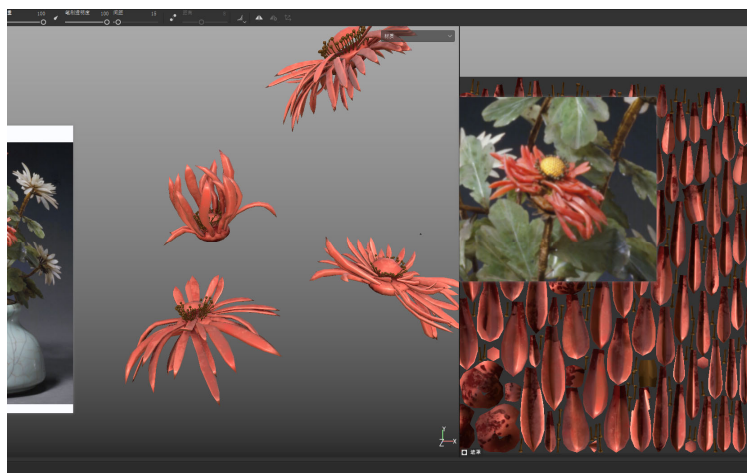


Figure 2. The drawing of textures

3.4. Post production

Post-production is mainly divided into two major parts: rendering and editing. It mainly uses the Vray rendering plugin of 3DMax, the 8Monkey renderer, the built-in rendering function of Substance Painter, as well as editing and post-production software such as PR and AE. Post-production often aims to make up for the deficiencies in the early and middle stages of production, enhance the style and effect of the work, and thereby achieve the purpose of restoring cultural relics, showcasing the aesthetic style of cultural relics, and promoting the excellent culture of cultural relics. First, place natural ambient light in 3DMax, then add V-Ray

lighting to refine, smooth and adjust the materials of the model. Because the Vray renderer is powerful, has exquisite effects but requires a lot of time, the 8Monkey renderer is the most cost-effective choice for rendering videos. Therefore, Vray rendering images and 8Monkey rendering videos are combined to export materials. After integrating the materials, they are imported into PR for editing. The visual language is combined with the background music and lighting to match the atmosphere of the cultural relics, thus conforming to the theme and purpose of this creation.



Figure 3. Picture rendering

4. Conclusion

Since the 21st century, China's economy and technology have developed rapidly, but its art and culture have gradually shown a state of deficiency. More and more artworks with unique aesthetics, unique thinking and unique significance have been created, rather than completely following the so-called trends of The Times and forgetting one's true passion and characteristics, and forgetting the artworks that the world really needs. A good work of art should not merely provide sensory stimulation to people, but rather possess beauty that stands the test of time. Moreover, when creating works of art, innovation should be carried out on the premise of respecting and inheriting history. Through continuous learning and self-improvement, one should gradually break through the established aesthetic boundaries and create distinctive artistic creations.

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