Design of Ancient Architecture and Characteristic Analysis based on 3D Multimedia Simulation

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Abstract: Multimedia technology has great significance for the protection and development of ancient buildings. In this paper, the author makes the design of ancient architecture and characteristic analysis based on 3D multimedia simulation. Digital 3D building model can be easily used to study and spread the value of these ancient buildings, and reduce the damage to the building. Through the analysis of the architectural style and artistic features of ancient buildings, we can see that the design of ancient buildings is more complex. Therefore, compared with the previous planar graphics, the computer simulation of 3D technology can be more intuitive to show the artistic features of ancient buildings.

Key words: Multimedia simulation, Ancient architecture, Digital technology, Architectural image

1. INTRODUCTION

The ancient building not only has a high historical value, artistic value, also has very high scientific value, is the example of the kind of scientific research history, is also an important reference design of new buildings and new artistic creation, many ancient buildings and gardens are important places for cultural tourism(Daiyong, 2015). Chinese ancient architecture is not only the crystallization of ancient China's great creation and wisdom, but also on China's ancient history, culture, art and science and technology development is extremely important materials. However, how to solve the contradiction between development and protection has been one of the major problems in the field of ancient architecture protection (Bo, 2013). The main contradiction between protection and development of the performance on the one hand, because the ancient building has unique scientific value, cultural value, cultural value, we must meet the eight visitors with an open attitude, show the cultural charm, the development of the tourism industry, scientific research and development of the national economy. On the other hand, in order to avoid and reduce the impact of wind and rain erosion, tourism and other ancient buildings, must be closed repair and protection.

With the continuous development of modern information technology, the new technology has emerged, and how to use these new technologies for the development and protection of ancient buildings has become an important research topic(Cheng, 2014). However, compared with the achievement of Architectural Technology in ancient China in ancient China advanced, information technology is relatively backward, also failed to fully reflect the great effect of modern technology on the preservation and development, and it is important for the exploration and research, its significance is obviously. Multimedia is a comprehensive and comprehensive information resources, which can be used to achieve any media resources in information dissemination. In fact, it is essentially a combination of computer technology, computer graphics, image processing, visual arts, music, art, education, psychology, artificial intelligence, information science, electronic science and technology of many disciplines and technologies, it combines text, graphics, images, sound, video images, 2D and 3D animation etc(Liangfeng, 2006; Qiang, 2014). The information in one, can fully mobilize the visual and auditory processing function. Digital 3D building model can be easily used to study and spread the value of these buildings, and reduce the man-made damage to the material. The combination of digital 3D building model and virtual reality technology can also be used for tourism development, virtual exhibition, and expand the economic benefits of tourism industry(Yongdong, 2015). Increase people's understanding of detail while reducing the amount of physical contact. Exquisite classical architecture has always been a hot spot for people to visit. The three-dimensional structure of the internal structure of ancient buildings, so that even if people can not personally experience can truly through the modern computer technology to the rapid and accurate display of these beautiful building.

2. DESIGN OF ANCIENT ARCHITECTURE BASED ON MULTIMEDIA SIMULATION

2.1. Digitalization of ancient buildings

The starting point of digitization and 3D reconstruction of ancient buildings is data acquisition. The traditional method is to collect and measure the data of the ancient buildings, and accumulate a lot of ancient building engineering drawings and documents. With the continuous use of digital cameras, the use of video cameras to record the two-dimensional image of ancient buildings is one of the basic data sources.
Figure 1. Digitalization of ancient buildings

- **Parametric 3D modeling of engineering structures**: China ancient buildings, especially the Ming and Qing Dynasties of ancient architecture, magnificent ancient appearance, but the structure is very complex. Specific information is difficult to fully describe the complex shape with a small amount of 2D and 3D model of engineering structure, is a digital representation of shape and internal structure relations of the ancient buildings, is a digital representation of the comprehensive information of real world ancient architectural shapes. Ancient buildings due to its characteristic of structure and material, than the modern architectural complex, especially with the brackets of the ancient buildings in Ming and Qing Dynasty is even more so. A single building, usually consists of tens of thousands of components, wood is usually between birch bases except the roof transfer curve is a parabola, often there are many kinds of animal shaped ornaments, which makes the ancient drawings to 3D modeling are very complex. How to use the rules of ancient architecture and contains a lot of semantic, the modeling of complex three-dimensional structure into the automatic modeling process and a small amount of data based on semantic parameters is one of the difficult and important method to solve the three-dimensional modeling of the ancient buildings. The 3D model of the ancient building structure based on the engineering drawing contains the image, intuitive and accurate digital information, which is of great significance to improve the modernization level of the digital protection of ancient buildings.

- **Three dimensional modelling technology of engineering structure based on feature recognition**: With the rapid development of the technology of computer aided design, computer aided design and construction of space, is one of the key technologies of 3D model space to establish product digital model with complete geometrical and topological information, to facilitate the extraction of molding characteristics, for the construction of further finite element analysis and optimization design, construction interference check support. On the other hand, the engineering drawing is an effective method to express the three-dimensional form in two dimensional view

- **Multi view point cloud splicing technology**: An optical scanner can be directly obtained within seconds of measured point cloud data of the object surface, but because the linear propagation of light, in a perspective of the scanner can only collect the data of the object surface to a part of the whole, the surface of the object data from a different perspective on objects in multiple measurements to complete each time scanning is carried out in the current coordinate system, so as to get the measured object data model, we need to identify a suitable coordinate transformation, will be obtained from each angle point set into a unified coordinate system, which is the point cloud registration.

- **Three dimensional model retrieval technology of ancient buildings**: With the development of Internet technology, there are more and more large scale 3D model data. The storage, retrieval, sharing and reuse of these data have become an urgent problem to be solved. In the field of pattern recognition, image, video and audio retrieval technology has made great progress. However, the 3D shape information retrieval technology started late at home and abroad has developed a prototype system of 3D model retrieval, but these researches mainly focus on the keyword based retrieval and low-level visual features based on 3D model.
2.2. 3D modeling based on image

Because the image of the image is a two-dimensional information, it is necessary to add additional information when it is transformed into the three-dimensional information of the entity model. At present, the main method is based on the multi vision theory, that is, the use of multiple image matching to achieve the reduction of three-dimensional information. However, this method requires a lot of manual intervention when the elements are matched between different images. Another algorithm is to use the information recorded on the image to calculate the depth of the object, so as to get the three-dimensional information of the object. This method is not only complex algorithm. And anti-interference ability, reliability and accuracy are low. At the same time, the texture image is extracted from the original image by using the technology of texture extraction, and then it is transformed to the corresponding surface of the formed 3D entity to form a realistic model. For different aspects of the entity to shoot pictures using the occluded part of 3D entity modeling, extracted information, and then the model of fusion and registration, so as to determine the three-dimensional full details of the rules for entity can use the principle of symmetry has been derived from the entity details to calculate the invisible part the details.

According to the modelling of active cues, it is to show that the human body is marked with stripes or shadows on the surface of the object. According to the modelling of passive cues, we use some features of objects in the scene to model, such as some geometric features and texture features. According to the characteristics of the objects in the image, it can reduce the preparation work before the image is obtained, so the method based on the passive clues is usually used in the modeling of image. According to the number of the images of different methods of modelling, the so-called passive modelling is divided into stereo images based on image sequence modelling based on single image based on several. The first two methods are the use of the same scene of the image of the two or more than two degrees of overlap with the image modeling, the typical process including camera calibration, image matching process. Single image based modeling is the use of known shape in the scene or some structural information, such as the scene in straight vertical or parallel relationship, to reconstruct the 3D model of objects from a single image.
3. DESIGN AND CHARACTERISTICS OF ANCIENT ARCHITECTURE

Architecture is the carrier of human history and culture, in any era, the building with its moving image to show its style, reflecting its tolerance of all kinds of information and content. The development of architecture is the symbol of human progress and civilization. The ancient architecture can be divided into seven systems, European architecture, China architecture, ancient Egyptian architecture, Islamic architecture, ancient architecture, ancient West Asia India buildings and ancient America building, some of them in the course of history or interrupted or not widely spread, the influence is in Europe, building two systems have been. In the long history of five thousand years, China ancestors created a shine with great splendor of architectural culture, Chinese architecture become an independent school in the east of the world. The broad and profound Chinese architectural culture in ancient times to China as the center, with Chinese style buildings, spread to Japan, Korea, Mongolia and Vietnam and other countries, the formation of the "Pan Asian architectural style have a unique style in the history of human civilization," wrote a glorious chapter. Chinese ancient buildings, can be roughly divided into the palace hall building, building ten types of defensive guard. Chinese ancient architecture has its own unique style, and it has become an important place in the history of World Architecture.

3.1. Building group layout

The ancient Chinese architecture system is mainly composed of wood frame structure. From the view of the building's shape, the basic principles of the layout of the flat and the elevation of the building are symmetrical, regular, and the quality and rigidity change evenly. Most of the layout symmetry way on the whole, the concise and to the point organization of space, important buildings in the courtyard as the basic unit, design along the transverse longitudinal axis, between the building groups combined against the side of the main building, highlighting the magnificent. The more important buildings are arranged in the longitudinal axis. The design of group layout to "room" as a unit composed of single building, the main hall, hall as the center, surrounded with walls, rooms, corridors and other single building and the composition of the courtyard, and then in the courtyard as a unit, consisting of various forms of group. The Imperial Palace in Beijing as an example, its general layout is arranged along the longitudinal north-south axis, with Tiananmen as the prelude, in three Hall climax, Jingshan Hill Temple tail, not only there is from the Lord, and consistent, coherent, is a good example of China Palace.
3.2. Modulus system

The system features China classical architecture is mainly reflected in the architecture and components of integrated shape. Li Mingzhong in the Song Dynasty in the create a French house, to ‘material ’ancestors, material into eight, the size of the house, and for the first time, "clearly put forward the" wood "as modulus and according to the building size, size, volume of material with different specifications". During the Song Dynasty, the material was divided into eight grades. The provisions of the building design efficiency is greatly improved, as long as the proposed building size, you can use the material to determine the size of convenience, not only conducive to the construction of the standardization and division of labor, but also conducive to the processing components, make the complex project can be completed in a relatively short period of time.

3.3. Building component

Ancient buildings due to its characteristic of structure and material, than the modern architectural complex, especially with the brackets of the ancient buildings in Ming and Qing Dynasty is even more so. A single building, usually consists of tens of thousands of components, wood is usually between birch bases except the roof transfer curve is a parabola, often there are many kinds of animal shaped ornaments, which makes the ancient drawings to 3D digital reconstruction are very complex. However, due to the single body of ancient building standard, therefore, whether the single building size, its appearance by the order of the basis, housing body and roof roof is composed of three parts, each part according to the status of the different standards and components

![Figure 6. The ancient building roof](image)

4. RECONSTRUCTION OF ANCIENT BUILDING STRUCTURE MODEL

The ancient building surveying and mapping engineering drawings generally include the general layout, floor plan, component size table drawings, each floor plan including zhuchu style size, wall column, stair railing carving etc.. In order to different semantic architecture mapping engineering drawing distinction, recognition and use of semantic information which we need the detailed research and analysis. The ancient map surveying and mapping engineering semantic information can generally be divided into graphic structure semantics, special symbol semantics, semantics and the dimension drawing information of four kinds of latent semantic.

The ancient and modern construction technology is not the same, but the general ancient age of the building, the lack of reference drawings. Usually organize relevant personnel to the surveying and mapping of ancient architecture, using the traditional method of the collected data is out plane, elevation and section drawings of ancient buildings, just flat lines and related text, can not give an intuitive feeling. If the mapping results according to the type of buildings, bucket mouth module, order type, base frame, roof form, based on the interpretation of ancient architecture engineering semantics, assembled into three-dimensional model, so that the ancient architecture mapping information contained in the 3D model, 3D digital model contains more information than 2D graphics, more close to people's daily life space, can accurate, image, rich record of the shape of the buildings appearance, architectural style, internal structure etc.
According to ancient maps for surveying and mapping engineering semantics, determine the type of construction, the main parameters and obtain the bucket mouth modulus, platform style, roof member and roof component, and then call the corresponding position parameters in the component library of 3D three-dimensional reconstruction of the 3D component to the architectural graphics, ancient architecture 3D model reconstruction project hierarchy.

Taking the typical building form of ancient architecture as an example to describe the reconstruction process. Determine the form and modulus of the building in the construction of ancient buildings in the process of building size is based on the strict modulus system. First of all, in the design of the building type dialog box to choose the building. The 3D model architecture mapping based on engineering drawing, contains all the project size and structure relationship of ancient buildings, can query the size of each part in each part, enlarge the details, according to the needs, can also be through the layer management, view, three-dimensional graphics output. You can also set the point of view, from different directions, height observation. It provides a new technical means for the reconstruction and repair of ancient architecture, which is used to represent the complex combination of parts and structure.
5. CONCLUSION

The 3D reconstruction of ancient buildings, has been a research hotspot in the field of the protection of ancient buildings, has a wide application prospect. However, compared with the achievement of Architectural Technology in ancient China in ancient China advanced, information technology is relatively backward, also failed to fully reflect the great effect of modern technology on the preservation and development, and it is important for the exploration and research, not only to ancient buildings, monuments and other cultural relics repair and restoration work fine, accurate, engineering based on real data to reduce people contact at the same time, increase the understanding of the details and virtual restoration construction remains the original appearance, can simulate the dynamic evolution process of the ancient date, for archaeological research and tourism to provide more information and vivid expression.

REFERENCES