

Study on Digital Protection Strategy of Ancient Architectural Heritage

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Abstract: Most of the traditional surveying and repairing means of ancient buildings are manual water measuring tools such as rulers and leveling instruments, but this kind of surveying means can not achieve a comprehensive understanding of the entire ancient buildings, and in the actual process of surveying and mapping due to human investment, it is inevitable to avoid direct contact with buildings in the actual surveying and mapping, which will lead to the damage of ancient buildings, and this behavior is far away from the original intention of protecting ancient buildings. With the development of computer technology, GPS and other advanced digital technology, the protection efficiency of ancient buildings will be greatly improved. The digital technology used at present will play an important role in the protection of ancient buildings. Therefore, this paper analyzes the significance and value of digital protection of ancient architectural heritage, and puts forward specific protection strategies in order to provide a new way of thinking.

Keywords: Ancient architecture; Architectural heritage; Digital protection; Strategy optimization

1. Introduction

The characteristics of ancient traditional architecture is mainly wooden frame, the particularity of materials for its protection and repair has brought a certain degree of difficulty [1,2]. Traditional conservation research lacks the accuracy and convenience of digital technology in the means, and the sharing and dissemination of research results are limited. With the development of surveying and mapping technology and computer virtual technology, 3D laser scanning technology and virtual reality technology are developing rapidly, which provides more advanced protection technology and means for ancient buildings. The traditional protection of ancient buildings is mostly done by artificial surveying and mapping, but it consumes huge manpower, material and financial resources in the actual surveying and mapping at the same time. Due to its high efficiency and accuracy, non-contact and fast completion, 3D scanning and other digital technologies will be widely used in the protection of ancient buildings. Digital protection is an emerging field in the protection of ancient buildings, and there are different understandings of the application of this technology from different perspectives [3]. First of all, the ancient architecture is a kind of non-renewable spiritual wealth, and because of the time, climate and hydrology change, the ancient architecture is being worn out a little bit. Therefore, it is necessary to survey, collect and preserve the structure of the ancient architecture and the relevant information in detail. Secondly, it is necessary to determine the structure and color of the virtual scene to form the best maintenance and repair program, so as to set up a comprehensive maintenance and repair plan

in the actual repair work. Thirdly, the application of digital concept and digital technology can improve the collection and collation of ancient architecture related information in detail and establish a complete database of ancient architecture. Finally, digital technology represents the development and progress of an era, and the application of digital protection technology in the protection of ancient buildings embodies the development and exploration of the way out in the digital era. To sum up, the digital protection of ancient buildings is to use digital ideas and methods of ancient building protection strategy and protection means constantly updated, using computer technology, artificial intelligence and other related building information collection and collation and the establishment of ancient building information database, only in this way can better protection, development and publicity of ancient buildings.

The research on architectural heritage protection based on digital technology has unique advantages. Firstly, it can store the related information of architectural heritage with digital signal for persistence. Secondly, it can display the destroyed architectural heritage very vividly through the technology of virtual restoration. Finally, it can collect a large number of excellent research cases and share them through the platform, so as to provide rich reference materials for the research on architectural heritage protection, the repair, development and utilization of architectural heritage. In a word, digital technology brings great convenience to the research of traditional architectural heritage protection. Based on the digital technology, it is very necessary and necessary to study the architectural heritage protection.

2. Value and Significance of Digital Protection of Ancient Architectural Heritage

The existence of intangible cultural heritage is worrying, and it is in urgent need of salvage protection by digital means. With the acceleration of urbanization, people's way of production and life has changed significantly, and the cultural ecological environment on which the intangible cultural heritage relies for existence is deteriorating day by day. In the face of this severe situation, it is urgent to adopt digital technology to record the endangered intangible cultural heritage projects and the elderly inheritors systematically and completely. It is necessary to apply digital technology to record, reproduce and transmit intangible cultural heritage. In the past, the traditional way of recording was based on words and pictures, so it was difficult to record and reproduce the whole process of art and activity. Adopting advanced digital image, 3D animation, virtual reality and other technologies, we can record and save the heritage information realistically, effectively, comprehensively and completely, and strengthen the accuracy, authenticity and recoverability of the recorded content. The formation of digital resources, but also to break the tradition of oral and heart-to-heart teaching-based inheritance of the single and fuzzy, intuitive and vivid digital resources for large-scale teaching, is conducive to heritage inheritance and dissemination. Previous protection work, especially the census work has gathered a large number of data and information need unified information management, otherwise it is difficult to query and use, but also unable to share resources. Traditional media covering manuscripts, sound recordings, video recordings, physical objects and other media take up a large amount of space and are difficult to copy and carry. Early materials stored in old media are easy to be damaged or lost if not properly preserved. The application of digital technology can convert these resources into data, save space, achieve large-scale storage, and enhance the convenience of replication and retrieval applications.

2.1. Role of protection of ancient architectural heritage

(1) Where architectural heritage has undergone the baptism of years and has been damaged to varying degrees or has become a site, a series of standardized collection, processing, storage and presentation of architectural heritage entities themselves, various historical materials and other relevant information and materials shall be carried out by means of digital technology. The historical evolution of architectural heritage will be sorted out and inherited in an orderly way, and the painful historical experience and lessons from the destruction of architectural heritage will be absorbed to restore and extend the historical context of the city and enrich the graphic

and historical materials of ancient buildings. In addition, through the construction heritage information model and historical knowledge base of other construction heritage protection, repair, development, research and other programs to provide valuable reference.

(2) Digital virtual restoration technology has now been widely used in the study of architectural heritage protection. More and more people are familiar with and recognize the architectural heritage by using more and more methods to visualize the architectural heritage. Specifically, through the study of virtual restoration of ancient architectural heritage, to trace back to the history of ancient architecture, from the perspective of architectural culture to show its social features and historical culture.

(3) Research on digitization and virtual restoration deserves significant development and promotion, one of the important reasons being that it is an accurate and safe research tool for ancient architectural heritage. After digitized information collection of ancient architectural heritage, it can be far away from the site of heritage research. Digital information collection is accurate and convenient, and off-site research is one of the safest ways to secure a fragile architectural heritage.

2.2. Implications for tourism and regional economies

On the basis of digital technology such as computer and Internet, combining the characteristics of local architectural cultural heritage, we can explore the new forms of tourism cultural resources. For example, an attempt could be made to set up digital sites for virtual tours of architectural heritage, which would break the traditional pattern of tourism services, disseminate and promote traditional culture, complement traditional tourism and jointly promote the coordinated development of the local regional economy.

2.3. Implications for others

The research results can also form a platform for experts and scholars in the field of architectural heritage protection to exchange and study, and provide schools with rich cases and practices of architectural heritage protection, as well as reference for relevant architectural heritage protection units in practice. At the same time, many achievements of virtual restoration can also arouse more people's interest in architectural heritage and related traditional culture, and form the consciousness of consciously protecting historical and cultural heritage.

It can be seen from this that digital protection is a necessary step for the protection of ancient architectural heritage. Through digital recording, storage and database management, we can promote the protection, inheritance and utilization of intangible cultural heritage in an all-round and integral way.

3. Major Problems in Digital Protection of Ancient Architectural Heritage

Due to the late implementation of the digital protection of ancient architectural heritage in China, although some achievements have been made in various regions, the foundation is weak, and there are some prominent problems, which are specifically stated as follows: (1) Most of the digital protection of ancient architectural heritage is in the primary stage of information arrangement and management, and no systematic and complete work mode has been established; (2) The lack of a unified standard and specification system for the digital protection of ancient architectural heritage seriously restricts the interconnection of information and the sharing and integration of data resources; (3) The existing digital protection means list, lack of auxiliary decision-making ability to provide data support, lack of network publicity and exhibition channels, and poor display of digital resources, and the transmission mechanism and new scientific research mode based on this have not been established; (4) The construction of the database group of ancient architectural heritage based on the general survey database is lack of infrastructure, and the construction of the relevant IT basic platform and the special equipment for collection and processing needs to be strengthened; (5) The shortage of compound talents with both business quality and professional skills; and (6) The definition of the relevant regulations on the digital protection of ancient architectural heritage, especially the standards, is insufficient in terms of policy support.

4. Digital Protection Strategy for Ancient Architectural Heritage

4.1. Establishment of an ancient building information system

Ancient buildings, which have been accumulated for thousands of years, contain abundant information, and these information should be classified and analyzed by different information frameworks.

- (1) The physical and written information of ancient buildings shall be established;
- (2) Establishing the design and construction framework information of ancient buildings;
- (3) Information framework shall be established according to different systems of ancient buildings. For example, according to the structural system to establish a framework, can be based on decorative characteristics and style to establish an information framework, the use of space to establish an information framework;
- (4) An information framework can be established according to the conditions of the ancient buildings in different historical periods;

(5) Establishing different information frameworks for different clients. Only through continuous exploration, mining and updating, can the information of ancient buildings be updated, modified, supplemented and looked back, so as to control the ancient buildings and facilitate the restoration and protection in the future.

The specific system design includes the following three aspects:

(1) Geographic information system, including graphic database and attribute database, mainly collects, stores and manages Geographic information. It can be used as the data base of ancient architectural complex, and it constantly provides data as the basic information of analysis and display for ancient architectural analysis system.

(2) Professional information system of ancient architecture protection, including ancient architecture design database, professional laws and regulations database, historical architecture element database, mainly undertaking the determination of ancient architecture restoration scheme, and giving out different design schemes for selection.

(3) Environmental display and analysis system is an important core of the whole system. Firstly, it establishes virtual environment based on the spatial data of ancient architectural heritage provided by GIS to provide the basis for analysis of ancient buildings. Then, according to these information, it compares the elements of historical buildings, carries out professional analysis on the construction method, and combines these data with historical data to establish the restoration evaluation system of ancient buildings for the protection of ancient buildings in the future.

4.2 Three-dimensional laser scanning technology to complete the structural data of ancient buildings

Three-dimensional laser scanning technology is the laser pulse encountered obstacles reflected back after the time of a mapping method to measure the distance, this mapping method can be achieved more than cm distance mapping. The actual distance of building can be measured by 3D scanning technology, and the horizontal and vertical elevation of building can be measured, which will realize the relative position of building. The greatest advantage of this technique over conventional techniques is the ability to measure and model complex surfaces accurately and quickly, without contact, and to provide up-to-date information on the protection of ancient buildings.

4.3 Virtual reality technology for modeling ancient buildings

Virtual reality technology is a kind of cross technology. The technology uses computer software to simulate reality, which can create realistic or imaginary objects that

are stimulated by human senses. Applying the simulation technology of virtual reality to the protection of ancient buildings, visitors can not only understand the structure, charm and grandeur of ancient buildings in more detail, but also understand the buildings more intuitively, so as to make rational protection decisions based on the actual data.

4.4. Establishment of digital virtual cultural experience museum of ancient architecture

Only in this way can the experiencer achieve a kind of aesthetic enjoyment by arousing the psychological resonance of the experiencer through the experience and feeling of the virtual ancient buildings. While realizing the magnificence of ancient architecture, it is also necessary to stimulate the experience through the use of background music, acoustics and character dubbing to heighten the reality of the experience.

5. Conclusions

At present, the protection of ancient architectural heritage in our country has gradually moved from a single project protection to a new stage of overall protection, scientific protection and legal protection. With the deepening of the work, strengthening the integration of

technology and culture, the use of digital protection, protection has gradually become an inevitable trend.

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