Landscape Protection of Local Architectural Heritage in Liaoshen Area Based on Digital Technology

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Abstract: The protection of cultural landscape mainly consists of two parts: historical landscape protection management and restoration and natural ecological protection management and maintenance. The protection based on heritage site is a kind of dynamic heritage protection, and it is the protection in the development of the place where the heritage depends. Under the premise of the continuous development of social economy, digital technology has been widely used in the protection of local buildings, and has played a more and more key role. Using modern information technology to study and protect vernacular architecture can provide important information data for the research and excavation of Chinese historical and cultural heritage, and can also formulate and implement better protection measures for vernacular architecture. Based on this, this paper makes an in-depth analysis of the application of digital technology in landscape protection of local architectural heritage in Liaoshen area from various angles and levels.

1. Introduction

The reason why we pay attention to architectural heritage is that architecture reflects the humanistic concept and has changed from the original ancestral private property to a public and spiritual historical wealth [1]. These local buildings are all building craftsmen and architects spontaneously formed by local ordinary people. Local architecture is a product of the combination of native folk culture and traditional crafts. As an important part of local culture, traditional vernacular architecture is an important material and cultural carrier of society [2].

However, with the rapid advancement of urbanization and new rural construction planning, the local cultural landscape has also been impacted unprecedentedly [3]. With the continuous growth of population, the deterioration of ecological environment, the lack of folk customs, and the changes of people's traditional lifestyle, the local flavor, local charm and cultural landscape have been damaged. The purpose of this paper is to make relevant analysis and research on the construction and protection status of local cultural landscape in Liaoning and Shenyang. Based on digital technology, through the analysis and research on the elements of local cultural landscape, the problems existing in local cultural landscape are found and the corresponding feasible protection methods are put forward.

2. Local culture and local architecture

2.1. Local culture

Local culture is the natural product of the combination of local culture. Native land is a place where people give their strong feelings to their birthplace and live and integrate into it for a long time, which is recognized by local people. Native land is the continuous accumulation of survival experience in people's life; Native land is an act of mutual trust and cooperation between people. Native land is inherited from one generation to another, and it is the land where people were born and died.

Local culture, which combines the elaboration of scholars from all over the world and the research content of this paper, refers to the place where people give strong feelings to the nature, history, humanities and landscape of the birthplace and the area where they live and live for a long

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time and are recognized, which is recognized by local people.

2.2. Local architecture

Local architecture is the stage and material environment of local life, and it is the most ubiquitous and informative component of local culture [4]. Generally speaking, local architecture, that is, the living and production facilities handed down from generation to generation by local residents, exists for the needs of local life and is an effective means to adapt to natural economic life for a long time. Most of the vernacular architecture takes the vernacular settlement as its basic mode of existence, mainly showing five forms: residence, ancestral hall, cultural and educational buildings, temples and other buildings.

The essence of vernacular architecture is "architecture without architects" formed by people who are forced to improve their living environment, adapt to the natural environment, and accumulate life experience for generations. Rural environment is the soil where local architecture exists, and it also breeds local architects. The total number of houses there is not much, and the atmosphere of knowledge is conservative and dogmatic; Art is a folk art with little change, which usually takes hundreds of years to change [5]. Under such conditions, local architecture is almost completely suitable for local base conditions (climate) and building materials, etc. Their construction is just like the growth of plants. Although they are constantly multiplying, more and more similar leaves and flowers grow out.

At present, the protection practice of vernacular architecture in China mainly follows the relevant legal documents on the protection of Chinese cultural relics. This paper defines the concept of local architectural heritage: as small as a single building, as large as a settlement environment, or even a historical area of a town; It includes not only the physical heritage of local architecture, but also the intangible cultural heritage of local tradition.

3. Restrictive factors of temple building protection and inheritance in Liaoshen area

3.1. Temple building itself

(1) Natural damage is serious

Like other vernacular buildings in China, ancestral temple buildings are civil structures. In addition, they have been built for a long time, and there are common problems in the cultural heritage of vernacular buildings. For example, long-term exposure to wind, rain and climate changes in temples and temples will easily lead to deterioration, cracking and shedding of painted wood components on buildings, and at the same time, it will also cause problems of long grass and rain leakage on roofs. However, due to the influence of geological action for a long time, it is easy to cause ground subsidence and crack the walls of ancestral temple buildings [6]. Because there is no one to look at it, and no one to repair it, this will further increase the hidden dangers, and eventually make the temple buildings more dilapidated and finally become dangerous buildings.

(2) Loss of function

Because of historical reasons, most of the temple buildings have lost their original functions and are now in an abandoned state. This has caused the temple buildings to be left unattended for a long time, let alone maintained, thus speeding up the destruction due to disrepair. There is even a kind of temple that has collapsed because of disrepair and no one cares about it.

(3) Lack of information

When a building is built, it mainly depends on the building skills mastered by folk craftsmen, but most of these craftsmen can only build it, but cannot record it. Therefore, there is no relevant information about the building methods and architectural forms of temples and temples. As a result, after the building itself is damaged or collapsed, there is no relevant basis for repair.

3.2. Management aspect

(1) Not taken seriously

Because of the large number of cultural relics buildings and the limited manpower of cultural

relics departments, some cultural relics buildings cannot be maintained and protected in time. Among them, the temple buildings in the villages are in a state of unsupervised and protected all the year round because of their low protection level and remote location, which is limited by factors such as capital and manpower. As a result, these temple buildings are constantly exposed to the wind, sun and rain, and the building itself is dilapidated, which seriously damages the safety of cultural relics buildings.

(2) Imperfect management

Besides objective factors such as manpower and capital, the imperfection of management system is another factor that restricts the protection of temples and temples. Ancestral temple buildings are scattered and relatively remote, which objectively makes the management work difficult. Even those temples and temples with better preservation and higher protection level are similar to religious buildings, but their folk beliefs are different from religions. The unclear and mixed relationship between religion and feudal superstition also makes the management of temple buildings more difficult.

(3) There are cognitive biases

As a place of folk belief, the view of folk belief will directly affect the attitude towards temple architecture. For a long time, many people regard folk beliefs as "feudal superstitions" in nature, and put them into suppression, while they think that folk beliefs have become a dead culture or a dying cultural phenomenon in form. Most of them only have contact with grassroots people. Many people think that this is a kind of culture at the bottom of agricultural society. They think that the temple architecture is not important, and the research on it is of little significance. Both misunderstanding and contempt of ancestral temple buildings lead to the fact that these local buildings bearing folk culture are not given due attention, and naturally they are ignored when they are damaged.

4. Significance of digital technology in the protection of vernacular architecture

According to the previous investigation of local architecture in China, it can be seen that this kind of architecture is fragile in texture and vulnerable to the influence of current climate conditions. At the same time, there will be some unpredictable natural disasters, which will cause damage to some local buildings, but the number of craftsmen who can master exquisite craftsmanship is decreasing. The traditional significance of the protection of vernacular architecture includes the following aspects [7]: (1) Protecting vernacular architecture can protect Chinese traditional culture; (2) Protecting local architecture can respect the oriental architectural style; (3) Protect local buildings to inherit historical data.

With the development of science and technology in China, the development of photography and other technologies can provide us with better technical means to protect local buildings, create good conditions for their long-term preservation, and better complete the restoration, reconstruction and information preservation of local buildings. Therefore, digital technology has important practical significance for the protection of local architecture in China.

5. Application of digital technology in landscape protection of local architectural heritage in liaoshen area

5.1. Acquisition of local architecture data information

In the acquisition of traditional vernacular architecture information, the surveying and mapping method is realized by measuring with basic tools such as steel ruler and level gauge, and then the linear characteristic map is drawn according to the measured actual data combined with the relevant geometric relations. The traditional method is not only inefficient, low in measurement accuracy, but also time-consuming, and a building needs a lot of manpower and energy to complete.

In this paper, the temple buildings in liaoshen area are taken as an example, the point cloud data is obtained by Faro Focus 3D X330 3d laser scanner, then the data format is converted by Autodesk

Recap software, and then the "family" model of local building components is established by Autodesk Revit software, and then the BIM 3d model is established. the technical process is shown in Figure 1.

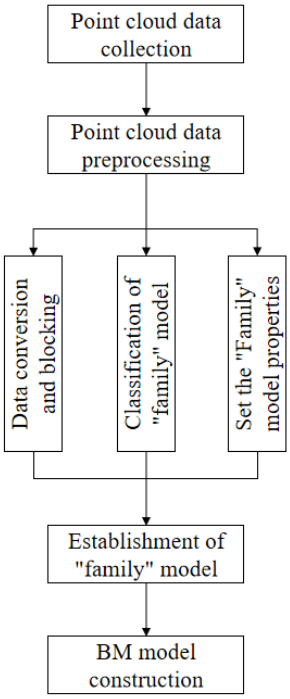

Figure 1 Establishment process of BIM model of vernacular architecture based on point cloud

The application of digital technology has solved this problem well. By using GPS, total station, modern measuring instruments, combined with photographic imaging technology, 3D laser technology and scanning technology, we can carry out in-depth and accurate measurement of places that cannot be achieved in traditional measurement, go deep into any complex field environment to carry out work, and then obtain accurate measurement data, which can be transmitted to the computer storage system synchronously to facilitate the establishment of the later database. Once measured, these data will become permanent digital resources of local buildings [8].

5.2. Digital preservation

The development of digital technology promotes the emergence of various image and graphics technologies, including various storage means and technologies. Under the influence of current preservation technology, laser scanning can be used to record the subtle features of vernacular architecture, such as cracks on the surface of vernacular architecture. Through the local architecture photos captured by laser, the time of laser refraction is analyzed, and the relevant software is used to deal with them accordingly, finally forming various software processing methods.

Digital preservation refers to the high-precision acquisition and preservation of information such as the graphic structure and texture of vernacular architecture obtained from advanced 2D and 3D scanning, digital photography, 3D modeling and image processing. In this process, the digital modeling function of computer should be used. High-precision information data preservation can provide powerful information for the protection and research of rural buildings, and can provide effective original data for the management and supervision of rural buildings, which sublimates the utilization value of various data.

5.3. Digital supervision and management of vernacular architecture

Local architecture is an important part of national cultural construction, and the protection of local architecture not only plays an important role in cultural construction, but also contributes to the protection of ecological environment, so it has multiple cultural, ecological and economic meanings for the countryside.

The protection of vernacular architecture is an important part of the whole social activities and decision-making. Therefore, we must persist in systematic thinking and methods, rely on digital image processing technology, comprehensively analyze and compare the digital system & prime; s own software with reference images according to the color, shape characteristics, arts and sciences of the building images to be detected, count the damage of cultural relics in different local buildings, and adopt effective protection and repair methods. Relevant experts can repair the decay or damage degree of local buildings through the information recorded in the database.

5.4. Virtual museum

With the rapid development of information technology, the virtual digital museum is constructed by using virtual reality technology and network technology, which breaks the limitations of physical museums, greatly expands the extension space of museums and maximizes the functions of museums. With the help of computers, people can better reproduce history, simulate realistic scenes through various virtual reality technologies, and achieve high fidelity in images and sounds.

Digitalization is to transform many complicated and changeable information into measurable numbers and data, and then build an appropriate digital model with these numbers and data, and transform them into a series of binary codes, which are introduced into the computer for unified processing. Today, with the development of Internet technology, high technology has brought us to an era of media integration with fast communication, wide audience and multi-point interaction. With the development of mass communication, everyone is both a receiver and a disseminator of information. Fig. 2 shows the structure system of digital protection mode of local architectural culture in Liaoshen area.

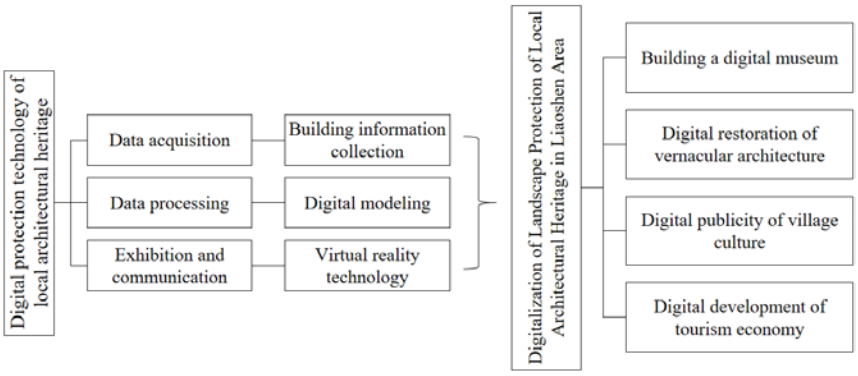

Figure 2 Digital model structure system of landscape protection of local architectural heritage in Liaoshen area

In digital museums, the exhibits in traditional museums can now be presented clearly and in detail to readers with a click of a mouse. Using virtual reality technology, people can roam in virtual museums and browse rare architectural monuments without leaving home. This is the embodiment of the combination of vernacular architecture protection and digital technology in the digital age, and it is also the era characteristic of vernacular architecture protection.

5.5. Virtual repair and recovery

Through the use of computer technology, we can carry out image processing and information transformation on damaged ancient buildings, including various traditional cultural relics protection and restoration work, and form a scientific and reasonable protection concept. According to the information data of various vernacular buildings that have been preserved at present, the protection and utilization of various resources are promoted, and finally the development of artificial intelligence is promoted, including the repair and restoration of the current vernacular buildings, realizing the restoration of the final appearance and improving the protection level of vernacular buildings.

6. Conclusion

The practice of protecting local architectural heritage is not a new topic. But at present, it is a hot topic, because with the continuous development of social economy, the rapid development of urban culture and the constant impact of local culture, people are bound to pay attention to the local architectural heritage; The digital age provides a new modern technology for the protection of rural vernacular architecture, promotes the preservation and restoration of vernacular architecture, and provides more convenience for the design and creation of modern architects. Nowadays, the development of science and technology is the theme of the times. Using digital technology to better protect the traditional village culture and record the data of the material and intangible cultural heritage of traditional villages, traditional handicrafts, traditional cuisine, local architecture and ancient sites are still playing a vigorous "vitality" regardless of generations. With the advent of the 5G era, it is no longer far away for the "cloud" side to feel the local culture.

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