

Research on 3d Visualization of Historical Building Heritage Based on Big Data

LiYe¹, WeiWu^{1,*}

¹He Xiangning College of Art and Design, Zhongkai University of Agriculture and Engineering,
Guangzhou, Guangdong, China, 506813

Article Info

Volume 83

Page Number: 5887 - 5894

Publication Issue:

July - August 2020

Abstract

Generally speaking, the development and protection of the cultural heritage of historical buildings are relatively contradictory. However, how to develop new resources from this culture, and how to protect and use these resources has become a key issue in current practice. The author through the analysis of the research literature of the scholars, for the history of architectural culture heritage, the potential value of gradually and analyzing historical heritage related tourism value of architectural culture, after pointed out that the cultural heritage of the historic buildings important resource, for its do to analyze the interaction between culture and economy, and analysis shows that tourism development is the necessary features to protect and pass on their heritage.

Article History

Article Received: 25 April 2020

Revised: 29 May 2020

Accepted: 20 June 2020

Publication: 28 August 2020

Keywords: Visualization, Historic Buildings, Cultural Heritage, Applicability;

1. Introduction

Three-dimensional visualization of historic buildings means to enhance the use value of buildings through the planning, connection and layout processing of buildings' functions. On the other hand, the 3d visualization of historical buildings is based on the actual use value of buildings, and some practical functions of buildings are created from the aspects of architectural form and location characteristics. Building big data design is an organic combination of building users' imagination and creativity on the basis of 3d visualization of historical buildings and the use of various current resources and building technologies. It can effectively complete the spatial construction and plane layout of buildings^[1]. A good building big data design can realize the social and individual efficacy of the building, which has an important impact on the success of the overall design of the building.

1. The purpose of 3d visualization of historical buildings and some functions of its realization

1.1. Purpose of 3d visualization of historical buildings

The purpose of 3d visualization of historical buildings is to improve the functional value of buildings, and different functional requirements of buildings can be realized through reasonable layout planning and appropriate optimization and adjustment.

1.2. The role of 3d visualization of historical buildings

Three-dimensional visualization of historical buildings is carried out on the basis of comprehensive design of buildings, and is a guarantee for the smooth construction of buildings. Its value lies in the realization of functional goals of buildings. The basic

condition of building big data design lies in the 3d visualization of historical buildings. On the one hand, the planning of the building itself needs to follow the principle of sustainable development; on the other hand, the planning of the building needs to carry out the three-dimensional visualization of the whole historical building from the aspects of time, design and planning scheme.

2.2.1. Shorten the design time of building big data and simplify the design process.

A good 3D visualization of historical buildings can make an overall analysis of the buildings in advance and simplify the design bidding process to a certain degree. However, for building big data design, it achieves the dual goals of low consumption and high efficiency, as shown in Figure 1 below:



Figure 1 A representative historical architectural heritage scene.

2.2.2. The overall forward-looking stage of big data design

Different from design, 3d visualization of historical buildings should not only consider the needs of current construction period, but also provide space for future development and renovation of buildings.



Figure 2.3D design in the forward stage.

2.2.3. Save subsequent construction costs

Many of the design choices of building big data by developers are carried out on the basis of bidding. However, it is easy to cause the overall waste of financial and material resources, and conduct publicity and further bidding. There is also a certain cost between the commission and the formal takeover, so the purpose of building big data design is to maximize the function with less money and time and reduce the design cost as much as possible.

2.2.4. Pay attention to avoiding design risks

Although the traditional way of "bidding and entrusting" is a better way of design, risks are likely to occur before and after the planning and design because neither party knows each other. Architects of big data architecture only explain their own professional knowledge, but cannot explain their own planning ideas. However, after providing a certain planning scheme, the other party can have a more comprehensive and deeper understanding of the planning creativity, so as to determine the situation of the commissioned design and avoid the risks in the construction design as a whole.

2. Significance and importance of 3D visualization of historical buildings for big data design of buildings

As a forward-looking overall planning of buildings, 3d visualization of historical buildings plays an important role in bridging the overall planning and big data design of buildings, so it is also a very important link in big data design of buildings and urban planning. Historical building 3 d visualization for developers and architects are more important: first historical building 3 d visualization can better avoid the result of the significant changes of historical building 3 d visualization of consumption, the introduction of the second historical building 3 d visualization can be very good control the cost of development, make investment overall goal more clear, security investment and report^[3].

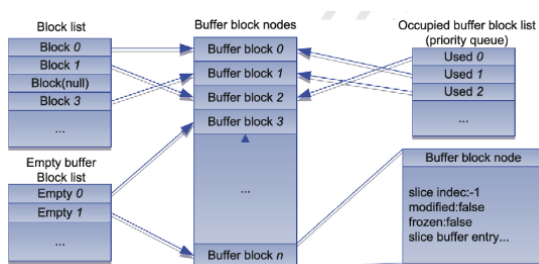


Figure 3. Visual analysis of historical buildings based on big data analysis.

For different building big data design projects, different 3d visualization of historical buildings is required, which needs to be considered from technical and economic indicators, construction funds, construction costs, value enhancement and other aspects. For commercial buildings, good 3 d visualization of historic buildings is considering the local market and the change rule of strain rules, shall be carried out in a more market research and analysis, from the aspects of economy and the appearance of multiple reasons, it may involve building standards layer of layout and space image management and other aspects.

3. Connection and coordination between 3D visualization of historic buildings and big data design of buildings

The function of the building is mainly reflected by its layout and structure, while different use functions have great spatial structure differences due to personal habits and professional characteristics. In the process of construction design, building big data designers should not generalize, but should have a comprehensive understanding of the overall building, and make various corrections according to the different needs of users. In this way, it is easier to maintain and repair well-built buildings and reduce unnecessary human and material waste^[4].

3.1. Three-dimensional visualization of historical buildings

For the 3d visualization and design of historic buildings, economic factors must be considered. However, if you want to use the building well within a certain time limit, you have to invest a certain amount of money for planning, design and construction, which is a challenge for architects and designers.

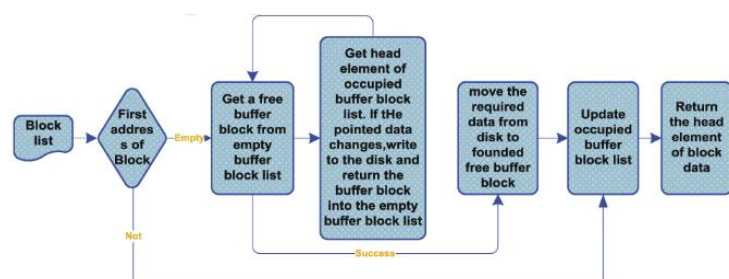


Figure 4. Historical building heritage study based on data analysis.

3.2. Design focusing on commonality

In China's building big data design, more reflects the "commonness" in the layout of building big data design. The appearance of the building pays attention to the color rendering, and carries on the unified design in the appearance design, compared with the more detailed design of some buildings, carries on the interior secondary design. At present, people pay more attention to the development of personality, but

the development model itself cannot meet people's actual needs.

3.3. Some builders intervened forcibly

Builders, such as investors, managers and owners, have the right to review and approve the planning and design ideas. The builder can be involved in building big data design and can make some feasible Suggestions, but it is better not to interfere forcibly. Although the owners have a stronger ability to work, but for the building construction will not be able to correctly understand the specific design concept, from the perspective of the overall design will not be able to grasp the macro, and if the builder of construction designers to impose interference, will cause the design scheme and the actual design comparative lack of coherent and unified, lead to the failure in the actual construction design plans.

3.4. The direct user of the building shall participate in the preparation of the construction assignment

The architectural planning and design cannot be separated from the architectural assignment book, and the formulation of the architectural assignment book is related to the overall process of the architectural big data design. Most of the functional requirements drawn up by the owners are feedback through the architectural specification, but the direct users are generally not involved in the drafting of the architectural specification. Therefore, it is necessary for managers and developers to jointly draft and approve the assignment book, no matter for the development of factories, office buildings and residential communities, as shown in Figure 5 below:



Figure 5. Architecture based on 3d computer design.

3.5. Scientific coordination between 3d visualization of historical buildings and big data design of buildings should be done seriously

Architectural planning and design cannot be separated from each other. Design and planning analyze and design buildings from two perspectives. So in architectural planning and design, historic buildings is the mutual penetration of 3 d visualization and design, and as different stages of the design process, the historical building three-dimensional visual designers need when planning for building integrity, expanding, and for the future development of space to be retained. Buildings reflect the regional characteristics and practical functions, and the three-dimensional visualization and design of historical buildings need to coordinate and cooperate from the perspective of layout, so that the buildings can get better shape design.

4. Real scene 3D research of historical architectural heritage based on big data

From the perspective of literature analysis, there is an obvious gap in the research on the development of cultural heritage and tourism of historic buildings. China's historical building cultural heritage mainly to protect^[5], rescue and utilization and development. It is very important to protect the historical architecture and cultural heritage through reasonable development and utilization of relevant resources, among which the tourism service also plays an important role.

4.1. Tourism value of historical building cultural heritage development

The cultural heritage of historical buildings plays a very important role in human development. On the one hand, because the cultural heritage of historical buildings has dynamic and relatively

three-dimensional physical characteristics, the relevant expression of its value has the characteristic of overlapping history and reality. Because of its rich cultural heritage, the cultural heritage of historical buildings plays an important role in tourism and cultural inheritance. As a more unique tourism resource, the cultural heritage of historic buildings has more profound tourism value.

5.1.1. Historical value analysis

In the long river of history, in different regions, different ethnic groups has its own profound cultural traditions, and in the changing history of retained their charm, in the history of traditional culture changes after still has a profound historical architectural culture value, is embodied in many aspects, such as archaeology, heritage, spirit and aesthetic, as shown in figure 6, it is for the cultural heritage of the historic buildings of the development of core value.

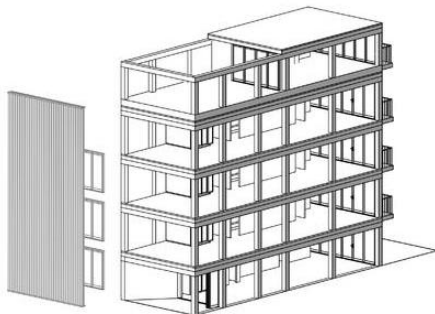


Figure 6.An overall framework case of architectural 3D design.

5.1.2. Cultural tourism value

As the root and development of human society in different space-time concept of cultural heritage, because of its dynamic be a living form of the traditional culture, and in which has a very rich historical culture, in the development of history also has an important value, it actually has a great attraction for tourists, tourists can also through the

activities related to a more profound understanding and know the culture. For the heritage inheritance of historical architecture culture, its related national spirit is an important source of development, and through the understanding of history and culture, tourists can be improved in their psychological structure and emotional temperament and other aspects, these tourism resources are very precious.

5.1.3. Leisure tourism value

Generally speaking, the cultural heritage of historical buildings has great artistic aesthetic value, which also shows the interesting life of different nationalities in different aspects, and the relevant artistic creativity of nationalities is gradually improved. For the cultural heritage of the historic buildings, there are a large number of outstanding works of art, is well preserved these artistic works shows the characteristics of characteristic and representative, also widely accepted by contemporary people, to a certain extent, this also is the cultural heritage of the historic building the basis of 3 d visualization of the material.

5.1.4. Educational tourism value

Relatively speaking, the cultural heritage of historical buildings is a social cultural form, which endows people with the power to manage and regulate their own thoughts and behaviors, and is also of great significance to the harmonious development of the society. Generally speaking, the cultural heritage of historical buildings contains great ethical and moral resources, which is not only a kind of accumulation of civilization, but also a guarantee for the stable development of social order. The inheritance and development process of historical architectural cultural heritage is the development process from a single person to a social group, in which there is a large amount of human and geographical knowledge. These are the epitome of folk customs in the long history of development, and they are of great value to the education and production of the folk.

4.2. Time value analysis

As the product of a long history, it is necessary to reserve and analyze the development of productivity and the degree of scientific and technological development in different periods of history, which is also the source for later generations to obtain relevant scientific and technological information. The cultural heritage of some historical buildings has unique charm and can attract scholars of different majors to analyze and investigate from different levels and angles. The reference value of related science and technology also provides opportunities for further development.

5. The organic linkage between the protection of historical building cultural heritage and 3d visualization

5.1. Integration and linkage at the cultural level

6.1.1. Integration and linkage of cultural values

Generally speaking, the cultural heritage of historical buildings has a whole set of knowledge concepts and systems, which are quite different from the traditional material heritage. The cultural heritage focuses more on the inheritance of cultural concepts, which have certain requirements on humanistic consciousness, spirit and ideological realm. In the process of continuous inheritance and development, this deeply rooted cultural concept runs through people's lives more and more, and is undergoing continuous reform and development with the passage of time.



Figure 7. Three-dimensional design combined with urban construction.

On the one hand, because more protective resources and efforts are put into the cultural heritage of this historical building, this culture and its value will surely be inherited and recognized. On the other hand, because of the great tourism resource potential for the cultural heritage of historical buildings, this unique cultural connotation will be constantly injected into the tourism products, which will have a huge impact on relevant tourists, and the cultural heritage value and significance of this kind of historical buildings are also being continuously explored. On the other hand, due to the new involvement of tourism products, relevant tourists will also face more novel cultural concepts and value systems^[6]. In this way, the original culture can be protected and developed, which also plays an important role in the cultural heritage of historic buildings, among which both sides can carry out coordinated overall development.

6.1.2. Integration and linkage of cultural forms

Although the cultural heritage of some historical buildings has its own material carrier, the value of these cultural heritage is not expressed in the form of carrier. Relatively speaking, the cultural heritage value of historical buildings is generally improved through language and behavior, which reveals its own tradition in an invisible way. Some performances,

such as oral arts, folk performances and ceremonial ceremonies, are different forms of expression of this culture. Relatively speaking, the cultural heritage of historical architecture transmits its own attached deep value system to its own development in the dynamic expression.

5.2. Integration and linkage at the economic level

6.2.1. Promotion of historical architecture and cultural heritage

From the analysis of the two existing cultural heritage lists of historical buildings in China, the number of historical building cultural heritage in China does not show the balance of distribution regions on the overall national map, and the value and influence of cultural heritage found in the region are also very different. In general, some historical architectural cultural heritages with profound cultural connotations and great value also have important driving forces in the overall tourism resources. In practice, different cultures in different regions show great differences, and whether the cultural heritage is well preserved becomes an important factor for its development.

6.2.2. 3d visualization promotion

For some cultural heritage will be extinct, while its cultural value is very big, but its regional difference is very big, the overall cultural value will present its own important cultural heritage, while the development of tourist guide will be in very important in the history of architectural culture heritage protection principles of driven protection. Due to the involvement of related tourism activities, it is a kind of cultural creation Renaissance for the cultural heritage of historical buildings, and it can also effectively promote the economic development of tourism.

6. Conclusion

Generally speaking, the development and protection of the cultural heritage of historic buildings are relatively contradictory. However, how to develop new resources from this culture, protect and utilize these resources has become a key issue in current practice. From the perspective of literature analysis, there is an obvious gap in the research on the development of cultural heritage and tourism of historic buildings. China's historical building cultural heritage mainly to protect, rescue and utilization and development. It is of great significance to protect the historical architecture and cultural heritage through reasonable development and utilization of relevant resources.

References

1. Yangqiu Y E, University H. A Study of Situational Visualization Application Based on "Internet+" Video Threshold—Taking the Historical Relics of Fuzhou Maritime Silk Road as an Example[J]. Research on Heritages and Preservation, 2019.
2. Du X , Guo H, Wang C, et al. Study on 3D visualization application for the Grand Canal heritage site research[J]. Proceedings of SPIE - The International Society for Optical Engineering, 2009, 7841:821-821.
3. Bocchi F, Del A, Andres F. Special Issue on Cultural Heritage and Architecture 3D[J]. Journal of Digital Information Management, 2004, 2.
4. Giovanni Issini. Knowledge Visualization of Large-size Architectural Heritage. A Research Experience on Yanqing Section of Chinese Great Wall[J]. 2012.
5. Issini G. Knowledge Visualization of Large-size Architectural Heritage. A Research Experience on Yanqing Section of Chinese Great Wall[C]// International Conference on Information
5893

Visualisation. IEEE Computer Society, 2012.

6. Jingxuan, Duan, Hansen, et al. Research on Big Data Consistency Algorithm of Multi-sensor Fusion[C]// 2014 International Conference on Vehicle, Mechanical and Electrical Engineering(ICVMEE 2014). 10.