Application Research of Ancient Wall Protection based on Digital Technology BIM and GIS

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Abstract: The mathematical and information model of ancient wall is a kind of technical means to realize the correlation between the entity model of ancient wall and non-geometric attributes. Combining technology of BIM (Building Information Modeling) and GIS (Geographic Information System) is a comprehensive method of information digitization, and it can enrich ancient wall construction level and parameterized management and protection. In this study, we analyze the advantages and disadvantages of BIM and GIS in the protection of ancient walls, and discuss the application of BIM and GIS in the protection of ancient walls, and introduce the method of sharing information between BIM and GIS.

Keywords: BIM; GIS; Ancient wall protection

1. Introduction

China has a long history. The ancient wall is an important element in historical architecture, which accumulating and infiltrating the ancient Chinese traditional culture [1]. Whether the wall of the family or the Great Wall of the great country, whether the special wall of different nationalities or the geographically walls of different regions, the ancient walls occupy the essential elements of the entire ancient Chinese architectural system and reflect the deep connotation of Chinese architecture. The ancient wall carries the cultural characteristics of the Chinese history, and it like a cultural relic with high reserved and historical value o. Nowadays, the city develops the tertiary industry of urban characteristics and beautifies the urban environment, and develops modern tourism resources of ancient walls, making it a cultural heritage of classical human landscape and ancient Chinese architecture. However, due to many reasons such as time, history and improper protection and management, many ancient walls have been destroyed or even disappeared to varying degrees. The traditional means of protection can no longer meet the needs of ancient wall protection. It is urgent to update the planning and protection information of ancient walls and implement professional spatial planning and technical protection. This paper introduces a method of ancient wall protection combining BIM technology and GIS technology, and discusses its advantages and disadvantages in ancient wall protection.
Nowadays, in order to develop urban characteristics, promote the productivity of the tertiary industry and beautify the urban environment, some cities develop the modern tourism resources of the ancient wall with the method of forming the wall as a cultural heritage of classical human landscape and ancient Chinese architecture. However, due to many reasons such as time, environment, improper protection and wrong management, many ancient walls have been destroyed or even disappeared to varying degrees. However, due to many reasons such as time, history and improper protection and management, many ancient walls have been destroyed or even disappeared to varying degrees. The traditional means of protection can no longer meet the needs of ancient wall protection. It is urgent to update the planning and protection information of ancient walls and implement professional spatial planning and technical protection. This paper introduces a method of combining technology of BIM technology and GIS technology is used to protect the ancient wall, and discusses its advantages and disadvantages in ancient wall protection.

2. BIM Application in Ancient Wall Protection

As an innovative technology to improve the productivity of the construction industry, BIM can integrate the digital representation of the physical properties of buildings according to the building information model, and integrate the life cycle information of the simulated buildings. As an innovative technology to improve the productivity of the construction industry, BIM can integrate the digital representation of the physical properties of buildings according to the building information model, and integrate the life cycle information of the simulated buildings [2].

The BIM technology is applied to the protection of ancient wall heritage, the three-dimensional architectural model of the ancient wall is established, the building information of the ancient wall heritage is simulated, the engineering maintenance method of the ancient wall is simulated, and the different short engineering information resources for protecting the ancient wall are integrated. BIM technology can provide a model information foundation for the restoration and reconstruction of ancient walls, manage the heritage information of the entire life cycle of ancient walls, and meet the needs of protecting cultural heritage:

2.1. The advantages of BIM

BIM can realize model parameterization and data visualization in ancient wall protection. It manages the information of the ancient wall, and uses the "family" in BIM to build the model of ancient wall. In the model, the whole life cycle of the ancient wall is simulated, and the actual ancient wall protection construction behavior is simulated within a certain range to realize the visualization and quantitative analysis of the ancient wall protection. At the same time, the application of BIM technology provides a comprehensive IFC data standard for the ancient wall, which can facilitate the intercommunication and integration of ancient wall information in different software environments, and optimize the ancient wall information to realize the method protection technology of all-level and multi-level.

2.2. The insufficient of BIM

As a part of the natural world, the ancient wall interacts with the surrounding environment, which requires the external geographic information of ancient wall. BIM is lacking in establishing links with the surrounding natural environment and human environment.

3. GIS Application in Ancient Wall Protection

GIS is a technology based on spatial information management. It is used to query and analyze geospatial data under the support of computer systems. The application of GIS technology can describe the development plan of the surrounding environment of the ancient wall, calculate the spatial location geographic information of the reaction ancient wall, and analyze the geospatial information and geographic data of other buildings and environment of the ancient wall. The calculation and visual analysis of the spatial information such as the length, area and volume of the ancient wall can be completed by GIS.

3.1. The advantages of GIS

GIS can collect, store, manage, calculate, analyze, display and describe the spatial information of ancient walls in the overall macro location, and use digital images to express the recurring geographical related problems of ancient walls. The survey data is displayed by the coordinate system and projection for the protection of the ancient wall.

3.2. The insufficient of GIS

The model established by the GIS system lacks the spatial differentiation within the ancient wall, and only pursues the accuracy of the geographical location and the authenticity of the surface, and cannot provide specific information inside the building.

4. BIM and GIS Combined Application

4.1. The advantages of combining BIM and GIS

Through the above analysis of advantages and disadvantages, BIM technology provides the intrinsic model and fine information of the ancient wall, while GIS technology gets the geographical location of ancient wall through three-dimensional information. The combination solves the problem of information islands generated by GIS in ancient wall information management. GIS relies on BIM technology to record non-geometric attributes of buildings [3]. GIS can make up for the lack of information about the model established by BIM in its natural geography and other buildings. The effective connection between the two is reflected in the information fusion of the ancient wall simulation three-dimensional model, which can be the ancient wall.

On the one hand, the effective connection between the two is reflected in the information fusion of the ancient wall simulation three-dimensional model.

On the other hand, it can provide the informational spatial management of the whole life cycle in the protection and restoration of the ancient wall, and the workload is smaller than the ordinary one.

4.2. The way of integration of combining BIM and GIS

BIM and GIS are application technologies in different professional fields. The method of realizing information interaction through simple model transformation in different professional fields results in the dispersion and independence of applications because of only a small amount of semantic information, which has obvious limitations. Data-level sharing makes it easier to integrate BIM and GIS. IFC (Industry Foundation Classes) and CityGML (City Geography Markup Language) are used as common data model standards in BIM and GIS to realize geometric and semantic

information in sharing the information between the two technologies.

With Combine two technologies to build a data conversion format, analyze and summarize the internal components of the ancient wall, combine the data, establish a family model, and improve the whole life cycle management platform of the ancient wall heritage, and provide a basis for the shared BIM model design in the ancient wall GIS environment. By combining two technologies to build a data conversion format, the internal components of the ancient wall are analyzed and summarized, combined with the data, the family model is established. This method improves the life cycle management platform of the ancient wall heritage, and provides a basis for the design of the shared BIM model in the ancient wall GIS environment.

5 . Conclusions

In summary, although both GIS and BIM technologies have their own advantages and disadvantages, combining the advantages of the two technologies can meet the full life cycle geographic information management of urban planning for the protection of ancient wall cultural relics. However, the method of combining and utilizing the two technologies still needs to be optimized and continuously studied. Therefore, for realizing the preservation value and historical value of the ancient wall, it is necessary to establish parameterized information of ancient wall, and visually simulate the life cycle of planning and protection of ancient wall.

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