Research on Landscape Information Model Construction Based on Visualization Technology

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Abstract: With the development of information technology, the functions provided by computer digital technology are more and more widely used in the process of landscape architecture design. The application of visualization technology in landscape planning and design provides a powerful help for us to understand the characteristics and behaviors of the objective existence of the world. From the perspective of landscape architecture design, this paper makes an in-depth study of the construction mode of landscape information model, and puts forward the process of landscape information model construction and its corresponding functional characteristics in combination with relevant research status at home and abroad, so as to perfectly combine theory with practice.

1. Introduction

1.1. Visualization Technology
Visualization technology derives from the concept of Visualization in Scientific Computing. Visualization technology is a concept proposed by researchers in some developed countries in Europe and America in the early 1970s. Visualization technology refers to the use of computer graphics, computer image processing, computer signal processing and other methods to express the internal structure of data, information, knowledge. A good visualization technology can help users have a qualitative understanding of the data, and help users to better carry out subsequent pattern recognition and outlier detection. The main processes of visualization technology include filtering, analysis, filtering, mining, rendering, refining, and interaction. With more and more application fields of visualization technology, more and more types of visualization methods, and more and more mature visualization theories, visualization technology will develop more rapidly and more sound in the next few years.

1.2. BIM Building information modeling
The earliest BIM was actually an abbreviation of a modeling model. In this paper, BIM is the abbreviation of Building Information Modeling, referring to Building Information Modeling, which is also the meaning of BIM in this era. BIM is an architectural model that represents the information of physical characteristics and functional facilities. Its concept originated in the United States in the 1970s, and was proposed by Professor C.M. Astman of Georgia Institute of Technology as the Building Product Model. At the same time, he also developed the building information simulation manual, believing that BIM is a digital simulation building for design and construction, making the form and attribute of the
model become the record data of the engineering plan, thus opening the door of BIM. The specific application of BIM technology in the architectural design stage in China is summarized in general process as shown in Figure 1.

![Figure 1 the BIM design process](image)

2. Steinitz landscape Decision-making theory

Based on the concept of GIS application in landscape analysis and urban planning, Professor Karstenitz of Harvard University proposed the landscape change model in 1995, as shown in Figure 2. Steinitz's landscape change Model -- The design process can be divided into three parts and six levels according to the model stage defined by Steinitz. The whole design process is divided into six models: representative model, process model, evaluation model, change model, image model and decision model. Models are similar to diagrams or mathematical models that simulate real processes or systems, but with many simplified and abstract elements. A common form is a flowchart or process tree that shows a series of steps or feedback loops that guide decision makers or designers to consider decisions or other behavioral outcomes. This process framework is a linear system, and the six models will be "experienced" three times: the first one starts from confirming the project background -- establishing the research objects and problems; Then, starting from the decision model, the research method of the project was refined in this process, and the solutions were found according to the research of the project. The third time, the project was completed from the representative model and the final conclusion was reached. The whole process has one or more starting points where the complexity of the representative model depends on the level of decision content. In landscape architecture design provides a good site design demonstration process.
3. Experiment
Taking "landscape design of a residential area" as an example to verify the feasibility of landscape information model in landscape architecture design. The software platform of landscape information model is used to construct the corresponding landscape information model.

3.1. Landscape information model framework
By referring to the concept analysis of BIM, we can see that landscape information model is not only a technology, model entity or implementation process, but also a synthesis of multiple dimensions. What we want to create here is a platform that can integrate a variety of landscape software to carry the construction of landscape model, including the model information to be built in the landscape design site, which can be displayed in the interactive visual form and parameterized input and output, as shown in Figure 3.
3.2. Experimental implementation process

The architectural style of a residential area is a modernist design based on black, white and gray, and the building body is based on non-decorative geometric modeling. The landscape design of residential area mainly echoes the language of architectural design and pays attention to the activities and experiences of people in the place. The elderly and children occupy a large proportion in the residential area. However, the residential area is not divided into distinct functions but creates a landscape state with no boundaries for the mutual flow of space. This belongs to the field of small-scale landscape design. Therefore, CAD is selected to draw the scheme, and Sketchup combined with Vectorwork with BIM features is used to complete the concrete landscape model modeling of the residential area, as shown in Figure 4.
3.3. Final effect of the experiment

Through reasonable planning and design, the area of different types of activity space required by the proportion of the population living in the community should be fully considered, and a large landscape change should be created in the small space as far as possible. The final plan is shown in Figure 5.

The preliminary idea is implemented in CAD into a two-dimensional plane drawing. After the simplification of layers, the document is saved into DWY format and imported into Sketchup for modeling. The effect is shown in Figure 6. In this process, the spatial analysis of the scheme was carried out, and sunshine analysis was obtained according to the height and location of the building so as to reasonably arrange the vegetation. Vision analysis in landscape space, open design of residential landscape according to different needs. When the design is unreasonable or the traffic system is not smooth, the CAD plane will be timely corrected to promote the optimization of the scheme.
4. Conclusion

3D digital technology is the development direction of landscape architecture in optimizing the science and accuracy of landscape architecture design and providing more real landscape design experience. Through the efficient use of BIM technology in THE AEC industry and the mature life cycle theory, the integrated design process of digital and visual data information base management and control design life cycle is very worthy to be introduced into the practice of landscape architecture design, which will become the trend of The Times. Visualization technology enables landscape architecture design models to be expressed in real-time three-dimensional space and provide easy-to-grasp control interface, while combining multiple sensory aspects for an immersive landscape experience.

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