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The application of digital display in heritage museum

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Abstract. Museum as a basic platform for urban construction and cultural propaganda, its purpose is to let people understand the historical development context and the experience of historical figures, to provide collection, research, display integrated service system, is an important witness of historical development. With the continuous development of social economy and science and technology, while attaching great importance to spiritual pursuit, people will get more spiritual satisfaction from the museum platform. Especially in the background of the digital era, heritage museums pay more attention to providing people with high-quality and efficient cultural services while actively exploring new display modes. Therefore, how to apply digital display theory and technology? It has become a core subject for museums to explore actively in the new era. After understanding the content and requirements of site museum display design under the digital background, this paper mainly studies the design framework of digital site museum dynamic panoramic virtual display system, and then from the perspective of practical development, defines the digital display design content of site museum in the new era, in order to provide an effective basis for the construction and management of site museum in the new era.

Keywords: Heritage museum; Digital display; Browse module; Tag cloud.

1. Introduction

Cultural relics storage, academic research, restoration and protection, interactive appreciation and three-dimensional presentation of heritage museums with three-dimensional digital technology as the core have made rich achievements, which is of great significance for the construction and management of heritage museums. With the continuous improvement of the level of museum information construction, While building computer hardware platforms to support the operation of information systems, museums around China have begun to fully promote digital technologies such as video imaging, augmented reality and virtual simulation. Museums with conditions have also actively explored the three-dimensional digital protection of cultural relics and the development of cultural and creative products. However, under the influence of data production and new technologies, there are still many problems in the three-dimensional digital construction of museums, such as the high professional threshold, too complex data standards, long production time, and large construction costs, which urgently need to use core technologies to break through and innovate. In the field of computer vision, after decades of accumulation and development, image-centered 3D reconstruction technology has orderly realized virtual reality, film and television entertainment, robot navigation, etc. It can use pictures taken at different angles and feature detection methods to accurately restore the relationship between the camera and the scene, and effectively restore the three-dimensional structure of the scene. This content is also the focus of digital display of heritage museums in the new era.［1-4］

Under the background of digitalization, heritage museums begin to develop for the new era. The traditional single communication channel gradually fails to meet the needs of cultural relic construction and cultural publicity. Managers begin to use information technology to improve the product display mode and truly realize the comprehensive output of text, dynamic video and audio, which can not only improve the communication of museum exhibits. It can also improve the final effect of cultural relics display. Digital technology enhances people's sensory stimulation to a

certain extent. During the optimization of exhibition design, intensive processing will be carried out from the aspects of thinking, hearing, vision and touch, and details will be processed according to VR, 3D panoramic surround and AI technologies, finally breaking through the limitations of time and space. Give people a new sense of immersive experience. As a new direction for the innovation and development of museums in the new era, digital display forms will also face new problems and challenges, which requires starting from the perspective of audience groups, innovating and optimizing, fully implementing the people-oriented innovation concept, gradually changing the traditional and outdated ideological cognition, and investing more manpower, material resources and time during the construction and development. Respect the individual differences of audience groups, provide comprehensive services as far as possible, meet the cultural needs of different types of groups, truly combine science and technology with culture, and contribute to the creation of a socialist road with Chinese characteristics. On the basis of understanding the development content and current situation of the digital display of the museum in the new era, this paper mainly studies the design structure of the dynamic panoramic virtual display system of the digital museum, and then determines the main content of the digital display design from the perspective of time development.［5-8］

2. Method

2.1 Overall Structure

The digital display system of Heritage museum mainly includes three contents: database management module of visitor children's items, digital museum design module, and digital museum browsing module, as shown in Figure 1 below:

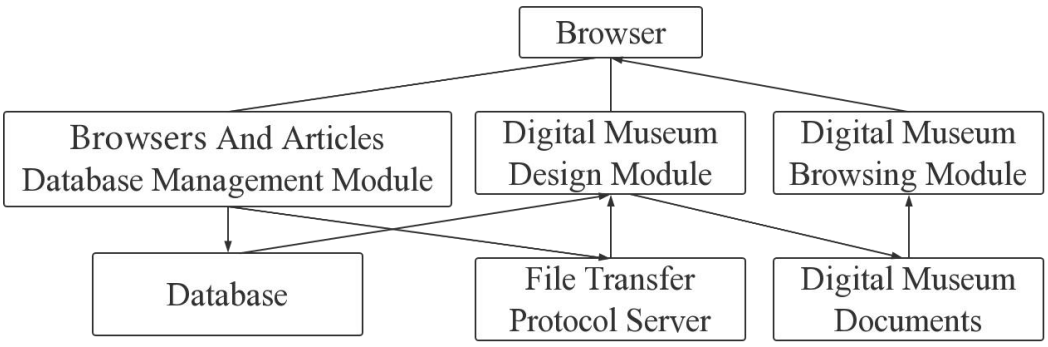

Figure 1 System architecture diagram

Based on the above analysis, it can be seen that the function of the database management module of visitors with items is to deal with the information of items in the database and server; The function of digital museum design module is to provide the required information of objects, so that visitors can create model files according to their own needs; The function of the digital Museum browsing module is to analyze the module files and finally present the constructed dynamic panoramic image.

2.2 Design Module

This module is mainly used to ensure that after visitors successfully log in to the system, the database can provide the required item information list according to the user level to generate a two-dimensional plan of the digital museum in the drawing board, select the picture as the texture

sentence on the local plane, and finally put the items in the item information list on the two-dimensional plane, the specific process is shown in Figure 2 below: [9-11]

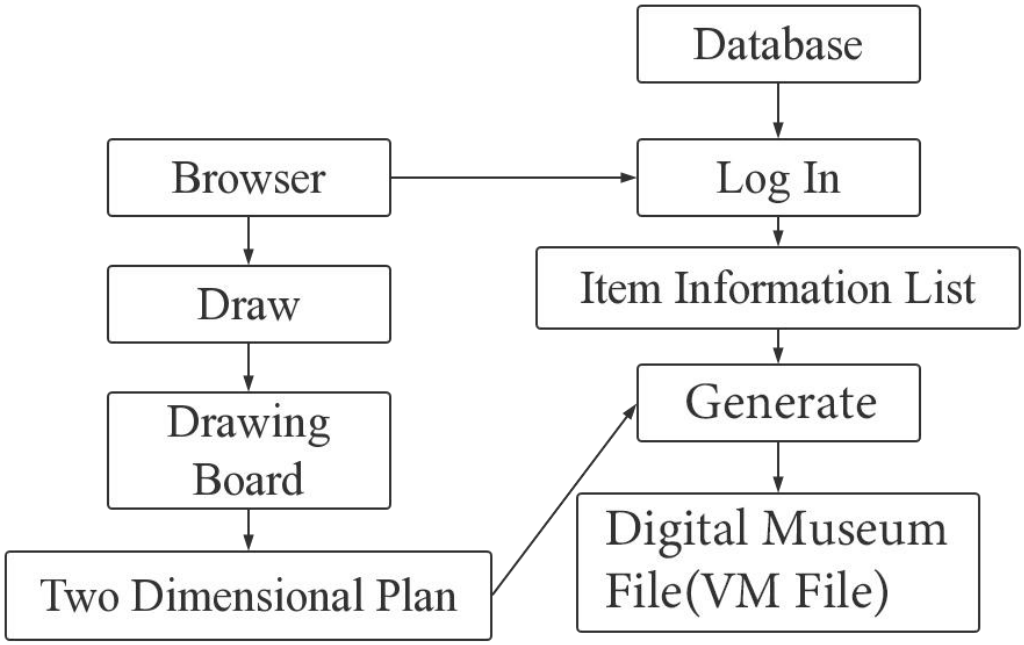

Figure 2 Flowchart of the design module

In this process, the file generated by the system contains the following information: first, the number and position of vertices in the two-dimensional plane; Secondly, the quantity, ID and location information of objects inside the museum; Third, the initial location information of the user in the module. Based on this information, users can quickly adjust the tour route of the site museum and find the required cultural materials according to their own needs.

2.3 Viewing Modules

The purpose of this module is to analyze the documents in the digital museum design module, and stretch the original two-dimensional plan into a three-dimensional spatial map for the convenience of users to browse and read. The specific structure is shown in Figure 3 below:

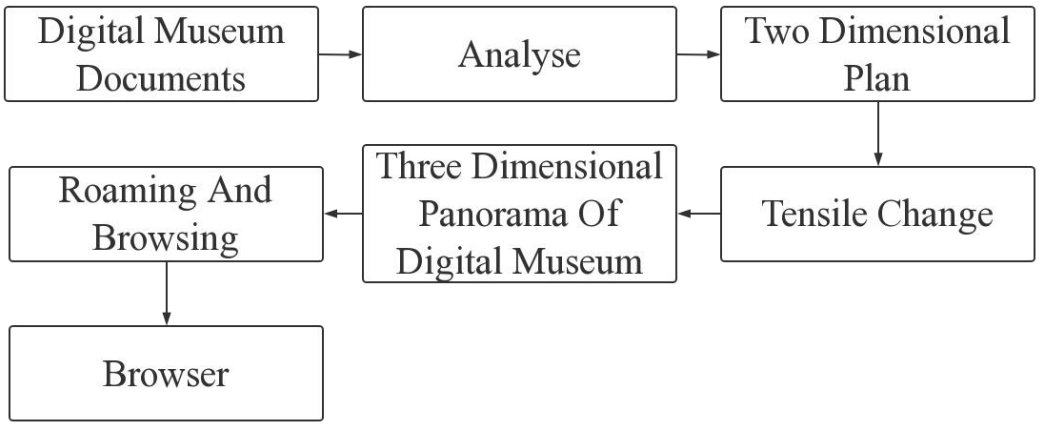

Figure 3 Browse the structure diagram of the module

2.4 Software Design

User demand is the fundamental requirement for the application of digital display technology in heritage museum design. In order to better meet the individual needs of different users, visualization technology, human-computer interaction theory and display design should be fully utilized when creating the digital display system architecture, and the flow chart as shown in Figure 4 below is finally formed:

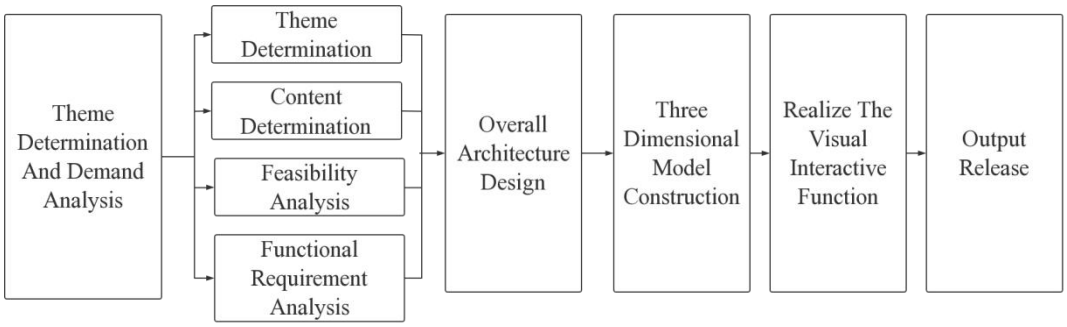

Figure 4 Flowchart of digital display technology

According to the above analysis, we can see that the theme should be determined first, and then the needs should be analyzed. In this way, we can not only scientifically plan the structure and application function of the system, but also determine the development goal of the site museum in the new era. The overall architecture design is planned and designed according to the analysis results of the previous stage. On this basis, the scene, display mode, functional objectives and service direction inside the digital heritage museum can be determined, which can not only simplify the work steps of the digital museum construction reform in the new era, but also truly realize the goal of digital display innovation. At the same time, it is necessary to determine the interactive behavior with consistency and clarify the realization process of different interactive functions, so as to facilitate the construction of a good communication bridge between users and the digital display system; 3D model construction is to use 3D modeling software to create museum scenes and required model files, scientifically set the lighting, materials and other expression effects inside the site museum, and finally get a more real browsing experience. In the stage of realizing the visual interaction function, the visual interaction software is used to create the scene and model of the site museum, and the optimization process is carried out according to the development of time. Finally, the visual function and interactive function can be obtained in line with the user's requirements. At the same time, the final result can be published directly to the corresponding website platform by using the web format or the execution file.［12-15］

3. Result analysis

Based on the analysis of the digital display architecture of a local heritage museum as shown in Figure 5 below, it can be seen that the overall system is divided into infrastructure layer, data layer, application layer and terminal display layer in the order of bottom to top. From the perspective of practical application, the actual design research is reflected in the following points:

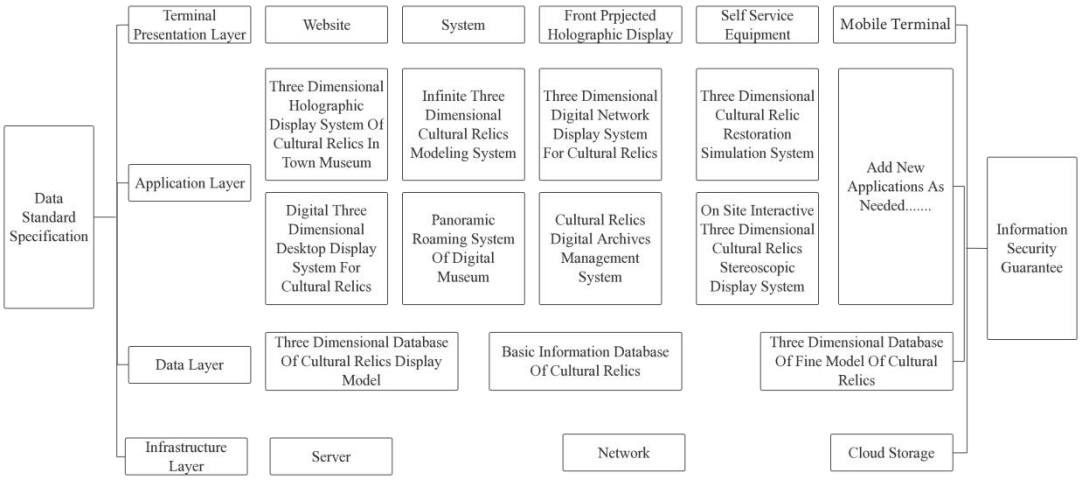

Figure 5 Architecture diagram of digital display scheme of Heritage Museum

First, the guide design. The integrated development of science and technology and culture should not only show the information style of heritage museums, but also actively spread cultural knowledge with regional characteristics. In this process, the digital display platform is divided into two situations, one refers to the display mode with physical coordination, and the other refers to the online museum dedicated to digital display. No matter which model, the most important thing is to establish a digital management system, and constantly improve the data sharing platform during the design and application, so as to improve the accuracy of information storage, and truly achieve inventory and cultural classification.

Second, sensory experience. If heritage museums want to present digital display design and improve the audience's sense of experience, they can start from the aspect of sensory experience. Through the use of digital three-dimensional technology to create a sensory replacement environment, present more authentic and reliable cultural exhibits, can give the audience a sense of being in the scene. From a certain point of view, heritage museum is a symbol of culture. Every topic selection and display design will have a profound impact on the audience's senses. Therefore, many factors should be considered during the digital display design, such as the topic selection, planning, and scheme, to truly consider whether the real value of characters and culture can be fully displayed. For example, during the exhibition, information technology is used to optimize the scene environment, and a number of technical means such as sound effects and pictures are used to provide a new sense of experience. Under the common influence of lighting, music and other elements, the audience can truly feel the cultural atmosphere in the museum and have a basic cognition of the cultural relics or culture presented.

Finally, show interaction. Under the background of the digital age, the display design mode of heritage museums has begun to develop in the direction of digitalization and intelligence, among which the most representative is the interactive display of exhibits. In interactive design, it is necessary to follow the basic concept of people-oriented, comprehensively consider the relationship between the audience and cultural publicity, rationally use text, audio and scene to cooperate with each other, narrow the distance between the audience and the product, and guide people to have deep thinking through interactive communication. For example, when displaying the history of cultural changes of the Yellow River in China, technological interactive modes such as multi-touch and interactive question and answer can be used to facilitate the on-site audience to experience the cultural atmosphere inside the site museum. At the same time, projection and dialogue can be used to increase the interactive sense of the site, which is more interesting than the traditional

paper-based viewing mode. The audience group can quickly attract the attention of the audience, so that they can effectively avoid the risk of destruction of cultural relics while understanding the relevant cultural knowledge. This design model is based on the people-oriented development concept, so that the audience can independently choose the content of interest to understand and analyze, so as to narrow the distance between the audience and the culture, and truly realize the cultural propaganda goal of edutainment.

Conclusion

To sum up, heritage museums, as the basic carrier of national culture and cultural transmission, can provide new ideas for digital display design of heritage museums in the background of the information age by fully integrating science, technology and cultural knowledge. Although the research of site museums in our country has created a variety of digital display models in recent years, it is still clear that the main body of cultural value is the cultural relics themselves, not the science and technology, and the information technology means is only used to assist innovation. Therefore, in the future, heritage museums should focus on finding the balance point between science and technology and culture when designing and applying digital display, focus on creating more cultural publicity and display modes for the public, and ultimately provide better cultural viewing and dissemination services.

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