



Construction of 3D Visualization Platform for Visual Communication Design of Chinese Traditional Culture Based on VR Technology

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Abstract. The development of science and technology has promoted cultural exchanges between countries. The introduction of western culture has impacted the development of Chinese traditional culture to a certain extent and weakened the attention of contemporary young people to Chinese traditional culture. In order to ensure the inheritance of Chinese traditional culture, this paper combines VR technology, computer application technology and visual communication technology, takes 3ds Max as a modeling tool and Unity3D virtual reality engine as a development platform, and constructs a three-dimensional visualization platform for visual communication design of Chinese traditional culture under VR technology. The platform will use 3ds Max, Photoshop, Unity3D and other software to transform the three-dimensional model of traditional visual communication design works, and add a large number of visual interactive operations, and then integrate and package them by Javaweb technology to form a web application program, so as to fully realize the integration of virtual reality technology and visual communication design. The measured results show that the three-dimensional visualization platform is of positive significance to the improvement of visual communication forms and promotes the innovation and inheritance of Chinese traditional culture.

Keywords: VR technology · Chinese traditional culture · innovation and inheritance · three-dimensional visualization platform

1 Introduction

With the further development of science and technology, the exchange and spread of cultures of various countries in China has been promoted, and the development of Chinese traditional culture has been hindered to some extent. At present, the communication mode of Chinese excellent traditional culture is still relatively backward, and a single propaganda mode can not achieve the expected publicity effect [1]. Chinese traditional culture, as an artistic treasure that embodies the wisdom of the Chinese people, should actively adapt to social development, seize communication opportunities, expand communication channels, and make it fit with the development wave of the times. In this paper, the main research object is to innovate the inheritance way of Chinese traditional culture. In view of the current national emphasis on traditional culture education and

the new goal of promoting Chinese traditional culture in the new period, with the help of the application advantages of electronic technology, VR technology and 3D stereo technology are integrated into the promotion of traditional culture, and the communication way of Chinese traditional culture is innovated. With the help of the technical advantages of the three-dimensional visualization platform, users can feel “immersive”. As a whole, the platform will show the charm of Chinese traditional culture to users from the aspects of historical reproduction, cultural interpretation, scene performance, virtual interaction and communication, and arouse the resonance between users and Chinese excellent traditional culture, thus expanding the influence of Chinese traditional culture [2].

2 Development Process

According to the requirements of the above related application technologies, the configuration and deployment of the development environment of the three-dimensional visualization platform for visual communication design of Chinese traditional culture under VR technology are completed. This system divides the development content into two parts. One is to complete the 3D model construction of Chinese traditional culture visual communication graphic design content based on 3ds Max, Photoshop, Unity 3D and other software. Secondly, in the Java language environment, all functional modules are integrated and encapsulated to form a standard Web application [3].

After the graphic design is completed in visual communication software, it is exported from Photoshop software to get the basic data material. Then import 3ds Max software to complete the corresponding 3D digital model construction. After all kinds of models are designed and built, they are exported and quoted into Unity3D, and the integration and assembly of models, the addition and optimization of dynamic effects, the construction of scenes, the setting and processing of objects in the environment and the development of key interactive functions are carried out. [4].

The construction of platform application framework and the integration and encapsulation of various functional modules are all developed with SSM framework under Javaweb technology system as the core. The overall development of the platform is based on Linux operating system, with Java as the basic development environment, JDK version 1.8 and above, IntelliJ IDEA Ultimate 2018 as the Java development environment, Tomcat 8.5 as the Web server and MySQL 5.5 as the database server. After the platform is fully developed, it is packaged and distributed to Tomcat server. After configuring the corresponding ports, users can complete the use of the system from the client browser [5]. Through the introduction of the above key technical theories, the overall environment of system development, the running process of related software and tools are determined, and the technical feasibility of the overall project of three-dimensional visualization platform for visual communication design of Chinese traditional culture under VR technology is also clarified.

3 Functional Implementation

3.1 Login

On the homepage, users can browse the display effects of different cultural relics through the carousel banner plug-in. In the function bar, all the activity labels of the platform are collected, such as VI design of cultural relics, illustration design of traditional culture and graphic composition of historical buildings. Users can browse freely according to their personal interests. Some functions of the platform will not be open to tourists, and can only be used after registration and login. In order to maintain the security of users' personal information and reduce the risks and problems caused by VPN account theft, the system will use account input and code scanning to log in. [6] The login QR code of the page will be refreshed after 2 min to ensure the security of the user's account. The implementation code of the system login function is as follows:

```
< legend > users login < /legend >
< form name = "LoginForm" method = "post" action = "login.php" onSubmit =
"return InputCheck(this)" >
  < label for = "username" class = "label" > user name: < /label >
  < input id = "username" name = "username" type = "text" class = "input" / >
  < label for = "password" class = "label" > password: < /label >
  < input id = "password" name = "password" type = "password" class = "input" / >
  < input type = "submit" name = "submit" value = "confirm" class = "left" / >
```

3.2 Design Center

In this module, users can browse all kinds of cultural relics under visual communication design. Click a cultural relic map, and the platform will automatically switch to the display interface. In the display interface, the cultural relics will be viewed from all directions and angles in the way of "naked eye 3D". [7] By default, the viewing mode adopts the automatic roaming mode under "naked eye 3D". In this mode, the cultural relic model will rotate automatically. Users can also manually adjust the viewing mode to self-help browsing mode according to their personal preferences. Move the mouse to the center of the cultural relic model, and an audio introduction of the cultural relic model will appear. Moving the mouse can adjust the rotation angle of the cultural relic model, and sliding the mouse wheel can zoom the size of the cultural relic model, giving users the most intuitive visual experience, so that users can observe the details of cultural relics from multiple angles and understand Chinese culture. [8] The platform also provides users with a way of "panoramic history". In "panoramic history", users can choose historical sites according to their preferences, and the system will automatically generate corresponding site models for users to browse and visit. Using the map sign in the upper left corner of the page, you can also adjust the season of the ruins model, and the landscape in the ruins will also change accordingly.

3.3 Practice Center

After a systematic visit, in order to further deepen users' understanding of Chinese traditional culture, users can experience the fun of constructing simple cultural relics

Table 1. User learning results evaluation form

Target layer	Standard layer	Weighted value	Item score	Score	Final score
Learning results score	Study duration	A1 = 0.036	84	3.024	7.269
	Model operation level	A2 = 0.043	85	3.655	
	Test paper answering level	A3 = 0.012	81	0.972	
...

models in the practice module. [9] After the overall operation, the system will generate corresponding examination papers for users to answer according to their browsing data and operation data, and after the answer, the system will automatically generate test scores according to the formula. In this respect, the system will adopt a multi-dimensional evaluation method to comprehensively evaluate the specific operations of users. At the same time, the AHP algorithm model will be used to evaluate the learning results of users, as shown in Table 1. The formula for calculating the weight value of the practice results is shown in Formula 1, where λ_{\max} represents the weight value, G represents the hierarchy, and P ranks the weight vector. [10]

$$\lambda_{\max} = \sum_{i=1}^n \frac{(GP)_r}{nP_i} \quad (1)$$

4 Conclusion

In the process of spreading Chinese traditional culture, the main goal should be to meet the spiritual needs of the people. This paper combines traditional culture with emerging technology to form a brand-new means of cultural communication. With the help of virtual reality technology, the high-quality content of traditional culture is displayed in front of users in an all-round way, which brings people a sense of visual impact, so as to improve the national interest in Chinese traditional culture and enable the people to learn and spread Chinese traditional culture consciously and spontaneously. The construction of three-dimensional visualization platform realizes the ingenious combination of traditional art culture and modern high technology, promotes the change of cultural communication mode, and realizes the further development of cultural communication intelligence.

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