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The practice of digital interactive technology in promoting the dissemination of traditional ethnic minority housing culture

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Abstract In order to promote the dissemination of traditional housing culture of ethnic minorities, a dissemination model based on digital interactive technology and a virtual traditional architecture roaming interactive system are constructed in turn. The current situation of the dissemination of ethnic minority traditional housing culture is interpreted, and the digital interactive technology is used to design the corresponding dissemination model and interactive method to address the existing problems. Determine the research subjects, synthesize the independent sample t-test and experimental simulation test to explore the communication mode and interactive system. The significant difference between this model and the traditional model in the dimensions of interestingness, richness and authenticity, with $P<0.05$, demonstrates the facilitating effect of this model on the dissemination of minority housing culture. Compared with the reference system (an interactive system based on the .NET platform), the system in this paper increases the number of effective user interactions by about 44% or more, which confirms the superiority of the virtual traditional architecture roaming interactive system in the field of minority traditional architecture culture dissemination.

Index Terms independent sample t-test, digital interactive technology, housing culture dissemination, interactive system

I. Introduction

China is a unified, multi-ethnic country in which 56 ethnic groups have jointly created a colorful and profound Chinese culture, and minority cultures are an important part of Chinese culture. Especially since the reform and opening up, the culture of ethnic minorities has gained unprecedented prosperity and development, laying a good foundation for Chinese people of all ethnic groups to move forward to the new century. Architecture is not only a manifestation of human material civilization but also a carrier of spiritual civilization. Traditional Chinese architecture inherits the characteristic culture of the Chinese nation and contains the creativity, wisdom and accumulation of life experience of the Chinese people for several generations [1]-[3]. Traditional Chinese architecture in different regions has different national characteristics and regional colors [4]. With the rapid development of modern science and technology and the advancement of digital technology, the digital inheritance of traditional ethnic architecture has become the most effective method for the preservation and inheritance of traditional ethnic architecture [5], [6].

The progress and development of digital technology provides a brand new concept for the protection of ethnic minority architecture culture. In particular, the rise and development of three-dimensional animation technology provides another brand-new method for the representation form of buildings, and the three-dimensional virtual space it creates can almost reach the degree of messy reality, which makes the viewing and research more intuitive, which is the effect that two-dimensional representation cannot achieve [7]-[10]. With the help of three-dimensional animation means of expression to carry out research on endangered buildings of ethnic minorities, the establishment of the corresponding digital heritage program, through the technology of virtual reality and the Internet, so that its national culture has been widely disseminated and popularized [11]-[14]. The interactive experience provided by digital technology allows more people to understand the traditional architectural culture of ethnic minorities, which will play a positive role in the restoration and protection of some historic buildings and is a very effective way for the dissemination of their national culture [15]-[17]. In addition, due to the characteristics of virtual reality technology itself, its application in the work of architectural culture dissemination can be a good solution to some traditional recording methods can not or is difficult to achieve the effect of the means of dissemination of ethnic minority architectural culture has played a complementary effect [18]-[20].

This paper promotes the dissemination of traditional housing culture of ethnic minorities by constructing a housing culture dissemination model and a virtual traditional architecture roaming interactive system, which has a more significant promotion effect than the traditional model and reference system, and the overall research idea is more innovative. Through the description of the current situation of the dissemination of ethnic minority traditional architecture culture, it is found that there are problems such as reduced practicality of traditional architecture, unstandardized development, and insufficient preservation technology. In response to the problems described above, it is proposed to utilize digital interactive technology to design the cultural dissemination model of ethnic minority housing and the virtual traditional architecture roaming interactive system respectively. Research subjects were selected and a research program was developed to investigate the practicality of the housing culture dissemination model and the virtual traditional architecture roaming interactive system respectively, aiming to promote the dissemination and inheritance of the traditional housing culture of ethnic minorities.

II. Study on the dissemination of housing culture incorporating digital interactive technologies

II. A. Definition of minority housing culture

Traditional housing is a national cultural phenomenon, but also a city's spiritual and cultural representatives [21]. With the continuous development of modern society and economy as well as culture, a variety of modernized architectural forms have begun to develop, which is a great impact on the protection of traditional architectural culture. Therefore, in the process of modern urban planning, the traditional architectural culture of ethnic minorities should be organically integrated into the modern city through digital interactive technology, so that it can show the vitality of the new culture.

II. B. Current situation of the dissemination of traditional architectural culture of ethnic minorities

At this stage, with the high degree of social and economic development, people have higher requirements for buildings. Whether it is a residential building, public building or business building, quality, function, aesthetics and environmental protection have become the development hotspots that modern construction enterprises focus on. This change has greatly promoted the development of China's construction industry as well as construction technology. It has pushed forward the pace of urban modernization. However, with the rapid development of modern architectural culture, it has brought great impact to the traditional minority traditional architectural culture.

II. B. 1) Reduced utility of traditional architecture

Traditional architecture is the architectural wisdom summarized by the working people in the long process of practice and exploration, and the basis for the inheritance of these architectural cultures is its outstanding use value. However, with the development of modern construction technology and building types, the practicality of these traditional buildings has been greatly reduced. At the present stage of urban architecture, has begun the development of digitalization, intelligence, in terms of functionality has a very prominent diversified characteristics, can meet the growing needs of people in all aspects, for people's life and work to provide great convenience. The traditional architectural form, with the rise of modern architectural culture, the use of value has become smaller and smaller, the number and scope of the building has also begun to shrink. This has directly caused the gradual decline of traditional architectural culture, which will eventually become extinct if not protected in time.

II. B. 2) Irregular development

In order to better protect traditional architectural culture, local governments have introduced a series of policies and regulations to support the development and protection of traditional architecture. Under this circumstance, a series of tourist attractions with the theme of traditional architecture have begun to develop. However, with the development of modern cities and social economy, some development irregularities are also reflected. Even in some areas also appeared in the arbitrary alteration of traditional architecture, destruction of architectural culture, malicious price gouging behavior. This greatly deviates from the essence and starting point of the protection of traditional architectural culture, and even plays a reverse role in the protection of traditional architectural culture.

II. B. 3) Inadequate protection techniques

In order to protect traditional minority cultures in an organic manner, it is necessary to have sufficient technical support in addition to adequate policies, funding and organizational conditions. Only in this way can we ensure to the greatest extent that the traditional architectural culture will not be destroyed due to objective or subjective reasons. In addition, in terms of technical equipment, China now applies in the building protection equipment and technology form than some developed countries in the West still has a very big gap. Especially in terms of technical equipment, some of the equipment used at this stage can not meet the demand for protection and restoration of traditional buildings, which is also the focus of architectural conservation work for a long time to come.

II. C.Models of cultural communication in housing based on interactive technologies

Aiming at the status quo and problems of traditional housing culture dissemination of ethnic minorities in the context of big data technology, in this regard, this subsection proposes a housing culture dissemination model based on interactive technology, which will in turn provide organic protection of traditional ethnic minority cultures, and promote the dissemination and inheritance of traditional housing culture of ethnic minorities.

II. C. 1) Overview of digital interactive technologies

There are many kinds of technologies under the category of interactive digital interactive technology, and many experts and scholars in the industry have also carried out some research on this, and here we mainly discuss the interactive technology that can be used for the dissemination of traditional housing culture of ethnic minorities.

(1) Touch-and-press technology

Touch interactive technology is also often referred to as touch screen technology, but this touch technology to show the medium is not limited to the screen, in some special plane can still do the transmission of information. The advantage of this touch interactive technology is that it allows people to more intuitively and conveniently choose the information they want, so that they can more effectively receive the traditional minority housing culture. The integration of digital interactive technology of the traditional housing culture of ethnic minorities has obvious communication advantages compared with the traditional way, in the content he can stimulate people's sensory nerves more than the traditional way, under the multi-dimensional communication of the large screen, so that people get an immersive experience, the blessing of interaction is to enable people to participate in the traditional housing culture of ethnic minorities in the communication activities, a deeper understanding of the content expressed by the traditional housing culture of ethnic minorities.

(2) Multimedia integrated effect

Multimedia integrated effect is simply through the technical means of sound, light, electricity, action and other digital information for unified control, in a specific time and space under the scene to coordinate and cooperate, presenting a more excellent audio-visual effects. 2008 Beijing Olympic Games opening ceremony of the painting and calligraphy scroll is the use of technical means of sound and light, such as the integrated arrangement, with the live performers to perform, and finally presented the scroll slowly unfolded, people swim in the painting, people and paintings perfect combination of performance effects, virtual reality technology is also another embodiment of multimedia integrated effect. Virtual reality technology is another embodiment of the comprehensive effect of multimedia, with the effect of people traveling in the painting and the perfect combination of people and paintings. Through VR glasses or helmets, users can enter the virtual reality space, with the transformation of the scene and the synergy of sound effects, so that people have a sense of immersion. The concepts of digital technology and traditional housing culture of ethnic minorities seem to be unrelated, but today they are closely linked and inseparable, whether from the perspective of traditional housing culture of ethnic minorities or from the perspective of protection methods, digital technology is a very good entry point. Therefore, starting from the content and intention, protection angle, dissemination and narrative, material and texture of the traditional housing culture of ethnic minorities, through the analysis of relevant data and the organization of exhibition works, we can clarify the modern and innovative development path of traditional art, so as to make some of the high level traditional art more accessible to the people.

II. C. 2) Innovative advantages

Interactive minority traditional housing culture is with the development of science and technology, based on the gradual development of traditional housing culture, for the dissemination of minority traditional housing culture, interactive minority traditional housing culture is not subversive, innovative, but the product of inheritance and development under the traditional housing culture of ethnic minorities, as a part of the tangible cultural heritage, unstoppable with the development of the times, thereby Promote the dissemination and protection of traditional housing culture of ethnic minorities.

(1) Interesting theme content

The content can not only produce narrative stories, but also produce works with simple and clear themes but strong interactivity. Due to the addition of fun, the single content will become more interesting, thus enhancing the user's cognitive level of the traditional housing culture of ethnic minorities, and making it known as the purveyor and inheritor of the traditional housing culture of ethnic minorities.

(2) The richness of multi-dimensional audiovisual experience

Digital interactive technology breaks the traditional minority housing culture dissemination method, broadens the interaction between traditional minority housing culture and people, and increases the immersion of people watching. It has a unique formal language, compositional form and spatial expression. It is not only limited to interactive forms such as walking down from the shelf, removing “no touching” and removing protective fences, but also allows the public to participate in the traditional ethnic minority buildings, so that people can have zero-distance contact with it and even “move” it, and experience the cultural and emotional values embedded in the traditional ethnic minority housing. Cultural and emotional value.

(3) Multi-sensory authenticity

With the development of 3D modeling, virtual reality and other technologies, digital traditional housing can be virtual reality, immersive, breaking people's perception of the traditional minority housing culture dissemination methods, providing users with a full range of the most authentic multi-sensory experience, so that they have a clearer perception of the traditional minority housing culture.

II. D. Virtual traditional architecture roaming interaction system design

It is clear from the previous content that while developing a model for the dissemination of housing culture based on interactive technology, a systematic platform for the dissemination of a few housing cultures was found to be lacking. Accordingly, the virtual traditional architecture roaming interactive system is proposed. It is possible to find new ideas and add new contents for the protection and dissemination path of national culture through the design of virtual roaming system with specific performance objects, so as to maximize the cultural value and social value of regional architectural connotations as much as possible.

II. D. 1) Overall framework design of roaming interactive system

The specific design method of the roaming interactive system is decided according to the principle of human cognition of information and different emotional experience levels of human design, combining the technical characteristics and functional applications of three-dimensional digitized simulation graphics, multimedia files and Unity 3D game engine, and using C# as the scripting language for the control of the system's interactive functions, so as to complete the entire design of the virtual roaming system and provide the most essential communication media and communication content for the digital dissemination of the few traditional architectural cultures. Provide the most indispensable communication media and content for digital communication of a few traditional architectural cultures.

(1) Technical Framework Structure

In view of the fact that the realization of the system design must rely on specific software platforms and programming languages, and need to use the corresponding technology to realize the principle, so the development of the virtual roaming system of minority traditional architecture firstly needs to start from the functional characteristics of the software and technology that will be used in the process of designing practice, to determine the macro technical framework for the design of the system, and to determine the basic method of realizing the system, which must be clearly designed in the early stage of the whole design process. This is the design content that must be clarified in the early stage of the whole design process.

Before the development of the system, the first step is to obtain the accurate data of the scene architecture and the environment through the graphic information of the main building required for the scene collected by the camera and the plane media, determine the overall geographical distribution of the virtual scene, and then express the distribution of the scene architecture in the form of a plan. The 3D modeling software is combined with the mapping files originated from shooting and computer drawing to construct the visualized concrete form of each building model in the scene. The completed model is imported in FBX format compatible with Unity 3D game development engine, and the specific environmental parameters in the software are set to simulate the sky environment and repair the texture information to complete the construction of the scene [22], [23]. On the basis of the existing scene, the main use of C# as a programming language, to complete the system interaction design part of the system is completed after the completion of the necessary usability testing, and then according to the different application platforms to generate the executable file form, the specific structural framework as shown in Figure 1.

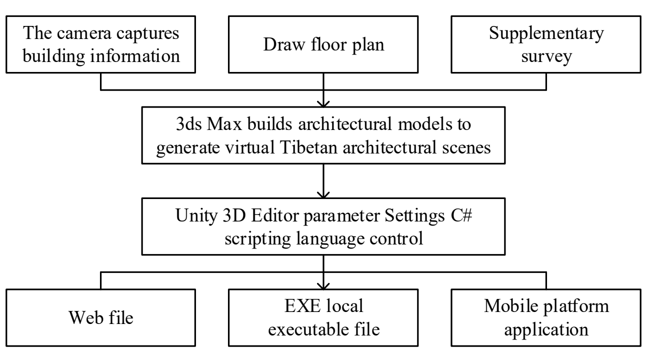


Figure 1: Technical framework for system design

(2) Overall content planning

Minority traditional architecture virtual roaming system as a practical art design works, the use and purpose is its essential attribute, and its purpose and people through the design of the final emotional experience and realize the cultural dissemination of behavior is closely related, only when people on the system application of the results of the emotional experience with the designer's understanding and expectations of the same, in order to show that the designers in the design process to present a proper and reasonable design content, the system also has the possibility to achieve the ultimate dissemination of architectural culture. Only when the result of people's emotional experience of the system is consistent with the designer's understanding and expectation, can it be said that the designer has presented appropriate and reasonable design content in the design process, and the system has the possibility to achieve the final purpose of disseminating architectural culture. Therefore, it can be said that the process of designing the content of the system is also the process of designing the user's emotional experience, which consists of the instinctive experience of sensory stimulation when interacting with the system, the pleasurable experience at the behavioral level brought about by operating and controlling the system, and the experience at the reflective level brought about by understanding and experiencing the architectural culture information content conveyed by the system. Combining the three levels of emotional experience expected to achieve the goal, can basically determine the system as a whole should have what the main content:

(a) Scale down the physical building by a certain proportion, and build a realistic architectural scene as much as possible.

(b) Provide users with independent choice of roaming mode and humanized easy-to-read user interface, and provide help services for necessary prompts.

(c) In the design of interactive functions, consider the cooperation of visual, tactile and auditory sensors to realize the multi-sensory nature of interactive behavior.

(d) Publish a variety of file forms for the system that are easy to share and copy.

II. D. 2) Visual interface and interactive function design

(1) Visual interface design

The visual interface can be divided into two major components, including virtual architectural scene design and UI design. In the architectural scene design part, firstly, according to different traditional minority building types, from the residential buildings, religious buildings, and garden buildings, each of them selects the individual buildings that can best reflect the cultural characteristics of the corresponding building types, realizes 1:1 original reproduction of the representative buildings of Tibet, and reorganizes and arranges them in the virtual space according to the different sizes of the buildings and the different values of the historical and cultural values, so as to constitute the virtual scene of the new traditional minority architecture park. The virtual scene of the architectural flavor park. After determining the performance objects in the scene, then through the 3DSMAX software using polygonal modeling for specific model construction. In the process of scene construction, we need to pay special attention to the editing of building materials, highlighting the traditional ethnic minority buildings love the natural materials to give people the visual experience, restore the external texture and texture of ethnic minority buildings. In the use of color, it is necessary to choose according to the traditional architectural color system of ethnic minorities, so that the whole scene first visually reflects the distinctive cultural characteristics of Tibetan architecture.

(2) Interaction Function Design

The design of interactive function corresponds to the emotional design content of human behavioral level and reflection level. Under the premise of visual information stimulation, users can utilize more sensory organs to interact with the system platform to realize the transmission of information, and the psychological immersion will be gradually deepened in this dynamic process, and how to make this immersion effect the best, it is necessary to make the design of interactive functions return to the human body itself, that is, to take into full consideration the real state of nature, the human body in the environment of the cultural architectural complex will have That is to say, fully considering the real natural state, the human in the cultural complex environment will have what movement and behavior of the physiological needs and the specific realization of the way, will be extended to the designer's system platform, to provide users with the closest to the natural state of the interactive function, in order to facilitate the user easier to temporarily forget the existence of the system hardware and software, to get the feeling of immersive excursion.

III. Research and analysis of communication models and interactive systems

III. A. Analysis of the utility of the housing culture communication model

III. A. 1) Subject of the study

Considering that with the age of too young and too old, resulting in a low level of interest in the cultural dissemination activities of minority housing, this experiment requires the age range of the subjects to be 20 to 40 years old, which is more likely to accept the activities of this research, after comprehensive consideration of this part of the experiment to take 36 volunteers of a village (a countryside with strong minority customs) as the subjects of the experiment. The principles of experimental subjects selection are:

(1) The ratio of men to women is one to one as far as possible.

(2) Voluntary participation in the experiment and the guarantee that the test will be completed truthfully.

After screening, 36 volunteers were finally identified, and men and women were randomly assigned to the experimental group and the control group equally, in which the experimental group and the control group each accounted for 18 volunteers, and the experimental group and the control group were set up as the housing culture communication mode based on the interactive technology and the traditional communication mode, respectively, to validate the effectiveness of the housing culture communication mode based on the interactive technology through the independent sample test of the two modes.

III. A. 2) Research process

In this experiment, by setting up an experimental group and a control group, the tested volunteers were randomly assigned into two groups for experimental interventions, and the research data were collected by means of questionnaires before and after the experiment and after fourteen days of the experiment. With the help of independent samples t-test to compare the test data before and after the experiment, and then summarize the promotion effect of interactive technology on the dissemination of traditional culture of ethnic minorities.

III. A. 3) Theory of independent samples t-tests

Inferences about the characteristics of the two aggregates can be made from the sample data. The purpose of the independent samples t-test is: to infer whether there is a significant difference between the means of two totals using independent samples from the two totals [24], [25]. The two sets of samples are independent of each other in the sense that one set of samples taken from one aggregate does not have any effect on the other set of samples taken from the other aggregate and the sample sizes of the two sets of samples remain equal. The basic steps of independent samples t-test

(1) Formulate the null hypothesis

$$H_0 : \mu_1 - \mu_2 = 0 \tag{1}$$

$$H_1 : \mu_1 - \mu_2 \neq 0 \tag{2}$$

where μ_1 and μ_2 are the means of the first and second totals, respectively.

(2) Selection of test statistic

The first case: when the two overall variances are unknown and equal, i.e., $\sigma_1 = \sigma_2$, under the condition that H_0 holds, the choice of test statistic is:

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{S_w\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}} = \frac{\bar{X}_1 - \bar{X}_2 - 2}{S_w\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}} \sim t(n_1 + n_2 - 2) \tag{3}$$

Among them:

$$S_w^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \tag{4}$$

The second case: when the two overall variances are unknown and unequal, i.e., $\sigma_1 \neq \sigma_2$, the test statistic is chosen:

$$t = \frac{\bar{X}_1 - \bar{X}_2 - (\mu_1 - \mu_2)}{\sqrt{\sigma_{12}^2}} \tag{5}$$

where $\sigma_{12}^2 = \dfrac{S_1^2}{n_1} + \dfrac{S_2^2}{n_2}$ obeys the t-distribution modified degrees of freedom of the modified degrees of freedom defined as:

$$f = \frac{(S_1^2 / n_1 + S_2^2 / n_2)^2}{(S_1^2 / n_1)^2 / n_1 + (S_2^2 / n_2)^2 / n_2} \tag{6}$$

(3) Calculate observations and p-values for test statistics

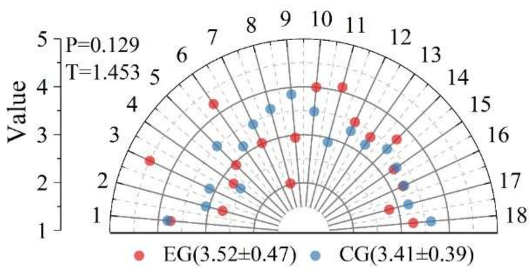
The purpose of this step is to calculate the observed values of the F-statistic and the t-statistic, as well as the corresponding P-value.SPSS will automatically calculate the F-statistic and the P-value based on a one-way ANOVA, and will automatically calculate the observed value of the t-statistic and the corresponding P-value by substituting the mean value of the two groups of samples, the number of samples, and the variance of the sampling distributions into the $t=\frac{\overline{X}_1-\overline{X}_2-(\mu_1-\mu_2)}{\sqrt{\sigma_{12}^2}}$.

III. A. 4) Results and analysis

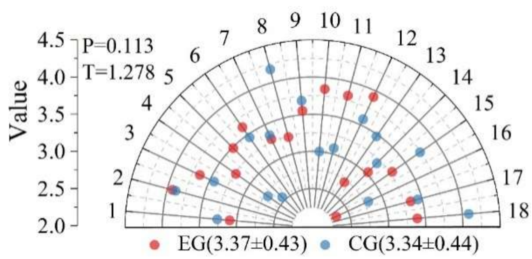
The three dimensions of fun, richness and authenticity refer to people's assessment of cultural communication modes, and the values of the three dimensions of fun, richness and authenticity are obtained through scale measurements, and independent sample t-tests are carried out for this paper's model and the traditional model, which can be divided into pre-intervention variability analysis and post-intervention variability analysis according to the experimental intervention process, and the specific research and analysis process is as follows:

(1) Pre-intervention difference analysis

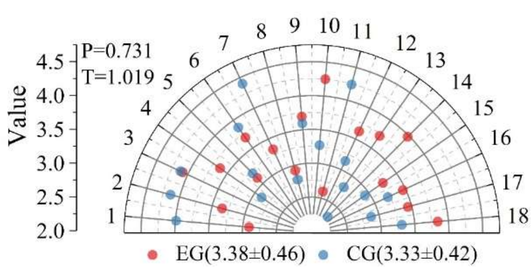
Using the independent sample t-test to explore the differences between this paper's model and the traditional model before the experimental intervention, the results of the pre-intervention variability analysis are shown in Figure 2, where (a) ~ (c) are fun, richness and authenticity, and EG and CE in the figure are the experimental group and the control group, respectively. It can be seen that the difference in the mean values of the three dimensions of fun, richness and authenticity between the experimental group and the control group is 0.11, 0.03 and 0.05 respectively, and there is almost no difference in the dimensions between the experimental group and the control group before the intervention and it satisfies P>0.05, which reinforces the fact that the experimental group and the control group do not have a significant difference in the dimensions of fun, richness and authenticity.



(a)interestingness



(b)richness

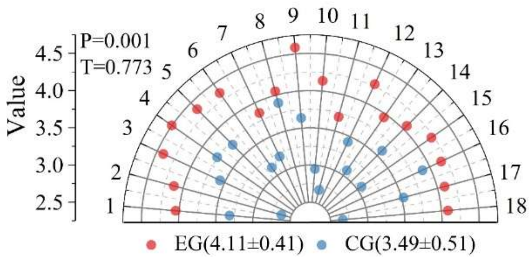


(c)authenticity

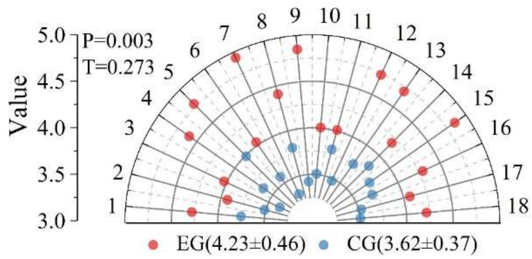
Figure 2: Difference analysis before intervention

(2) Post-intervention variability analysis

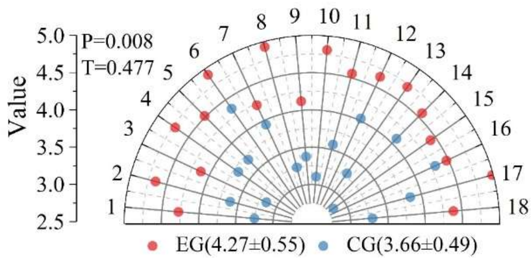
Using the same method described above, the experimental group and the control group were analyzed for differences after intervention, and Figure 3 demonstrates the results of the analysis of differences between the two groups after intervention. Based on the data performance in Figures 3(a)~3(c), it can be seen that the differences in the mean values of the dimensions between the experimental group and the control group after the intervention are 0.62, 0.61, 0.61, and the corresponding P-values are 0.001, 0.003, and 0.008 in accordance with P<0.05 in that order, which summarizes that the experimental group and the control group after the intervention have a significant difference in the dimensions of fun, richness, and authenticity, and that the digital interactive technology can promote ethnic minority housing culture in the traditional mode, as compared with the traditional mode. Compared with the traditional mode, digital interactive technology has a more significant effect on the promotion of cultural communication in minority housing, confirming the effectiveness of digital interactive technology.



(a)interestingness



(b)richness



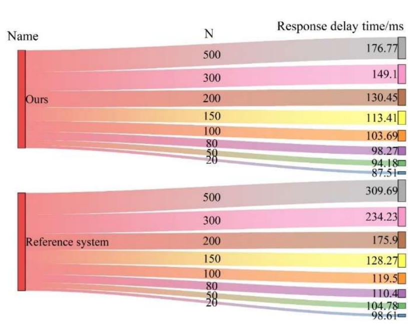
(c)authenticity

Figure 3: Analysis results of difference between the two groups after intervention

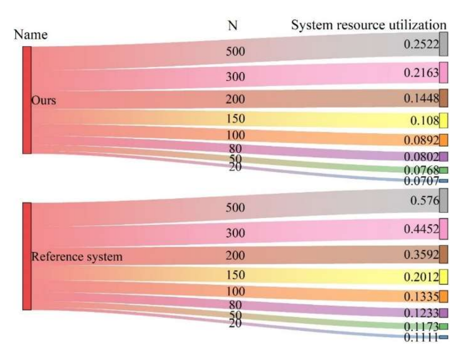
III. B. Interactive system analysis

III. B. 1) System performance analysis

According to the actual application scenario of the system, the evaluation indexes of this system performance experiment choose two items: system response delay time and system resource utilization. Among them: the system response delay time is the time difference between the request issued by the user end and the response received from the system. The system resource utilization rate is the proportion of computing resources occupied by the software part when the system function module is running. The shorter the response delay time of the system and the smaller the proportion of computing resources occupied by the system hardware when the function is running, the better the performance of the system. In order to make the experimental data have a certain objectivity, the interactive system based on .NET technology is introduced as the reference group of the system designed in this paper. Different numbers of system response requests are set, and the experimental index data of system operation performance are collected by specialized testing software. The system's operation performance experimental index data are shown in Fig. 4, where (a)~(b) are the response delay time and system resource utilization rate, respectively. The system designed in this paper is able to support more users' access requests, and the available resource space for functional expansion of the system in the process of subsequent cultural dissemination is larger, and the basic operational performance of the system is better.



(a)Response delay time



(b)System resource utilization

Figure 4: Operating performance experimental index data of the system

III. B. 2) System application analysis

In order to verify the effectiveness of the system's application in the actual traditional housing culture dissemination activities of ethnic minorities, a village (consistent with subsection 3.1.1) is also taken as an example for the system application experiment. A village is chosen to carry out the application test of the system, and the system is applied to the traditional housing culture dissemination activities of ethnic minorities in a village to compare the effects of different interactive systems in assisting the dissemination of traditional housing culture of ethnic minorities. The system designed in this paper and the interactive system based on the .NET platform were separately applied to the traditional housing culture dissemination activities of ethnic minorities, ignoring the deviation of the experimental results caused by the differences between individuals, and comparing the frequency of effective communication between users after the application of the system. The number of times users discussed the topics of minority traditional housing culture communication during the communication process was counted. The results of the comparison of the number of effective interactions between users applying the two systems to assist the communication activities of traditional ethnic minority housing culture are shown in Figure 5. As can be seen from Figure 5, the use of the virtual traditional architecture roaming interactive system increased the number of effective user interactions by approximately 44% or more. When the system is applied to actual cultural communication, it is found that the number of interactions and discussions is enhanced more significantly. The above analysis of the system performance and application experiments shows that the use of the virtual traditional architecture roaming interactive system based on digital interactive technology for cultural communication activities can improve the enthusiasm of user interaction, and has an important role in promoting the protection of the traditional architectural culture of ethnic minorities.

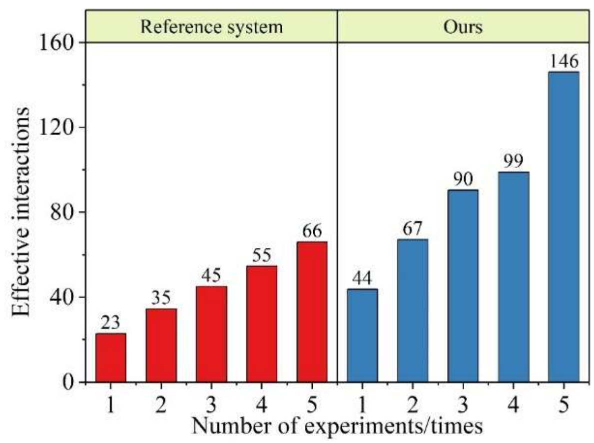


Figure 5: Comparison of effective interactions

IV. Conclusion

In this paper, for the current situation of traditional housing culture relay of ethnic minorities, the housing culture dissemination model based on digital interactive technology and the virtual ethnic minority building roaming interactive system are proposed respectively, and the comprehensive research data are verified and analyzed for both. After the experimental intervention, the difference between the mean values of the dimensions of the control group and the experimental group is 0.62, 0.61, 0.61, which satisfies the condition of $P<0.05$ significance, and it is concluded that the experimental group and the control group after the intervention have a significant difference in the dimensions of fun, richness, and authenticity, which fully verifies the effectiveness of the housing culture dissemination model of ethnic minorities based on digital interactive technology. Compared with the reference system (interactive system based on .NET platform), the use of the virtual traditional architecture roaming interactive system increased the number of effective user interactions by about 44% or more, and in terms of the dissemination of traditional ethnic minority architectural culture, the virtual traditional architecture roaming interactive system constructed in this paper has a higher priority.

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