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Research Article

Digital Protection of Cultural Heritage Based on Web Technology

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With the rapid development of digital technology, it has now been widely used for the digital protection of cultural heritage. The traditional cultural heritage digital protection method of information retrieval recall rate is low, and the processing time is long. Therefore, a new digital protection method of cultural heritage based on web technology is proposed. An improved four-layer architecture design pattern is adopted to plan a web-based digital protection platform for cultural heritage. The application service provider (ASP) combines SQL server and B/S architecture to develop a database platform and functional modules for direct dynamic management of the website model. Based on this, combined with web technology, the digital image of cultural heritage is reconstructed followed by computing the uncertainty probability of web visualization, completing the modeling metalanguage, and classification of network cultural heritage. The digital image enhancement of cultural heritage is based on HSV color space. In order to realize the digital protection of traditional cultural heritage, multifiltering technology is introduced into the process of brightness digital image extraction. It is evident from the experimental results that the proposed method has higher recall and lower error and can enhance the digital image of cultural heritage in a shorter time, which shows that the proposed method can effectively achieve digital protection of cultural heritage.

1. Introduction

With the continuous and rapid progress and developments in the field of computer network technology, the digital museum has become an important part of modern education. Historical and cultural heritage through digital technology into cultural heritage digital images can be widely disseminated on the network. Digital museum meets the cultural relics experts and cultural relics enthusiasts on the research setup, and it will save cultural relics data in the network for users to download. In order to show the original appearance of the cultural relic to the greatest extent, the three-dimensional digital model of the cultural relic in the digital museum has the shape and color information of the cultural relic [1]. The digital image of cultural heritage contains rich contents, which can be used only as the digital image information of cultural heritage through processing. However, due to illumination, equipment, and other reasons, the brightness of digital images of cultural heritage obtained is not enough, and it is difficult to guarantee the quality of digital images of cultural heritage. However, most current reconstruction methods of digital image authenticity are difficult to retain the details of digital images of cultural heritage while eliminating the influence of illumination, and there are problems of color distortion [2]. Therefore, how to effectively carry out digital processing of cultural heritage has become an important research topic in the field of cultural heritage protection.

Liu [3] designed a 3D image automatic visual communication optimization platform based on digital image reconstruction. By estimating the resolution of the 3D digital image, the key reconstruction nodes are iteratively modified, and when combined with the calculation results of the time-domain relaxation factor, the 3D defogging processing of digital image reconstruction is completed. On this basis, the infrared realistic camera is connected, and the images to be reconstructed are summarized into the visual communication processing equipment with the help of image sensor equipment, to realize the smooth application of the 3D image automatic visual communication optimization platform. Cao [4] proposed a multiview 3D reconstruction method of the virtual scene in building interior space. The multiview fusion processing is done for 3D sampling collection points to obtain complete 3D information, calculate the depth confidence of sampling points, and eliminate redundant fusion data. According to the data processing results, combined with the three-point measurement method, the best main view and subview are determined, and then the purpose of optimal growth is achieved through multiple iterations. Based on factorization, the feature point set is obtained by using the pixels of the three-dimensional model. Finally, the three-dimensional virtual space points corresponding to the feature points are solved according to the continuous depth fusion method, which can realize the three-dimensional reconstruction of the multiview virtual scene of indoor space. Zhang [5] proposes an optimization method for visual quality evaluation based on weighted structural similarity. The wavelet decomposition method is used to decompose the mechanical product image to obtain the low-frequency subband and high-frequency subband of the mechanical product image. The visual model is used to perceptually filter the image subbands of each mechanical product, and the weighted structural similarity method is used for evaluation to complete the optimization of image vision. Biryukova [6] in his research considers the pros and cons of digital technologies in the field of protection of cultural heritage. In this study, the authors analyze the properties of virtual forms of cultural heritage preservations in the context of interaction between contemporary society and cultural tradition.

In the application of the method proposed in the above literature, the recall rate of traditional cultural heritage information retrieval is low and the processing time is long. Therefore, in order to capitalize on the weaknesses of the existing method, a new digital protection method of cultural heritage based on web technology is proposed in this study.

2. Digital Protection Platform for Cultural Heritage Based on Web

Also known as the global information network or the World Wide Web, the web integrates text, graphics, images, and sounds to present and provide information in an intuitive graphical user interface based on hypertext and hypermedia technology. With the rapid development of network technology, the web has gradually become the mainstream of Internet information resources. Therefore, the use of web technology for the Manchu intangible cultural heritage put on the coat of the times will make this precious traditional culture on the stage of the world national dance play a greater role.

Digital technology is a kind of science and technology associated with electronic computers. It refers to a kind of technology that converts various kinds of information, including diagrams, literature, sounds, and images, into binary digits "0" and "1" that can be recognized by electronic computers for operation, processing, storage, transmission, transmission, and reduction. The protection of Manchu intangible cultural heritage will step into a new era by using digital technology to convert the physical intangible cultural heritage of Manchu into electronic information, store it in memory, and provide it to users through the network. First, rich data can be stored at low cost due to the amazing storage capacity of memory that can store a large amount of research object information on a very small chip. Secondly, the various storage formats of digital technology can store the Manchu intangible cultural heritage in various media such as pictures, words, and sounds in the database. At the same time, the information can be copied in large quantities under the permission of the authority, and no matter how long it takes, it will not be changed, which makes the precious national cultural heritage permanent and provides convenient conditions for the inheritance. In addition, the application of digital technology has created an advantageous research platform for researchers of Manchu culture, so long as the conditions permit the researchers to open the computer at any time when they need to and to enter relevant keywords, subject words, and other search items into the search engine to easily obtain information, thus saving time for the digital protection of cultural heritage.

The platform adopts an improved four-tier architecture design pattern, that is, the traditional three-tier architecture (presentation layer, business logic layer, and data layer) is changed into the presentation layer, control layer, business layer, and data layer. The specific architecture design is shown in Figure 1.

The presentation layer mainly uses Html 5, JSP, and Struts—tags for page display, effectively combining Ajax and WebGL technologies to enhance the user experience. The business layer is handled by Spring, the current mainstream lightweight application framework, which performs two main tasks: first, it calls the DAO class to implement the business logic; second, it writes the server method; finally, it uses the other layers of the Spring IoC container organic integration platform, using Ajax to easily achieve asynchronous communication between the client and the server and reducing the pressure on the server. It can be seen that each module and level of the application platform are separated effectively, and the goal of "high clustering and low coupling" is achieved in the software design.

According to the demand, digital protection platforms can be divided into management subplatform and application subplatform. ASP combined with SQL server and B/S architecture and developed a database platform for direct dynamic management of website model. The management subplatform contains the following modules:

(i) *Authentication*. Authenticate the user.

(ii) *Document Management*. The literature was added, modified, and deleted.

(iii) *Column Management*. Add, modify, and delete arrays and their children.

(iv) *User Management*. Illegal users can be locked or deleted.

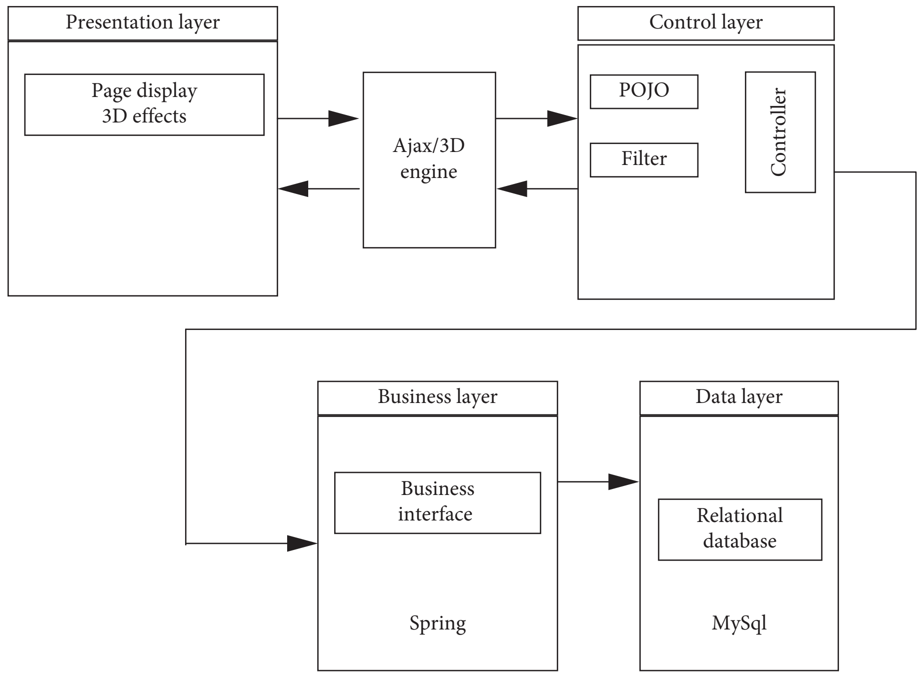

Figure 1: Overall architecture design of the platform.

(v) *Management by Administrators*. Set the manager's authority. Enable different administrators to perform different levels of database platform management operations.

The application subplatform includes the following modules:

(i) *Classified Navigation and Browsing*. Browse the information by column.

(ii) *Search by Conditions*. Set the search item to the title, keyword, source, author, and abstract for any conditional search.

(iii) *View Brief Information*. Displays brief information such as title, author, source, and abstract.

(iv) *Download the Original Text*. Save all types of data from the platform locally.

In addition, the platform includes the following functional modules:

(i) *Registration*. Register the user's unique username, which is first checked to see if the username exists and then the user's other packets including passwords, password protection questions and answers, gender, email, and QQ number registrations in the database.

(ii) *Login*. Users use the correct user name and password to log on to the platform. If user names are not correctly entered three consecutive times, passwords are prompted "illegal operation."

(iii) *Retrieving the Password*. When the user forgets the password, the password can be reset by answering the question correctly.

The main functional module relationships are shown in Figure 2.

Visual C+ is used to achieve the design of the platform interface. The core object-oriented implementation of VTK is implemented through Visual C+ and basically completes operations on various Unix platforms, mainly for visualization. The VTK visualization tool library is an image application database, which has the features of open source and cross-platform operation, including image processing, visualization, and display. Image processing is to reconstruct the 3D image of a digital museum, reconstruct the 3D reconstruction result by visual processing, and show it to the users.

In the design platform, the original data of digital museum cultural relic images are preprocessed and transformed into a 3D point cloud data field for 3D reconstruction. The hardware uses the FSL bus to reconstruct the connection between the IP core and MicroBlaze software and to accelerate the hardware. Figure 3 shows the interface diagram of the platform.

3. Digital Image Reconstruction of Cultural Heritage Based on Web

3.1. Web Visualization Uncertainty Probability Calculation. The focus of the visual development platform for the World Wide Web (WAN) is to classify and refine various types of data information in the web and make use of key technologies to display information in the form of graphics or charts in a unified visual platform, to improve the visual perception, reduce the dispersion of data, and facilitate research and management. This article will use the service-oriented architecture of service-oriented architecture in microservices technology to visualize specific network information, which is

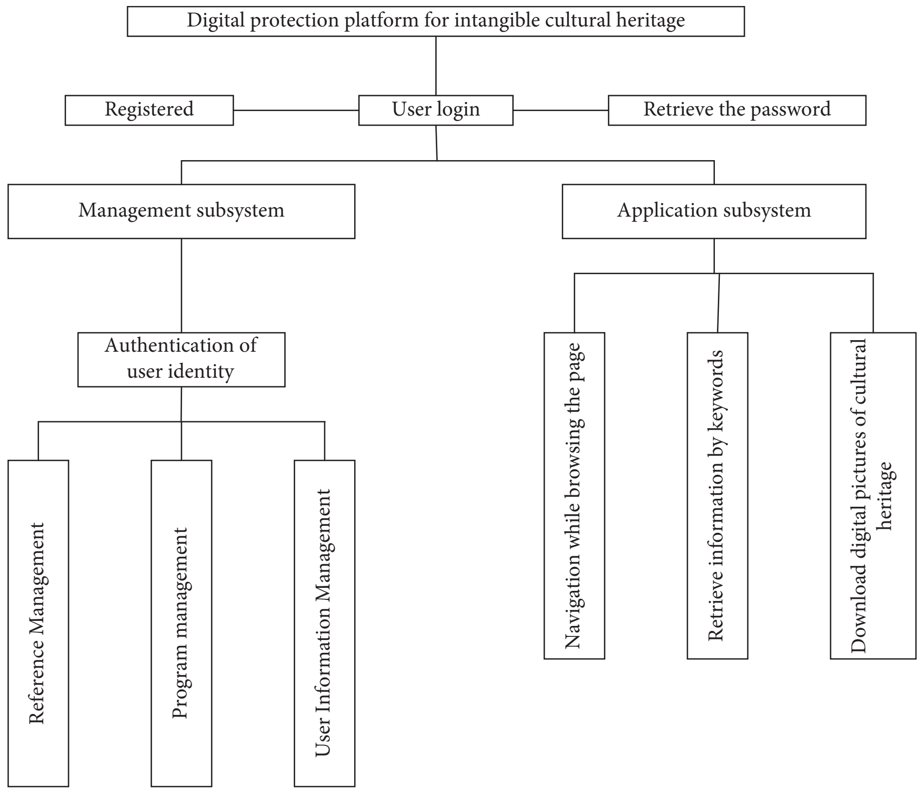

Figure 2: Functional module diagram.

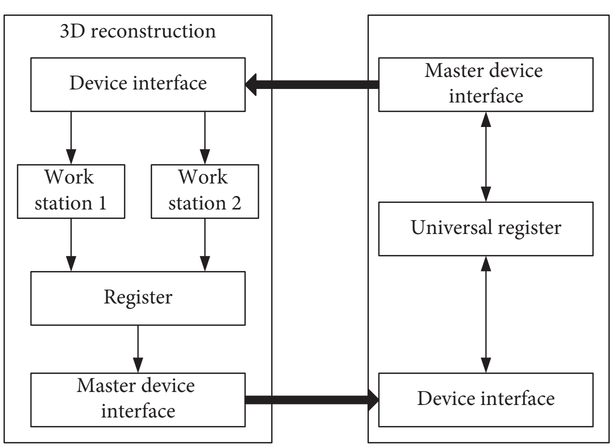

Figure 3: Interface design of the platform.

highly independent, has high consistency in the process of data transformation, and facilitates the collaborative operation of visual information resources [6].

First, given a set of data probabilities that can represent network uncertainties is $P = (X, J, \rho)$; in a set, X represents the set of network edge information; J represents the set of network edge nodes; $\rho = \{\rho_{ij}\}$ represents the density of the probability distribution of uncertain data, where $ij \in J$ and $\rho_{ij}(q)$ is the weighted value of the network edge; if the weighted value $\rho_{ij}(q)$ conforms to a continuous function, it is written as follows:

$$\int_{-\infty}^{\infty} \rho_{ij}(q)\mathrm{d}q = 1. \tag{1}$$

In general, a discrete function can be used to explain the continuity function, which is expressed as follows:

$$\rho_{ij}(q) = \begin{cases} 1 - \wp^{*}, & \text{if } q = 0, \\ \wp^{*}, & \text{if } q = 1. \end{cases} \tag{2}$$

Here, $1 - \wp^{*}$ represents the probability of the existence of the network data edges in the visual block diagram, and the corresponding probability weight of the value is 1; $\wp^{*}$ represents the nonexistence of the network data edges, the corresponding probability weight is 0, and the meaning of the distance between the network nodes i and j is positive and infinite. $(1/q)$ is used to express the distance relationship between nodes in the network. In order to ensure the accuracy of the calculation of the uncertainty of data visualization, we can get the expected layout of network data visualization by solving the problem of deterministic weight remotely. The expected layout of network data visualization includes the distribution of probability functions with uncertainty about network data, which is roughly divided into four kinds. The four kinds of distribution probabilities are expressed by a set of functions F_1. Each data edge of the data matrix layout corresponds to a probability weight density function of $\rho_{ij}(q)$. Thus, according to the initially given data, the edge j calculated that the probability of expected weight is q_{ij}, and the formula is as follows:

$$Q_{ij} = \int_{-\infty}^{\infty} \frac{\rho_{ij}(q)}{q} \mathrm{d}q, \tag{3}$$

$$\text{stress}(P) = \frac{\sum_{i\geq j}\varphi_{ij}\left(\sum_{i,j}P_{ij} - P\right)}{d_{ij}^2}, \tag{4}$$

$$D = 1/ = \left\{d_{ij}\right\}. \tag{5}$$

In formula (3), Q_{ij} represents the weighted probability of the network data appearing in the nodes when visualization is carried out; the shortest path algorithm between the data is used to obtain a visual shortest matrix of $D = \left\{d_{ij}\right\}$. The P_i in formula (4) represents the expected layout $P_i \in P^{n\times 2}$ of the visual matrix, where P represents a matrix of size $n \times 2$ and n represents the number of nodes of the network data. According to the gravity algorithm, the probabilistic uncertainty of network data can be calculated accurately, the error of visual weight distribution can be reduced, and the overall efficiency can be improved.

3.2. Network Cultural Heritage Modeling Metalanguage and Classification. One of the main problems in the design of a Chinese cultural heritage classification platform based on a multilingual model is the choice of multilingual model based on word level or word level. But when we design the classifier of multilingual model, it is easy to make the data sparse, so it is more suitable to choose the multilingual model according to the level of the words. The performance of the multituple model is equivalent to the level $N-1$ tuple model. In addition, compared with the latter, both in the classification performance and classification speed, to avoid a large number of spam strings, the benefits are obvious. In the dictionary, if the number of entries is 100000, the estimated parameter is 1000002 and the classifier model is based on the word multilingual model.

Two problems should be paid attention to the cultural heritage classification of multilingual model: one is to have enough training data to extract “good“ model parameters and the other is the problem of the sparseness of statistical data, which is to use smoothing technique to deal with small probability events and prevent the model from overfitting.

Classification Process of New Cultural Heritage. For classified new cultural heritage A, it is preprocessed into W, a continuous string set of Chinese characters. The probability of each successive Chinese character string W_i is calculated, which is obtained after word segmentation, stop word, and noncontent word filtering, belonging to each document category R, respectively:

$$\begin{aligned} P_c(\gamma_i) &= P_c(\gamma_1\gamma_2\ldots\gamma_m) \\ &= R\prod_{i=1}^{m} p_c(\gamma_i|\gamma_{i-1}) + \sum_{i=1}^{m} \lg p_c(R_i|R_{i-1}). \end{aligned} \tag{6}$$

Here, in the probability that new cultural heritage W belongs to the document category R, the category with the maximum probability is determined as the category to which the new cultural heritage belongs.

3.3. Digital Image Enhancement of Cultural Heritage Based on HSV Color Space. In the authenticity improvement process of digital image reconstruction of cultural heritage, firstly, the brightness component of V channel is enhanced in the HSV space of digital cultural heritage image, and the reflection component in the logarithmic domain is stretched to a certain dynamic range. An adjustment factor is introduced in the process [7, 8]. The processed brightness digital image is used to make illumination compensation for each channel signal after filtering, and the specific process is described as follows:

To reconstruct the entire digital image of cultural heritage, it is necessary to increase the brightness of each pixel of the digital image of cultural heritage, so the brightness component is first extracted from the original digital image of cultural heritage, the V component of the HSV color space is the brightness component, and the processing V component is equal to cultural heritage digital image RGB three-channel maximum processing. Formula (9) is used to extract luminance component of cultural heritage digital image:

$$V(x,y) = \max\{R(x,y), G(x,y), B(x,y)\}, \tag{7}$$

where $R(x,y)$, $G(x,y)$, and $B(x,y)$ respectively represent the R, G, B value of the original cultural heritage digital image, and the reflection component of the brightness component of the cultural heritage digital image is obtained according to the Retinex theory:

$$V_{\text{enh}} = \lg[V(x,y)]\lg[F(x,y,c)\cdot V(x,y)], \tag{8}$$

where $F(x,y,c)$ represents the surround function, and Gaussian filtering uses approximate mean filtering.

The above process causes a large amount of noise in the dark area of the color of the digital image of cultural heritage [9, 10], and the bright area loses the original details due to enhancement. Therefore, an enhancement adjustment factor $\mathfrak{R}(x,y)$ is proposed, which is defined by the following formula:

$$\mathfrak{R}(x,y) = \aleph\cdot \sin[V(x,y)], \tag{9}$$

where $\aleph$ represents the adjustment range of the enhancement adjustment factor on the brightness of cultural heritage. The brightness component $V_{\text{enh}}(x,y)$ of the original digital image of cultural heritage is multiplied by the adjustment factor $\mathfrak{R}(x,y)$, which is expressed by the following formula:

$$V^*_{\text{enh}}(x,y) = \mathfrak{R}(x,y)\cdot V_{\text{enh}}(x,y). \tag{10}$$

Based on the calculation results of formula (10), for the range from 0 to 255 of the luminance component $V^*_{\text{enh}}(x,y)$

of the enhanced digital cultural heritage image [11], the formula (13) is used to solve the luminance gain curve of the digital cultural heritage image:

$$Z(x, y) = \frac{V^{*}_{\text{enh}}(x, y)}{V(x, y)}. \tag{11}$$

Through the analysis of formulas (10) and (11), in order to make the brightness of the reconstructed digital image of cultural heritage not decrease after enhancement, the brightness component of the reconstructed digital image of cultural heritage shall be compared with that of the original digital image of cultural heritage, the larger value of the two shall be selected, and the R, G, B value after enhancement of the digital image of cultural heritage shall be calculated by using the following formula:

$$\begin{cases} R_1(x, y) = R(x, y) \cdot K(x, y), \\ G_1(x, y) = G(x, y) \cdot K(x, y), \\ B_1(x, y) = B(x, y) \cdot K(x, y), \end{cases} \tag{12}$$

where $R_1(x, y)$, $G_1(x, y)$, and $B_1(x, y)$ represent R, G, and B values of the enhanced cultural heritage digital image.

3.4. Multilateral Filtering of Cultural Heritage Digital Images. In the process of improving the authenticity of the digital image of cultural heritage, based on the digital image of cultural heritage after illumination compensation obtained in Section 3.3, the multilateral filtering technology is introduced into the process of extracting the luminance digital image, and the optimum neighborhood range of the pixel of the digital image of cultural heritage is calculated by tilting the filtering window of the multilateral filter [12, 13]. In this range, a binary constraint function is introduced to smooth the edges of the digital image of cultural heritage, and the extracted luminance digital image is enhanced by the multiscale Retinex digital image. Finally, the HSV space of the digital image of cultural heritage is transformed into RGB space, and the reconstruction of the authenticity of the digital image of cultural heritage is completed as follows:

The tilt filter window is a digital image filter window revolving around a center point $C(x)$, the tilt vector $\delta(x)$ is a weighted average of the approximate gradient values in the neighborhood, and the gradient of the digital image $C(x)$ is as follows:

$$\delta(x) = \left(\frac{1}{\kappa(x)}\right) \sum_{-\infty}^{\infty} \nabla C(x + \xi) \cdot c(\xi), \tag{13}$$

$$\kappa(x) = \int \nabla C(x + \xi) \mathrm{d}\xi, \tag{14}$$

where $\kappa(x)$ represents the incident component estimation, ξ represents the offset vector between the current point and the center point of the cultural heritage digital image, C represents the pixel value in the neighborhood of the cultural heritage digital image, and after tilting the filter window, the distance from the cultural heritage digital image point $C(x + \xi)$ to the plane passing through the center point is replaced with the distance from the point to the center point, and ∇ represents the transformation parameter. The pixel value plane $T(\cdot)$ of cultural heritage digital image is defined as the first-order Taylor formula of neighborhood pixel value [14]:

$$T(\cdot) = C(x) + G_{\theta}\delta, \tag{15}$$

where G_{θ} represents the tilt distance of the filtering window of the cultural heritage digital image, the local detail information $C(x, \xi)$ of the cultural heritage digital image is obtained by subtracting the standard amount P from the pixel value C in the neighborhood of the cultural heritage digital image, and the pixel value ϖ of the output cultural heritage digital image is obtained by bilateral filtering of $C(x, \xi)$ [15, 16], combined with $C(x)$. The specific process is as follows:

$$\varpi = \frac{C(x + \xi) - P(x, \xi)}{T(\cdot)} \cdot \phi, \tag{16}$$

$$\phi = \frac{C(x) + (1/d\xi) \int_{-\infty}^{\infty} I_{\Delta v}(x, \xi)}{\kappa(x)}, \tag{17}$$

where ϕ represents the detail signal in the neighborhood of the digital image of cultural heritage. In order to improve the definition of edges and features of cultural heritage digital images, a binary limit function $f(\cdot)$ is introduced. ∞ and $-\infty$ represent the upper and lower limits of the binary limit function respectively. The smooth area of cultural heritage digital images is limited to the connected area with approximate rotation vector in the tilted neighborhood:

$$f(\cdot) = \begin{cases} 1, & \text{if } \delta(x + \xi) - \delta < \mathfrak{R}, \\ 0, & \text{otherwise.} \end{cases} \tag{18}$$

By constructing the largest and smallest cultural heritage digital image stack and querying the largest inbound matrix to determine the nonzero connectivity area in the neighborhood of the cultural heritage digital image, the cultural heritage digital image in the HSV color space is converted to the digital image in the RGB space according to formula (18) to obtain the reconstructed cultural heritage digital image. The reconstruction of digital image authenticity of cultural heritage in digital library based on multilateral filtering is accomplished [17].

4. Experimental Design and Result Analysis

Simulation experiments are designed to verify the effectiveness of the proposed method. The experimental platform is called Matlab2020b, and a total of 10000 digital images of cultural heritages are selected as experimental sample data sets. The data sets include seven cultural heritages, namely, the Imperial Palace in Beijing, the Summer Palace, the Great Wall, the Temple of Heaven, the Peking Man Site in Zhoukoudian, the Mausoleum of Emperor Qin Shihuang, and the ancient architectural complex in Wudang Mountain. These cultural heritages are labeled in sequence as 1 #, 2 #, 3 #, 4 #, 5 #, 6 #, and 7 #. The comparison method is the optimization method of digital image vision transmission and the multiview 3D reconstruction method of the virtual scene presented by Liu [3]. The experimental results of these two methods are compared with the experimental results of the proposed method to test the application effect of the proposed method [18, 19]. Detailed experimental data sets are listed in Table 1.

4.1. Experimental Results and Analysis. The calculation formula of information retrieval recall is as follows:

$$P_{\text{recall}} = \frac{A'}{A_{\text{total}}} \times 100\%. \quad (19)$$

Here, A_{total} represents all the information retrieved and A' means to retrieve the information the user wants to retrieve. The larger the recall of information retrieval is, the more comprehensive the information retrieval is.

The calculation formula of information retrieval error is as follows:

$$\varepsilon = \frac{B - B'}{B'}. \quad (20)$$

Here, B represents the search quantity and B' represents the actual quantity to be retrieved. The smaller the error value of information retrieval is, the more accurate the information retrieval is.

For the recall of information retrieval, the digital image visual communication optimization method proposed by Liu [3] is used. The multiview 3D reconstruction method of the virtual scene proposed by Cao [4] is compared with the proposed method. The results are shown in Figure 4.

It can be seen from Figure 4 that the highest recall rate of the digital image visual communication optimization method proposed by Liu [3] is 58% and the lowest is 40%. Using the multiview 3D reconstruction method of virtual scene proposed by Cao [4], the highest recall rate is 60% and the lowest is 40%. The highest recall rate is 99% and the lowest is 90%. It can be seen that the recall rate of information retrieval using the proposed method is high.

For information retrieval errors, the digital image visual communication optimization method proposed by Liu [3], the virtual scene multiview 3D reconstruction method proposed by Cao [4], and the proposed method are compared and analyzed respectively. The results are shown in Figure 5.

As can be seen from Figure 5, the maximum error of the proposed method for optimizing the visual communication of digital images by Liu [3] is 13% and the minimum error is 7%; the maximum error of the multiview 3D reconstruction method for virtual scenes by Cao [4] is 12% and the minimum error is 19%; the maximum error of the proposed method is 4% and the minimum error is 2%. Therefore, the error of information retrieval using the method of digital protection of cultural heritage based on the web is small.

Group 2 simulations compare the running times of the three methods, and the results are shown in Figure 6.

As can be seen from Figure 6, the final time required to visualize the full task amount in this method is the shortest, far better than the other two, and approximately half the time is saved. There are two main reasons for this phenomenon: firstly, before the visualization of image digitization, there is no classification and integration of the original data, which leads to the confusion of the position of the initialization random points, and the random value will affect the running time; secondly, 1000 data values exceed the maximum threshold of the distribution of the algorithm matrix, the demand for the energy function value will increase as the data volume

Table 1: Experimental datasets used.

Type	Quantity
The Forbidden City in Beijing	280
The Summer Palace	355
The Great Wall	285
Temple of Heaven	510
The Peking Man Site in Zhoukoudian	115
The Mausoleum of Emperor Qin Shihuang	200
Ancient buildings in Wudang Mountain	255

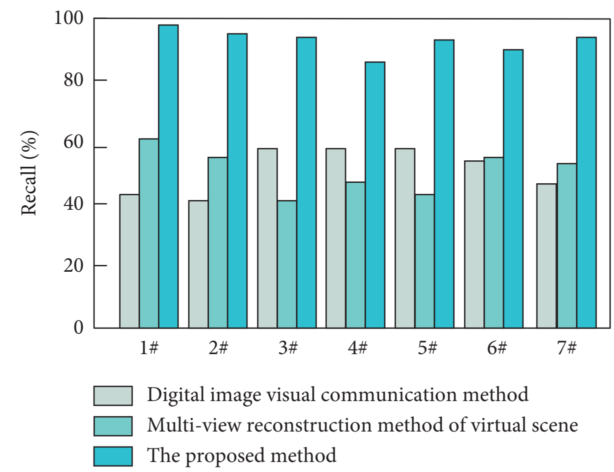

Figure 4: Comparative analysis of recall rate of information retrieval by two methods.

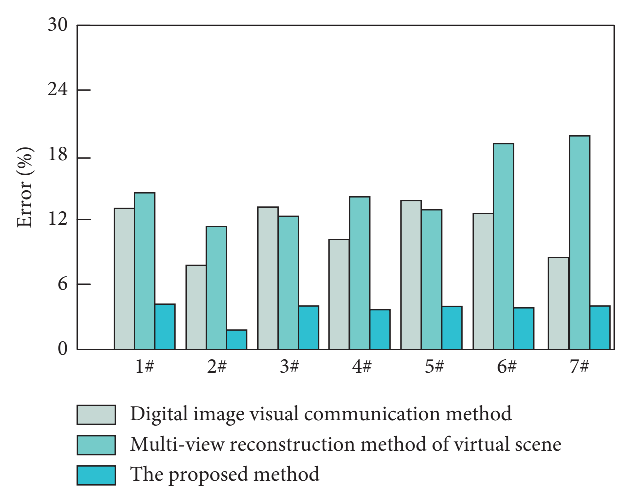

Figure 5: Comparative analysis of information retrieval errors of two methods.

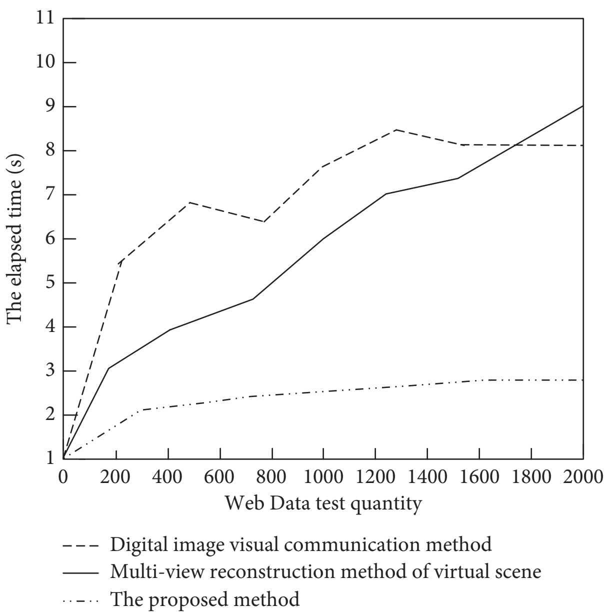

Figure 6: Running time comparison curve of three methods.

increases, and when the data exceed the critical point, a certain amount of energy compensation will be made to ensure the balance, so the time needed will suddenly increase. In contrast, this study, through the network cultural heritage modeling metalanguage and classification, reduces time consumption and improves the stability of the overall visualization.

5. Conclusion

In order to solve the problems of low recall and long processing time in traditional digital protection of cultural heritage, a new digital protection method based on web technology is proposed. An improved four-layer architecture design pattern is adopted to design a web-based digital protection platform for cultural heritage. In the HSV space of the digital image of cultural heritage, the luminance channel is enhanced, and the enhancement adjustment factor is introduced to adjust the luminance of the digital image. The multifiltering technology is introduced into the process of extracting the luminance digital image. The best neighborhood of the pixel of the cultural heritage digital image is calculated by tilting the filtering window of multifiltering. The experimental results show that the recall of cultural heritage images can reach 90%, the error of information retrieval is always less than 6%, and the enhancement time can be controlled within 3 s.

Data Availability

The data used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares no conflicts of interest.

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