Research Article

Statistical System of Cultural Heritage Tourism Information Based on Image Feature Extraction Technology

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This paper presents an in-depth study of a statistical system using image feature extraction technology for cultural heritage tourism information. Based on the specificity of the tourism industry, it combines the technical architecture, framework of image feature extraction, GIS basic design, database design, and other related theories; realizes visual mapping through relevant tourism statistics in GIS; and uses the spatial analysis capability of ArcGIS software to complete the statistical scheme of cultural heritage tourism information data in the context of Internet big data. In this paper, the image preprocessing process is accelerated by the parallel optimization of the filtering operation and down-sampling operation in the relevant image preprocessing algorithm. The preprocessed images can effectively improve the recognition effect of the image feature extraction and classification stage. Based on cultural heritage tourism information mining results, the design and development of the tourism information statistics platform are carried out. The platform is built and developed using GIS secondary development technology and HTML + CSS front-end development technology API, Echarts, and other image feature components. The platform enables the massive and disorganized tourism text information to be displayed in a way that is easier to understand in both maps and text. This paper’s research on critical technologies provides technical support for image feature extraction of tourism statistics, which has specific practical value. Implementing the cultural heritage tourism platform offers a visual operating environment for tourism, enabling cultural heritage tourism businesses to tap into user preferences so that users can effectively access the travel options that interest them, which is conducive to promoting the development of travel recommendation platforms.

1. Introduction

In recent years, the development of “Internet +” has been strongly advocated, and this trend has also affected the tourism industry. More and more travel companies have started to achieve sales through online platforms, and Ctrip, Ali Travel, and GoWhere.com are more typical travel platforms. These travel platforms generate a large amount of user data daily [1]. Big data visualization is an effective means to realize data analysis and mining, which enables us to study and mine massive data more effectively. Using visual data analysis, on the one hand, helps enterprises do a good job in market evaluation and prediction, on the other hand, it also helps the tourism industry improve its business methods on the basis of data analysis. On the other hand, it also helps the tourism industry to improve the operation methods based on data analysis, eliminate wrong tourism products, optimize tourism services according to the massive customer data, further enhance the standardization and scientific nature of the tourism industry, and improve the satisfaction of tourists [2]. In the era of big data, traditional software has certain limitations in dealing with massive trajectory data. The original visualization system can no longer meet the current visualization needs, thus failing to dig out more valuable information. Therefore, combining the existing research results and existing work, this paper
designs a big data platform for storing and managing massive tourism statistics and combines GIS with spatial data for visualization, through heat maps and cluster maps, etc., to realize the visualization demand and optimize the layout of massive data visualization. The traditional tourism information management system must be accessed on a personal computer, which has disadvantages such as inconvenience in carrying, lack of multiple wireless network access interfaces, and high-power consumption [3]. This system combines tourism information management with intelligent handheld devices, which can overcome the above disadvantages and use the current advanced electronic modules on handheld devices, such as GPS, gyroscope, and gravity sensor, to browse query tourism information from multiple directions and angles.

Image preprocessing and feature extraction are the critical steps in image recognition technology. Image preprocessing determines the quality of the subsequent image processing stages, and the image recognition result depends mainly on the image feature extraction process [4]. However, all feature extraction algorithms have advantages in computational speed and accuracy. However, there are still many problems in algorithm performance and accuracy. Therefore, many researchers have studied processes such as GPU-accelerated image processing recognition to change the defects of traditional methods and improve the usefulness of image feature extraction [5]. Global features and local features are the general classifications of image features nowadays, and there is no clear definition for image features. Global features can better understand the information and content of the image, but they are not very suitable for image matching. For example, if a picture is red if the feature of red is used for matching, it is likely to find many photos that meet the conditions. On the contrary, local features are perfect for image matching. Standard local features are speckle information, corner information, edge information, and ridges in the image. Local features are information with solid representation in a picture with local invariance [6]. Therefore, local features are better applied to image matching work and less suitable for understanding images, and the SIFT algorithm studied in this paper is a local feature extraction algorithm.

With the rise of quality tourism, tourists are not only limited to traditional sightseeing tours but also cultural tourism has become popular. With the rapid development of technology, cultural tourism that used to rely on the development of historical and cultural resources gradually fails to meet the needs of tourists. Technology breaks traditional culture’s time and space limitations and opens a digital development path for it. Combining cultural heritage and technology to develop digital tourism has become a new form of tourism [7]. For cultural heritage tourism destinations, it is essential to clarify the inner mechanism of how to recreate the charm of cultural heritage by digital means, effectively improve the quality of tourists’ tourism experience, and thus activate cultural tourism [8]. Based on SOR theory, social presence theory, and innovation diffusion theory, this study investigates the factors influencing the digital tourism of cultural heritage on tourists’ travel experience and behavioral intentions from the perspective of tourists and analyzes its mechanism to provide a reference for the development of digital tourism of cultural heritage, promote tourism with culture, highlight culture with tourism, and seek the way of integrated development together. Culture enables the quality of tourism to be improved, and tourism allows culture to be widely spread. The Ministry of Culture and Tourism establishment shows that culture and tourism are inseparable, culture is the content, and tourism is the scene; integrating culture and tourism helps enhance and manifest cultural self-confidence and plays a vital role in improving cultural influence.

2. Related Works

Scholars have researched image feature extraction problems for a long time. A landmark work in the development of feature extraction should be the SIFT algorithm proposed by Bianchi G et al. The algorithm has local invariance, which means that the recognition of the image is not affected when the object is rotated or occluded [9]. The algorithm is quite tolerant to some everyday physical noises. If these feature points are matched for the job, the target object can be found very accurately, even if the retrieved image data set is large. However, due to the high time complexity of the SIFT algorithm, the feature extraction time is challenging to meet the real-time requirements [10]. Many scholars have subsequently done optimization work based on the SIFT algorithm to improve the feature extraction time. The image is analyzed from the perspective of the spatial domain, which uses the statistical calculation method to do first-order or higher order feature analysis on texture image elements and corresponding pixel values. The technique has a more significant advantage for those texture images with structure or regularity [11]. The method mainly analyzes the spatial location and dependence between image grayscale pixels. The approach considers that since certain identical or similar textures usually appear repeatedly, there must be some grayscale correspondence between any two pixels in the image space. The grayscale co-occurrence matrix is precisely for this grayscale condition to be counted. Due to the rapid improvement of Internet technology, this image media information has become huge. People urgently need to solve the problem of finding the information they are interested in from the vastness of image media information. Using suitable feature extraction methods to bring out the images we are interested in from the vast number of images, we can quickly start analyzing and studying them [12]. Therefore, many domestic and foreign research institutes have researched image feature extraction and obtained significant results. It is essential to propose new methods and ideas for feature extraction to get the desired image quickly.

The rapid development of computer technology has brought us into the "map reading era." The current exploration and research on tourism information visualization are mainly focused on the visualization of the demand for intelligent tourism services [13]. The research in this area primarily focuses on the current situation of information visualization design application in tourism services in outer
cities, the new mode of intelligent tourism for customers in the Internet era and the potential service demand of customers in this new tourism model, and the response strategy with information visualization design [14]. Lee et al. discuss that the informatization of tourism resources is a certainty of tourism development and procedures and develops the tourism resources management information system [15]. As for the scenic tourist information visualization and distribution system, in this regard, Polukhina et al. use Google Earth software as the primary GIS platform and generate XML through KML markup language to publish the latest information on tourist scenic spots in the form of text, pictures, and videos on the GE platform [16]. The KML technology is also used to standardize the format of multi-source heterogeneous data, and the preliminary 3D visualization of the Wuyi Mountain scenic area is completed. Image feature extraction is an essential branch of image processing and plays a pivotal role even in computer vision. In real life, to improve efficiency, people hope that computer recognition and image analysis can achieve the same vision as humans and can correctly judge and understand objects [17]. Image feature extraction technology has been well received as an essential technology and applied in different fields with good results.

People’s sense of heritage recognition has increased in recent years, but the existing cultural relics and monuments are also under constant destruction and threat. Nowadays, most cultural heritage resources have been damaged to different degrees due to the unreasonable development of tourism, the construction of extensive tourism infrastructure, and uncivilized tourism behavior [18]. It should achieve the practical unity of good unity’s current and long-term interests and environmental, economic, and social benefits. Combining the tourism market and cultural heritage protection is the mark of the success of cultural heritage tourism development, which can meet the increase in people’s demand for tourism products and the sustainable development of cultural heritage tourism [19]. The story of cultural heritage tourism resources is to protect cultural heritage better, and the relationship between resource protection and utilization should be handled appropriately. Jayaraman and Makun point out that the artistic value of heritage will be transformed into economic value while being enjoyed by people through tourism, entertainment, viewing, and experience; driving regional economic development; and promoting people in the region to actively engage in the protection of cultural heritage due to the benefits, while realizing cultural heritage protection and tourism development [20]. Thus, with the increasing demand for people’s spiritual and cultural dimensions, cultural heritage has become a vital resource to attract modern people to visit and tour because of its rich historical and cultural connotations of cultural heritage. How to stand out from the competition is also an important issue that many cultural heritage tourism resources are facing. The tourism scenic spot management system developed for the management of cultural heritage tourism scenic spots can be managed for each scenic tourism spot, realizing the sharing of information and data analysis and other functions, which significantly improves the efficiency of tourism information management and data analysis and plays a significant role in accelerating the network and intelligent construction of scenic tourism spots. It is also well perfected in terms of tourism information guidance and services. Like the well-known Sophia Cathedral and Notre Dame de Paris, they all provide tourist information on their websites for tourists and information support for the management of the attractions.

3. Design of a Statistical System for Cultural Heritage Tourism Information Based on Image Feature Extraction Technology

3.1. Image Feature Extraction Technique Model Construction

The features are extracted and stored based on the image content in the feature database. When retrieving, the feature data of the image is first removed and then compared with the feature data information in the database. The similarity between the image retrieved and the image in the database is judged according to the distance. Based on the characteristics of the image itself, it is possible to determine whether the algorithm used to process the image is effective or not. Therefore, there are significant differences in the methods used in different application areas depending on the object of feature extraction [21]. For example, color feature extraction focuses on image libraries with distinct color features, shape feature extraction is suitable for image libraries with shape features, and some use a combination of elements to achieve this. So, there are more feature extraction methods, such as color feature extraction, including color moments, color sets, histograms, and other processes; for shape feature extraction, there are shape invariant moments, Fourier shape descriptors, and other methods. The feature extraction steps are shown in Figure 1.

The extracted image features are stored in the database as vectors. Each feature value of an image is represented in the form of a vector so that vectors in the N-dimensional feature space can mean the feature information of a picture. At the same time, the points in the feature space are used as the expression of query vectors, called query points, which convert the calculation of similarity between images into the analysis of the similarity between feature vectors. To calculate the similarity between vectors, there are commonly used Euclidean distance $D_e$ and absolute value distance $D_c$ to represent the distance function and its mathematical expressions.

$$D_e = \sum_{k=1}^{n} \sqrt{(x_k + y_k)^2 + (s_1 - s_2)^2}$$

$$D_c = \sum_{k=1}^{n} \sqrt{x_k + y_k}$$

$$\sqrt{s_1 + s_2}$$

Further combining $D_e$ and $D_c$ using the Minkowski distance is as follows:
\[
D_m = \sum_{k=1}^{k} \left[ (x_k - y_k) + \sqrt{(s_1 + s_2)} \right].
\] (2)

As seen from the expressions above, the word of Minkowski’s equation is more straightforward. Different measures are sometimes combined for other applications that need to calculate similar distances flexibly with compound measures for some measurement distances. Usually, different similarity calculation rules correspond to different application needs.

Before the image library is subjected to feature extraction, it is serialized by the serialization processing module. After the serialization module, an image is transformed into the form of a single record, and finally, all the documents are serialized and saved to the distributed file system HDFS. When feature extraction is performed, the feature extraction function module reads the serialized image records in HDFS and distributes them to each task, which runs on the whole cluster. Each task performs feature extraction by the Spark-SIFT algorithm, and after the extraction is completed, each task directly saves the extracted features to HDFS. The monitoring module collects the exception information during the feature extraction job operation and writes the exception information to a specific exception log. The framework diagram of the image feature extraction system is shown in Figure 2. The main work of this paper lies in the library and application layers of Spark. This paper implements Spark-image Lib, the primary image processing library under Spark, which contains Spark’s image representation and reading operations and some basic image processing interfaces, such as image graying, image scaling, and image blurring. This library is equivalent to other libraries of Spark, such as Graph X, a distributed graph computation processing library, and MLib, a machine learning library. MLib is comparable, and we have embedded this library into the spark ecosystem. The local features of the image remain invariant to rotation, scale, scaling, and brightness changes and maintain a certain degree of stability to viewpoint changes, affine transformations, and noise. Good uniqueness and rich information are suitable for fast and accurate matching of massive feature libraries. This developed Spark-SIFT algorithm based on this library, called in Spark applications, to achieve distributed feature extraction work.

The various methods of image feature extraction extract the underlying content information of the image; in the actual retrieval, when we have not seen the picture before, we do not know anything about the parts contained in the photo; only when we use the designed method to complete the retrieval, we can see whether the image we retrieve is similar, which is the final judgment of the image similar people or the user. Therefore, to make image retrieval develop in a better direction, a feedback mechanism is needed, which is a collaborative relationship between the retrieval system and the user, where the retrieval system presents the final retrieval results to the user, and the user makes the retrieval more effective by improving the algorithm and refining the retrieval steps through his judgment [22].

![Figure 1: Feature extraction steps.](image-url)
relevant feedback is to play a good bridge role. It is the retrieval system, and the user is to promote; its ultimate purpose is to make the retrieval system more potent so that the user can use it more conveniently.

3.2. Design of Cultural Heritage Tourism Information Statistical System. There are various techniques for image feature extraction, and the effective use of these techniques is the crucial relevance to image feature extraction development. The image feature extraction data system architecture mainly contains several critical data storage, management, and access aspects. The visualization system’s architectural design is essential and related to the subsequent, direct use. The overall architecture of the tourism statistics visualization system in this paper is based on layering, i.e., the functions of the whole system are split, and each layer only needs to implement the corresponding processes. This layering aims to achieve a low-coupling and high-cohesion system framework [23]. The plan follows the traditional three-layer architecture model in design, which makes the design and development of the software more standardized and facilitates the management and maintenance of the system.

The system adopts a classic B/S architecture, consisting of a data access layer, a business logic layer, and a user presentation layer. The user presentation layer is seen in the browser to achieve visualization, and it exchanges and transmits data with the business logic layer through the HTTP protocol. In contrast, the business logic layer accesses the data layer according to the business needs, and this layered structure makes the system relatively flexible. The business logic layer is the core of the whole system, which analyzes the data by parsing user requests through the browser and performs relevant operations on the data layer according to users’ needs. It then parses the data returned from the data layer and displays it in the form of web pages. The overall architecture of this system is shown in Figure 3.

The data layer is mainly responsible for the storage and management of data, firstly, the data related to tourism statistics are stored and organized through the relational database Oracle, and at the same time, the system uses the Hadoop framework to realize the processing of data for a large amount of data so that the task of analysis and information mining of big data can be completed efficiently, through the open-source tool Sqoop in Oracle and Hadoop for data transfer. The business logic layer is a bridge between the user and the data layers, between the page visualization and the database, with three data management modules, statistical analysis, and visualization. The visualization implementation in this chapter is also based on these three parts to complete.

Three parameters, i.e., embedding dimension \( m \), delay time \( t \), and scale factor \( s \), need to be controlled in the application. The choice of parameters is crucial for the damage detection results. If the embedding dimension \( m \) is too small, the original signal retains fewer features in the reconstructed signal, i.e., the algorithm fails; if the embedding dimension \( m \) is too large, the analysis and information mining of big data cannot be completed efficiently.
is too large, it leads to a slight difference between the aligned entropy values, making it difficult to detect subtle changes in the signal and distinguish changes in the signal and increasing the computational complexity [24]. If the delay time is too short, the reconstruction of the signal loses its meaning; if it is too large, it cannot effectively count the feature information in the signal. Considering the time complexity of the algorithm and the waveform characteristics of the guideway vibration signal, the embedding dimension $m$ is chosen in agreement with the delay time. There is also the choice of the scale factors to be considered. If the scale factor $s$ is too small, the final obtained alignment entropy value cannot reflect the characteristics of the original signal; if the scale factor $s$ is too large, the complexity difference between signals will be masked, and most of the choices of scale factor $s$ can be verified by experimental data, so the selection of scale factor $s$ will be discussed in the result analysis. The options of embedding dimension $m$ and delay time in the alignment entropy provide technical support for applying the algorithm later. The Gaussian white noise of length 512 is used as an example for simulation analysis in this paper to study the effect of delay time on the alignment entropy value. The variation of the alignment entropy value with the embedding dimension $m$ at different delay times is shown in Figure 4.

Consider the time series $X = \{x(i), \ i = 1, 2, l, n\}$ for which the coarse granulation operation yields the sequence

$$y(j) = \sum_{i=1}^{js} x(s + 1),$$

(3)

where $s$ denotes the scale factor and represents the coarse-grained time series at different scales. When $s = 1 y(j)$ is the original time series, the single-scale alignment entropy is calculated at different scales:

![Figure 3: Overall system design.](image)

![Figure 4: Alignment entropy values at different time delays.](image)
4. Analysis of Results

4.1. Test Analysis of Cultural Heritage Tourism Information Statistical System. This paper uses multiple linear regression methods to analyze the perceived value of cultural heritage sites at three levels: attribute level value, outcome level value, and purpose level value. First, scatter plots were used to determine the existence of linear relationships between the relevant independent variables and the dependent variables; second, the data were tested for suitability for multiple regression analysis by covariance diagnosis, and the data showed that the eigenvalues were nonzero and the conditional indicators were all less than 30, indicating that the sample data were suitable for regression analysis [25]. A linear regression analysis was conducted with heritage material attributes, heritage immaterial attributes, human environment attributes, tourism service attributes, and tourism facility attributes as independent variables and functional outcomes, psychological outcomes, and social outcomes as dependent variables, respectively. The regression model was established using the "stepwise" method, with \( P \leq 0.05 \) as the inclusion criterion and \( P \geq 0.12 \) as the exclusion criterion for the independent variables. The results showed that the adjusted R-square of the regression models with functional outcome and psychological outcome as the dependent variables was more significant than 0.2, except for the dependent variable "social outcome," which had an adjusted R-square of 0.094, indicating that there was an effect between the variables, and the F-values were above 3.86. The absolute values of t were more significant than 1.96, saying that the model fit was acceptable. The significance between the independent and dependent variables was vital. The attributes’ factors positively influenced the functional, psychological, and social outcomes in the outcome layer as shown in Figure 5.

Figure 5: Results of perceived value regression analysis.
cultural heritage sites at the attribute, outcome, and purpose levels was studied from an empirical perspective to test the hypotheses proposed in this study.

This experimental system used histogram intersection distance and Euclidean distance similarity matching methods to query color features. In contrast, Euclidean distance similarity measures were compared for retrieval with shape features. The so-called system structure refers to the specific implementation process of the retrieval system, and its definition’s rationality directly affects the system’s use and management. The system structure is considered separately for different categories, such as classification of images, storage of photos and image features, and extraction of features; selection of retrieval methods in the query process and principles of testing image similarity; definition of new features and automatic generation and updating of data; and operability of adding or reducing images to the database. To explore the influence of not using samples on the classification results, 4000, 6000, and 18000 randomly selected from the 63115-sample data preprocessed in the previous paper are tested with dimensions of 100, 150, and 200, respectively, and 10-fold cross-validation is used. The obtained results are shown in Figure 6.

In this paper, the visualization of visitor flow also includes the visualization of the change in passenger flow over time. The distribution of passenger flow has spatial and temporal characteristics. Studying the shift in tourist flow over time in a day helps discover tourist habits and preferences. Considering that passenger flow’s spatial and temporal characteristics are a kind of overall change, the continuous heat map is chosen as the visualization means when choosing the method. The implementation principle of the heat map has been mentioned earlier. Still, the difference is that the function of change over time needs to be added on top of the original one. The implementation of this paper is based on echarts.js, which provides a timeline component interface in its class library to help realize the function of data change over time. According to the experimental design classification, we performed three implementations: directly projecting the coordinates of round points onto the map, using the K-means algorithm for visualization, and using the CFSFDP algorithm for visualization [26]. If we look at the speed of operation alone, k-means is faster than hierarchy. The reason is that K-means is to find the center and then calculate the distance; scale is to merge sample by sample, layer by layer, and the complexity of the hierarchy algorithm is higher. More importantly, the classification effect of K-means and hierarchical clustering algorithms can only be described as a matter of opinion under large numbers. A comparison of the image feature extraction effect maps was obtained as shown in Figure 7. Direct visualization is the simplest and most basic visual analysis method. It plots the data by computer and displays them to the user for observation. Direct visualization of all bus route data is done without processing the effect of direct visualization; direct visualization can only view the current road geographic location information but cannot analyze the existing road, thus cannot be interpreted to get the appropriate travel information.

4.2. Image Feature Extraction Technology for Cultural Heritage Tourism Information Statistics System Implementation. The time consumed per image in each key stage of the system and the model training time under one iteration cycle were tested, with the number of samples in one iteration being 500. The time spent in comparing and validating was proportional to the number of feature vectors in the face database in the actual application. To further verify the system’s effectiveness, the system testing compares standard face recognition algorithms, including PCA, 2DPCA, and ICA, from two perspectives of recognition rate and time spent in critical stages. PAC, or principal component analysis, is an earlier and more widely used face recognition method that vectorizes face images, arranging each grayscale image of a face into a one-dimensional vector. The principal components are extracted through the K-L transform; any face image can be approximated as a linear combination of this group of feature face images. The coefficients of the mixture are the feature description of the face. 2DPCA, i.e., two-dimensional principal component analysis, can directly use two-dimensional grayscale images for feature extraction, overcoming the problem of small samples and large dimensionality of PCA. ICA, i.e., independent component analysis, has the idea of finding a set of mutually independent bases from the training samples and using them to describe the sample data by a linear transformation. Six
images of each person in the sample database were randomly selected as the training samples, and the rest were used as the test samples. The performance data of each algorithm is shown in Figure 8.

The test shows that with the parallelization acceleration of GPU, the system can perform fast preprocessing of the input face image in real time and stable and extract face features effectively and accurately, basically meeting the real-time requirements. For recognition speed, the system has significantly improved to ensure the introductory recognition rate. The GPU-based image preprocessing acceleration algorithm and hybrid parallel alternating convolutional neural network model used in this system enhance key steps’ efficiency in the image recognition process and have good practicality.

To statistically analyze the retrieval effect of the features, the retrieval experiments for each image in the database were conducted separately during the investigations. The retrieval precision of all photos in each category was counted, as well as the average retrieval precision and recall rate of all images at different numbers of returned images, respectively, as shown in Figure 9 gives the recall/precision plots of several
binary patterns to varying numbers of produced images. P-R curve can be a good measure of a retrieval algorithm, and the higher the retrieval precision of the retrieval algorithm with the same recall, the better the retrieval effect of the algorithm. Therefore, all the algorithms in this paper have a better retrieval effect than other algorithms. In the P-R graph, as the recall rate increases, the search accuracy of the four algorithms decreases, mainly due to the rise in the number of returned images. From the performance point of view, with the increase in the recall rate, the LMDP algorithm still has a higher search accuracy than the other three algorithms, which is in line with our requirement of being complete and accurate.

When the independent variable was system quality, the interaction term of system quality and cultural identity had a significant adverse effect on tourism (coeff = -0.117, $P = 0.038 < 0.05$) and a significant positive effect on behavioral intentions (coeff = 0.204, $P = 0.001 < 0.05$), indicating that both behavioral purposes to travel were moderated by cultural identity. The interaction term between system quality and consumer innovativeness had a significant adverse effect on behavioral intentions (coeff = -0.164, $P = 0.013 < 0.05$) but not on tourism experience (coeff = 0.090, $P = 0.122 > 0.05$), indicating that consumer innovativeness moderates the direct path and does not mediate the first half of the mediating effect travel experience path has no moderating effect. Data statistics and reports show an essential function of the cultural heritage tourism information system. This module displays the tourism resources visited by the user to the decision-maker using an account. The data analysis can play a decision-making role in regulating, expanding, and expanding the tourism market.

5. Conclusion

As precious historical relics, cultural heritage is characterized by historicity, uniqueness, irreplaceability, and non-renewability and is also a vital tourism resource. In this environment of rapid development of cultural heritage tourism, it is necessary to fully consider the antecedent influences on the attitudes and behavioral intentions of mass tourists toward cultural heritage conservation in the process of cultural heritage tourism to do an excellent job of cultural heritage conservation and inheritance. A GIS-related tourism statistics visualization and mapping scheme is proposed. The cultural heritage tourism data information platform is designed from the visualization system architecture of the cultural heritage tourism data information platform, visualization framework, GIS basic design, database design, etc. The primary methods of geographic data preservation and visualization are introduced. This paper’s image feature extraction technology solution first solves the framework problem. After an in-depth analysis of the data characteristics in the big data environment, this paper considers that solving the data storage and data access efficiency are critical issues. Therefore, based on these two crucial vital aspects, this paper designs the visualization framework and
visualization process based on the big data platform and then introduces the data import, storage and optimization, data access, and visualization aspects of the visualization process. Considering the correlation between embedding dimension and time delay, the joint determination method of two parameters is used to optimize the embedding dimension and time delay. The computed value can more effectively distinguish the features of different fault types, thus completing the image feature extraction. Through this system, the massive and disorganized cultural heritage tourism text information is presented in a way that is easier to understand comprehensively.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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