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Strategic Research on the Construction of Red Tourism Culture Platform and Brand Development Based on Big Data Analysis

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SUMMARY: *Using fixed rules to set travel recommendations and operational strategies only allows for simple matching operations based on limited and static information, resulting in low-quality tourism platform services. Therefore, this paper conducts strategic research on the construction and brand development of a red tourism cultural platform based on big data analysis. Regarding platform hardware design, this study selected high-performance servers and other equipment, optimizing configuration to enhance data processing capabilities and provide stable hardware support for the platform. Regarding software design, this study established a red tourism cultural resource library. After collecting information from multiple channels, cloud computing was utilized for integration, upload, and cloud-based processing, enabling centralized resource integration and intelligent management. Based on big data analysis, a preference prediction model was constructed by integrating behavioral indicators such as user click counts to accurately predict user preferences. Deeply mining historical user data to quantify interests and preferences, a hybrid similarity calculation method was used to screen matching content, enabling personalized recommendations and completing platform construction. Furthermore, a red tourism brand development strategy was developed, systematically planning implementation paths from the perspectives of resource integration and other dimensions to enhance brand competitiveness and influence. Test results show that this method stabilizes the characteristic distribution value of recommendation results within a high range despite changes in the number of users. The user click-through rate significantly increases and remains high as the amount of accessed data increases. The platform throughput increases from 125 request seconds with 50 concurrent users to 770 request/second with 600 concurrent users, effectively improving the platform's service quality.*

KEYWORDS: *Big data analysis; Red Tourism Cultural Platform; Resource Integration; Personalized Recommendation; Brand Development Strategy*

1 Introduction

Currently, the digitalization process is driving the structural transformation of the tourism industry. Red tourism, as a specific business model, carries both cultural heritage functions and economic development potential. The integration of information technology has brought new operational conditions to the tourism industry. Based on this, the Red Tourism Culture Platform has formed specific practical paths in optimizing service supply and enhancing brand influence through emerging technological means.

Several studies have provided specific solutions for this field. For example, in reference [1], a travel guide sharing and interactive platform was built based on the Spring Boot

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framework, which facilitates users to publish and exchange travel experiences and obtain the necessary information. In reference [2], a smart tourism service platform based on the Internet of Things was designed using computer-aided technology, which achieves intelligent user services by collecting sensor data. In reference [3], a tourism strategy support platform was built around PHP and MySQL technologies to assist users in completing itinerary planning. Reference [4] analyzed the application direction and potential value of big data for the red tourism culture platform, providing a basis for its strategic decision-making.

This paper summarizes previous achievements in tourism platform construction, smart tourism services, and red tourism strategies, and proposes a research method for red tourism cultural platform construction and brand development strategies based on big data analysis to promote the dissemination of red tourism culture.

2 Building a Red Tourism Culture Platform Based on Big Data Analysis

2.1 Platform Hardware Design

In the context of digitalization, a core responsibility of the red tourism culture platform is to promote the inheritance of red culture [5]. To cope with high concurrent requests, this paper first optimizes the hardware configuration to improve the platform's reliability and availability, allowing users to smoothly access information and participate in interactions.

A Dell PowerEdge R750xs was selected, equipped with dual Xeon Platinum 8380 processors, 512GB of memory, and 8 SSDs in RAID 10.

The Huawei FusionServer 2288H V5 was selected as the database server. It features two Intel Xeon Gold 6348 processors (20 cores, 40 threads), 256GB of DDR4 memory, and four 7.68TB SATA SSDs arranged in a RAID 5 array. The network interface is configured with two 10Gbps SFP+ ports. Table 1 shows the hardware configuration for the red tourism culture platform.

Table 1: Red tourism culture platform hardware configuration details

Hardware category	Device name	Device model	Main technical parameters
Server	Core business server	Dell poweredge r750xs	Processor: 2 intel xeon platinum 8380 processors, 28 cores with 56 threads, clock speed of 2.3ghz, maximum turbo frequency of 3.4ghz, memory: 512gb ddr4, frequency of 3200mhz, storage: 8 3.84tb sas solid-state drives (ssds) to form a raid 10 array, network interface: 2 10gbps sfp+ports and 2 1gbps rj-45 ports
Server	Database server	Huawei FusionServer 2288h v5	Processor: 2 intel xeon gold 6348 processors, 20 cores with 40 threads, clock speed of 2.6ghz, maximum turbo frequency of 3.5ghz, memory: 256gb ddr4, frequency of 2933mhz, storage: 4 7.68tb sata solid state drives (ssds) forming a raid 5 array, network interface: 2 10gbps sfp+ports
Storage device	Massive data storage array	Hp MSA 2060 storage array	Storage capacity: supports up to 192 3.5-inch hard drives, with an initial configuration of 24 12tb sata hard drives for a total capacity of 288tb. Interface type: supports 12gb/s sas and 1gb/s scsi interfaces. Cache: equipped with 16gb high-speed cache. Redundancy design: dual controller redundancy, power redundancy
Network equipment	Core switch	Cisco Catalyst 9500-16x switch	Number of ports: 16 40gbps or 100gbps ports, switching capacity: up to 19.2tbps, forwarding performance: 7.2bpps

Huawei FusionServer 2288H V5 was selected as the database server, equipped with two Intel Xeon Gold 6348 processors, 256GB DDR4 memory, and four 7.68TB SATA SSDs in a RAID 5 array. This server has high-performance computing and high concurrency processing capabilities, which can efficiently support the platform's real-time reading, writing, and complex query tasks of structured data such as user behavior data, resource tags, and recommendation records [6].

An HP MSA 2060 storage array was selected, initially configured with 24 12TB SATA hard drives, supporting 12Gb/s SAS interfaces, 16GB of cache, and dual controller and power supply redundancy. The 16GB cache and dual controller redundancy design of this device ensure stable data reading performance even when multiple users access the resource library concurrently, while enhancing the system's fault tolerance and data security [7, 8]. As the high-capacity storage hub of the platform, this device is mainly used to store unstructured data in the red tourism cultural resource library, including historical images, audio explanations, cultural pictures, literature scans, etc.

The Cisco Catalyst 9500-16X switch is selected as the core switch. It has 16 flexibly configurable ports, a switching capacity of 19.2Tbps, and supports multiple routing protocols. This switch supports multiple routing protocols and network management strategies, facilitating fine-grained scheduling and secure isolation of platform traffic in the future [9]. Switches are responsible for high-speed data forwarding between servers, storage devices, firewalls, and clients.

The hardware topology of the red tourism culture platform system is shown in Figure 1.

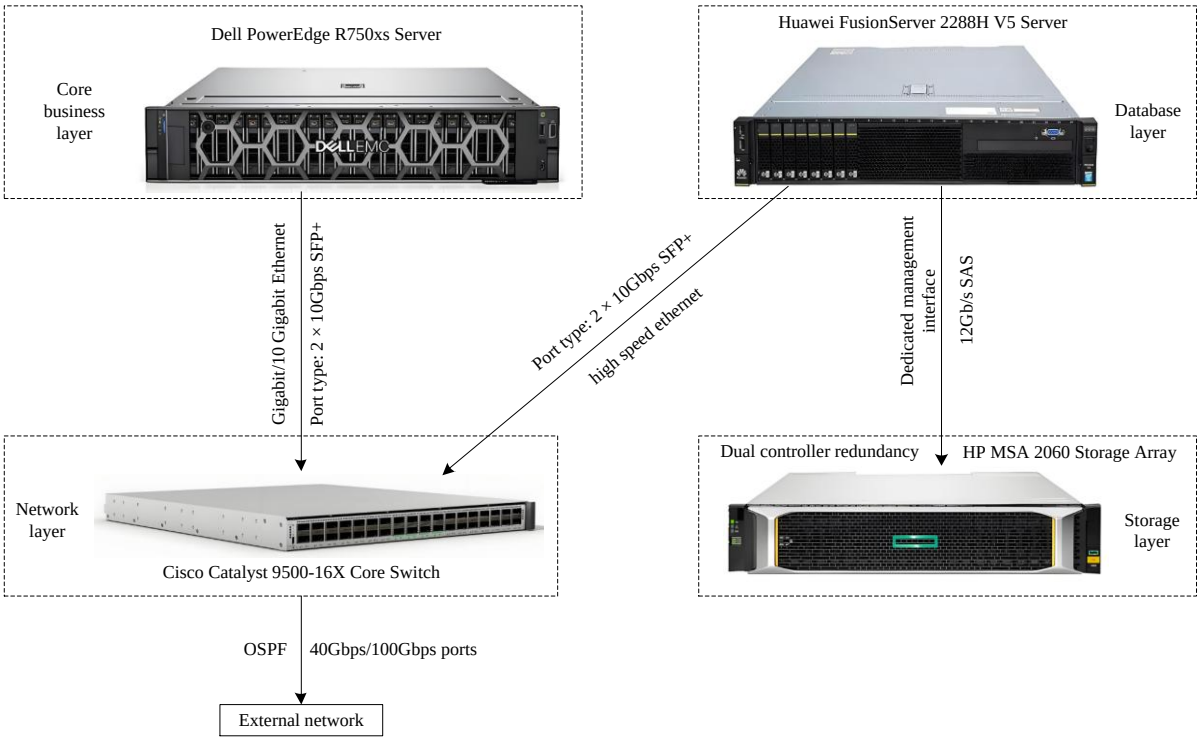

Figure 1: Red Tourism Culture Platform System Hardware Topology Schematic

In addition, to ensure the accuracy and effectiveness of information recommendation on the red tourism culture platform, this study deployed a firewall system to strengthen the security of the network management system structure. The deployment steps are as follows:

Step 1: Determine the firewall access location. Deploy hardware firewall devices in series using transparent bridging mode between core switches and external routers, while creating

virtual firewall instances within the virtualization platform to achieve logical isolation between different functional areas such as resource library servers, user behavior analysis clusters, and recommendation engine modules.

Step 2: Configure access control policies. According to the principle of minimum privilege, only the ports necessary for external services of the platform are opened, and a source IP whitelist is set to restrict management access permissions. During communication between internal regions, the resource repository server is allowed to output data to the recommendation engine, but external networks are prohibited from directly accessing the database port.

Step 3: Enable deep packet inspection and application recognition. Configure a firewall to implement real-time unpacking and detection of HTTP and HTTPS traffic, intercepting common threats such as SQL injection, cross site scripting attacks, and malicious file uploads [10, 11]. Simultaneously set application recognition rules, allowing only compliant browsers and API clients to access platform interfaces.

Step 4: Configure the intrusion prevention system module. Import the latest threat feature library, enable automatic blocking function for DDoS attacks, brute force cracking, and abnormal scanning, and set threshold triggering rules.

Step 5: Implement local storage of logs and alerts. Store the alarm information and traffic logs generated by the firewall in the local log server of the platform, and set key alarms to be pushed to the operation and maintenance terminal in real time for timely response and processing.

2.2 Platform Software Design

2.2.1 Establishing a Red Tourism Cultural Resource Library

During the software design process, given the diverse and complex nature of red tourism cultural resources, this paper set out to construct a red tourism cultural resource library to achieve centralized integration of red tourism cultural resources for easier unified management and development and utilization.

Regarding information collection from public channels, we strictly adhered to relevant regulations and utilized web crawler technology to extensively collect information from the public internet. Collection channels included the official websites and social media accounts, official WeChat public accounts, and Douyin accounts of cultural tourism management departments and their subordinate administrative region tourism management agencies, as well as well-known online travel platforms and tourism service platforms established by local tourism enterprises [12]. The collected information was rich and diverse, including basic information related to red tourism culture, such as tours, performing arts activities, and tourism products, as well as multi-media red tourism cultural information, including tourism news, folk culture, images, audio and video.

For undisclosed information, leverage a bottom-up information reporting mechanism or tourism resource census system, and work closely with tourism management departments to acquire content related to red tourism culture within a specific scope.

For non-digital resources, collect books, journals, images, historical and cultural materials, and unpublished gray literature related to red tourism culture from the collections and collections of university libraries, as well as various public libraries, museums, and cultural centers at all levels in the region. For digital resources, comprehensively search for tourism-related literature related to red tourism culture within resource sharing systems, such as the library's own resources and procurement, union catalogs, and the National Library's online public catalog. Furthermore, metadata for red tourism culture-related literature is

obtained through various academic search platforms and knowledge service platforms, and full text is obtained through sharing or document delivery [13, 14].

To build an intelligent red tourism cultural resource platform, based on cloud computing technology [15, 16], this paper proposes a resource integration upload and cloud processing solution. This solution integrates multi-source location information and uploads it to a cloud-based resource repository, providing strong support for subsequent intelligent processing and red tourism cultural information sharing. Among them, the transmission efficiency of red tourism cultural resources can be expressed by formula (1):

$$m(t)=\frac{t+v+w\cdot(t+1)}{\varphi\cdot(z+1)+\psi} \tag{1}$$

In formula (1), $m(t)$ represents the red tourism cultural data upload cycle, z represents the operation cache optimization coefficient, t represents the data transmission rate, v represents the total amount of red tourism cultural data transmitted to the target storage at one time, w and ψ represent the adjustment parameters [17].

At the same time, this paper adopts cloud platform technology to integrate the management of red tourism cultural resources, connects the resources to the cloud platform database through the serial port, and uploads the regularly updated and historically stored red tourism cultural resources to the cloud platform. The resource transmission function is shown in formula (2):

$$L(n)=\left(m(t)\cdot(\rho+1)\right)\cdot g\left[h(n)+\cos(n)\right] \tag{2}$$

In formula (2), $L(n)$ represents the red tourism cultural resource output of the database at time n, $h(n)$ represents the relevant variables, ρ represents the red tourism cultural resource transmission adjustment parameters.

By using the above method and related formulas, red tourism cultural resources are continuously uploaded to the cloud platform, completing the establishment of the red tourism cultural resource library.

2.2.2 Predicting User Preferences Based on Big Data Analysis

Based on the above-established red tourism cultural resource library, we conduct user preference prediction for red tourism culture, helping the platform identify high-value users and potential churn users in advance, and then formulate targeted marketing and service strategies.

When conducting red tourism cultural preference prediction, this paper comprehensively considers multiple user behavior indicators, with click count and dwell time as core features. Among them, the click count is expressed in the model using the weighted function shown in formula (3):

$$M(i)=\begin{cases} e^{a\cdot(ci+1)}+u\cdot\ln(c_i+1)+\omega, i>j \\ o+r\cdot\dfrac{1}{i-j+1}, i<j \end{cases} \tag{3}$$

In formula (3), a, u, c, o and r represent the model parameter, c_i represents the

count of the user's i click, i represents the time window threshold [18].

By adjusting the parameter weights, the short-term fluctuations and long-term trends of user click behavior can be effectively captured.

At the same time, a logarithmic function is used to represent the user's dwell time on red tourism cultural resources. By quantifying its logarithmic transformation, the data skewness is eliminated, providing standardized input for subsequent preference prediction.

Based on the above behavioral indicators, a prediction model of user preference behavior for red tourism culture is constructed, as shown in formula (4):

$$K=\sum_{i=1}^{P}\left(\mu_i\cdot\left(M\left(i\right)+1\right)+\zeta\cdot\frac{1}{\left|M\left(i\right)\right|+1}+d+\chi\cdot\sum_{i=1}^{P}\frac{1}{1+e^{-M(i)}}\right) \tag{4}$$

In formula (4), K represents the predicted red tourism culture user preference behavior, μ_i represents the weight coefficient of feature $M\left(i\right)$, d represents the bias term, ζ and χ represents the adjustment parameter, $\sum_{i=1}^{P}\frac{1}{1+e^{-M(i)}}$ represents the Sigmoid function term [19, 20].

Based on this prediction model, users' preferences for red tourism culture can be accurately predicted.

2.2.3 Recommending Personalized Red Tourism Culture

Based on the established preference behavior prediction model, we deeply mine and analyze the user's historical click and browsing data, quantify their preferences, and then filter matching content from the established red tourism cultural resource library for personalized recommendations. To quantify the similarity of interests between users, this paper adopts a hybrid similarity calculation method that combines improved cosine similarity with the Jaccard coefficient, as shown in formula (5):

$$sim\left(x,y\right)=\beta_1\cdot\frac{\sum_{i\in I}\left(K_{x,i}-\bar{K}_x\right)\left(K_{y,i}-\bar{K}_y\right)}{\sqrt{\sum_{i\in I}\left(K_{x,i}-\bar{K}_x\right)^2\left(K_{y,i}-\bar{K}_y\right)^2}}+\beta_2\cdot\frac{\left|I_x\cap I_y\right|}{\left|I_x\cup I_y\right|} \tag{5}$$

In formula (5), $K_{x,i}$ represents the score of user x on red tourism cultural resources i, $\bar{K}_x$ represents the average score of user x, I_x and I_y represent the red tourism cultural resources that user x and user y have generated behaviors, β_1 and β_2 represent the weight parameter.

In order to provide target users with accurate and demand-oriented red tourism cultural recommendations, the following recommendation strategy and calculation formula are adopted.

$$Q=\sum_{y\in gx}sim\left(x,y\right)+a_1\sum_{y\in gx}sim\left(x,y\right)+a_1R_x+\sum_{y\in gx}sim\left(x,y\right)\cdot\left(R_y+a_2\cdot\frac{1}{\left|R_{y,j}\right|+1}\right) \tag{6}$$

In formula (6), gx represents the nearest neighbor set for user x, R_x and R_y represent the

average ratings of red tourism culture for user x and y, a_1 and a_2 represent the recommendation adjustment parameter.

Through this formula, the target user's potential rating of unrated red tourism culture can be predicted, and then red tourism culture with higher ratings can be selected for recommendation. Through the above-mentioned hardware and software configuration, the construction of the red tourism culture platform is achieved.

3 Platform Testing

3.1 Scenario Simulation and Data Support

This article builds a test environment based on the architecture and technical requirements of the red tourism culture platform: the server uses the same hardware configuration as the production environment and is installed with the same system and software; the network simulates various bandwidth and latency conditions; and the client considers multiple operating system and browser combinations. The platform provides precise services through big data analysis, and its core data must contain rich information.

The platform is based on an authoritative database of red tourism culture as its data foundation. This database contains numerous locations, events, and other information related to red tourism culture across the country, accompanied by precise spatial coordinates, providing an important source for the construction of test data. However, considering the differences in the focus of red tourism culture among different users, relying solely on the static basic data mentioned above is still difficult to fully meet the actual needs of platform testing.

Based on the above limitations, deep attribute mining and content improvement of red tourism culture information should be carried out before the experiment. Regarding the information of red culture venues, in addition to basic spatial and attribute data, further collection of exhibition themes, featured exhibits, explanation service configurations, recent red culture event information, as well as the surrounding facilities such as catering, accommodation, and transportation. For information on red cultural activities, it is necessary to systematically record elements such as the theme, specific content, time and location of the event, participation methods, and organizers.

The data collection process adopts a parallel approach of three channels. Firstly, it relies on official cultural websites and other online platforms to organize public information and user comment texts; The second is to form a research team to conduct on-site surveys and obtain first-hand information through face-to-face interviews; Thirdly, establish a collaborative mechanism with government departments to obtain authoritative data support.

To ensure the standardization and accuracy of the data collected and stored, a sample table for red tourism cultural information collection was developed, as shown in Table 2:

Table 2: Sample Table for Red Tourism Cultural Information Collection

Information category	Specific information items	Information note
Basic positioning information	Name of cultural location	The official names of locations related to red tourism culture should be accurate and avoid using abbreviations or common names
	Coordinates	Using wgs84 coordinate system, accurate to 6 decimal places
	Region	Specify the administrative region of the province, city, county (district), etc. Where the cultural location is located
Historical and cultural information	Cultural origin time	The origin time of events or locations related to red tourism culture, accurate to year, month, and day
	Historical event	Important historical events related to the red tourism culture, including event name, time of occurrence, and main process
	Representative figure	Individuals who have played significant roles in relevant historical events, including their names, life profiles, and major contributions
Cultural connotation information	Cultural theme	The core themes of red tourism culture, such as revolutionary spirit, patriotism, etc
	Spiritual connotation	Elaborate on the spiritual values inherent in red tourism culture, such as hard work and selfless dedication
	Cultural characteristics	Introduce the unique features of red tourism culture, such as specific art forms, historical traditions, etc
Open operational information	Opening hours	The specific time period during which this red tourism and cultural venue is open to the public every day, including different opening times during peak and off-season
	Ticket price	Explain the admission fee standards for visiting the venue, including full price tickets, half price tickets, free tickets, etc
	User carrying capacity	The maximum number of users that the venue can accommodate per day
Featured display information	Display name	Representative display project names in red tourism cultural venues, such as cultural relics, pictures, literature, etc
	Display era	Display the historical period involved in the project
	Display introduction	A brief introduction to the displayed project, including its source, historical significance, and related stories
Recent activity information	Event name	Name of the recent red cultural event held at this cultural venue
	Event time	Specific start and end times of the activity
	Location	The specific location of the event within the cultural venue
	Event introduction	A brief introduction to the activity, including content, purpose, and highlights

The table clearly lists the required information and its entry specifications. Data must be entered and processed strictly in accordance with the requirements to support platform testing.

Furthermore, this paper collects test data from multiple dimensions tailored to the platform's characteristics, covering red cultural venues from different regions and time periods, and also simulates the generation of new resources. The distribution of red tourism culture data sources is shown in Figure 2.

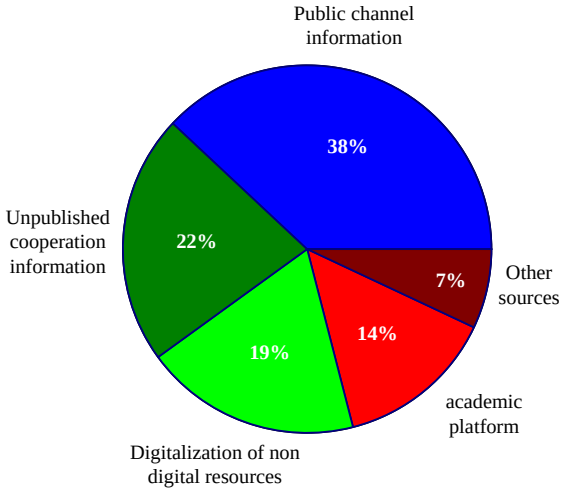

Figure 2: Distribution of Red Tourism Culture Resource Data Sources

Based on the analysis of historical user access records and reference to market research data, a large number of user behavior trajectories covering browsing, searching, clicking, and other operations were simulated and generated through experiments. At the same time, individual differences such as user age and gender were included to more realistically present the behavior patterns of different user groups on the platform.

3.2 Test Results and Analysis

3.2.1 Analysis of Feature Distribution of Recommendation Results

On the basis of building a testing scenario and constructing a diversified data system, the recommendation function of the red tourism culture platform was tested, and the feature distribution values of the recommendation results are shown in Figure 3.

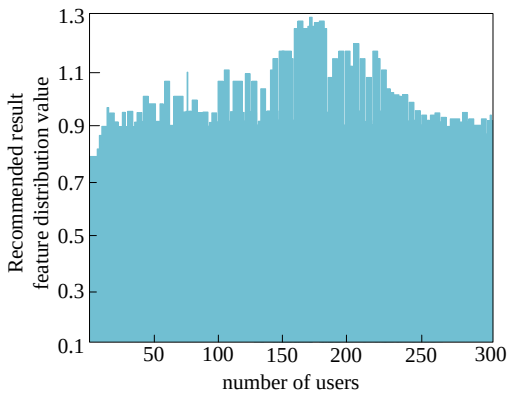

Figure 3: Feature Distribution Values of Red Tourism Culture Recommendation Results

Figure 3 shows that although there is some fluctuation in the feature distribution values of the recommendation results, the overall level is still relatively high. When the number of users is small, the distribution value already has a certain foundation, indicating that the platform relies on its existing data accumulation and analysis capabilities to generate preliminary recommendation results with reference value. Although the diversity of user interests has an impact on recommendation effectiveness, the platform can still output reasonable recommendations based on information features and some user behavior patterns. As the number of users increases, the characteristic distribution values do not show a significant decline or drastic fluctuations, and continue to maintain a high range and reach a peak. This trend reflects the sustained advantages of big data analysis. Based on in-depth exploration of user data and the characteristics of red tourism culture information, the platform can accurately identify users' common needs and potential interest points.

3.2.2 Analysis of User Click-Through Rate and Data Access Volume

Based on the analysis of the characteristic distribution values of the red tourism culture recommendation results, further examine the relevant data at the user behavior level of the platform to more comprehensively evaluate its performance. Figure 4 shows the corresponding relationship between user click through rate and access data volume.

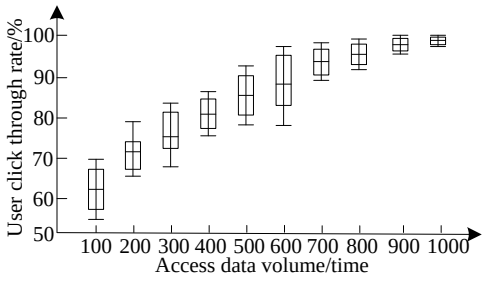

Figure 4: Analysis of User Click-Through Rate and Access Data Volume on the Red Tourism Culture Platform

As shown in Figure 4, there is a clear and regular correlation between user click through rates and the amount of data accessed. When the amount of accessed data is low, the click through rate remains at a basic level, indicating that the recommendation mechanism and display strategy established by the platform relying on big data analysis can still attract some users to generate click behavior.As the amount of accessed data increases, the user click through rate also increases accordingly and reaches its peak within a certain range. At this point, the platform has accumulated richer user behavior information, and through deep mining and analysis, it can accurately grasp users' interests and preferences, thereby optimizing recommendation strategies and service methods. When the amount of accessed data exceeds a certain scale, although the click through rate growth slows down, it still maintains a high level, reflecting the good stability and adaptability of the big data analysis model adopted by the platform.

Overall, the results in Figure 4 confirm that the platform can effectively capture changes in user needs, continuously achieve accurate recommendations, and demonstrate strong operational efficiency.

3.2.3 Platform Performance Analysis under Different Load Conditions

To comprehensively evaluate the performance of the red tourism culture platform in terms of

stability and reliability, the direction is to investigate its performance changes under different load conditions. Table 3 lists the relevant data of platform throughput under different load conditions.

Table 3: Statistics of Red Tourism Culture Platform Throughput under Different Load Scenarios

Number of simulated users (pcs)	Load conditions (number of concurrent users, individuals)	Throughput (requests/second)
100	50	125
200	100	238
300	150	342
400	200	435
500	250	510
600	300	578
700	350	632
800	400	685
900	450	720
1000	500	745
1100	550	762
1200	600	770

The trend of the data in Table 3 indicates that as the number of simulated concurrent users gradually increases, the throughput of the platform continues to rise, but the growth rate gradually slows down. As the number of concurrent users gradually increases from 50, the throughput maintains a stable improvement, reflecting the platform's good scalability and adaptability. This performance is mainly attributed to the deep integration of big data analysis technology in the platform, which can monitor and mine massive amounts of data in real time. Under low load conditions, the platform can predict user request patterns and allocate system resources reasonably; Under high load conditions, resource allocation and processing flow can be dynamically adjusted to optimize operational efficiency.

4 Planning the Red Tourism Brand Development Strategy

After the red tourism culture platform was constructed, this paper systematically planned the implementation path of the brand development strategy, focusing on core elements such as resource integration. The specific details are shown in Table 4.

Table 4: Red Tourism Brand Development Strategy Plan

Serial number	Strategic dimension	Key initiatives
(1)	Resource integration and development	Comprehensively sorting out red resources
		Scientific classification and grouping
		Design theme route
		Innovative development resources
(2)	Branding	Exploring the value and characteristics of resources
		Design brand image logo
		Extract core values
		Strengthen brand management
(3)	Promotion	Building an omnichannel network
		Keep up with the trend and create an ip
		Utilizing big data for precise marketing
(4)	Sustainable development	Government guidance and protection
		Introduce a professional team
		Government enterprise cooperative development
		Continuous innovation and improvement

First, strengthen the integrated development of red tourism cultural resources. Red tourism resources should be systematically sorted out, a resource archive should be established, and the spatial and temporal distribution, historical background and cultural attributes of various resources should be clarified. Through scientific classification and cluster analysis, the internal connections and thematic commonalities between resources can be identified to provide data support for subsequent product design. Taking into account the needs and characteristics of different tourist groups, we should design diverse and themed tour routes, such as "Red Study Tours" for young people and "Parent-Child Red Experience Tours" for families, to enhance tourists' sense of participation and gain [14]. Furthermore, we should actively promote the innovative transformation and utilization of red resources, using modern technologies such as VR/AR and holographic projection to develop new cultural products such as immersive red live performances and virtual exhibitions to enhance the appeal and influence of red tourism.

Second, focus on brand image building. We should deeply explore the unique value and spiritual connotations of local red cultural resources and refine representative and appealing core brand values. Incorporating regional cultural characteristics, we should design a unified visual identity system (VIS), including a logo, standard fonts, and colors, to enhance brand recognition and memorability. We should integrate core brand values into every aspect of product development, service provision, and promotion, fostering a positive brand image through consistent brand behavior. Furthermore, we should establish and improve brand usage and management standards to prevent brand abuse and devaluation, ensuring the seriousness and authority of the red tourism brand.

Third, build an omnichannel promotional network. An omnichannel promotional network should be established that integrates online and offline channels, blending traditional and modern approaches. In traditional media, collaborations can be made with television, radio, and newspapers to produce special programs and columns on red tourism. In digital media, a focus should be placed on new media platforms such as WeChat, Weibo, Douyin, and Xiaohongshu. Online activities such as short video challenges and interactive topics should be planned to create influential red tourism IPs and popular check-in spots. Big data technology

should be actively used to analyze tourist profiles and behavioral preferences to achieve targeted and personalized promotional content delivery, thereby improving marketing conversion rates.

Fourth, leverage big data to enhance promotional accuracy. Analyze tourist behavior data, understand group characteristics, preferences, and consumption patterns, implement differentiated intelligent recommendation strategies, and promote red tourism culture and service information tailored to interests. Monitor and evaluate promotional effectiveness in real time, adjust strategies, optimize content formats, and improve return on investment [15].

Finally, adhere to government leadership and government-enterprise collaboration to promote development. Adhere to the principles of government guidance, market operation, and social participation to form a multi-faceted and coordinated development pattern. Government departments should play a leading role in formulating medium- and long-term plans for red tourism development and improving relevant policies and regulations, increasing funding and infrastructure development. At the same time, actively introduce professional operation teams and market institutions to improve the operational efficiency and service levels of red tourism projects. Encourage the government to establish strategic partnerships with businesses, universities, and research institutions to jointly carry out resource protection, product development, and talent development. Establish a red tourism development evaluation and feedback mechanism to regularly monitor and evaluate project development, brand impact, and visitor satisfaction, continuously optimize development strategies, and achieve healthy and sustainable development of the red tourism brand.

5 Conclusion

This study is based on big data analysis of the strategy for the construction of a red tourism culture platform and brand development. At the technical level, by optimizing hardware configuration and building a resource library for multi-source data collection and cloud integration, the unified management of unstructured resources and user behavior data of red tourism culture has been achieved; On this basis, a personalized recommendation mechanism was designed by combining a weighted model of user click behavior and dwell time with mixed similarity calculation, effectively improving the stability and accuracy of recommendation results. At the strategic level, a systematic implementation strategy has been proposed to link the platform technology implementation with the brand development path, including resource integration, image shaping, omnichannel communication, and government enterprise collaboration.

The test results show that the built platform maintains a stable high distribution value of recommended features during the process of user scale changes, and the user click through rate significantly increases with the increase of access data volume. The throughput continues to grow under concurrency pressure, verifying the applicability and engineering feasibility of big data analysis methods in the field of red tourism. When the number of concurrent users increased from 50 to 600, the platform throughput increased from 125 request/second to 770 request/second. User click-through rate significantly increased and remained high with the increase in access data volume, validating the effectiveness of big data analysis. This study addressed the low service quality of traditional tourism platforms and improved the service quality of red tourism cultural platforms. The resulting regularity-based conclusions provide guidance for platform development, and the proposed brand development strategy also provides a path for the innovative development of red tourism brands.

The next stage of research can further introduce multimodal data analysis, integrate image, speech, and text information, and enhance semantic understanding of the connotation of red

culture; Explore the hybrid architecture of edge computing and cloud collaboration to reduce recommendation delay and improve real-time response capability. Meanwhile, by combining user generated content with social network analysis, we can dynamically capture the evolution patterns of red tourism culture hotspots, providing more granular support for intelligent decision-making in brand communication. Through continuous technological iteration and industry collaboration, the red tourism culture platform is expected to evolve from information supply to cultural experience and value co creation.

Author biography

Ye Feifei (1987.8-), female, from Anqing City, Anhui Province. I graduated with a master's degree in Tourism Management from Anhui Normal University. Currently, I work in the Department of Tourism and Public Management at Tongcheng Normal University, with a research focus on tourism planning and destination management. I mainly teach courses such as Introduction to Tourism, Tourism Culture, and Tourism Economics, and have participated in multiple provincial and school level teaching and research projects. I have rich work experience, solid theoretical foundation, and professional level.

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