

Retraction

Retracted: Digital Management and Optimization of Tourism Information Resources Based on Machine Learning

International Transactions on Electrical Energy Systems

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] X. Zhuang, H. Jiao, and L. Kang, "Digital Management and Optimization of Tourism Information Resources Based on Machine Learning," *International Transactions on Electrical Energy Systems*, vol. 2022, Article ID 7510206, 12 pages, 2022.

Research Article

Digital Management and Optimization of Tourism Information Resources Based on Machine Learning

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With the gradual growth of economy, tourism has become a pillar industry in many countries and plays an important role in promoting national development. The individualization and diversification of tourism resources must be supported by a powerful information resource management system. However, the traditional tourism information resource management system has some problems, such as scattered sources of tourism information, low interactivity, and slow update of information resources. Tourists cannot get detailed information of scenic spots and make detailed plans for tourism which hinder the further development of the tourism industry. In order to solve these problems and promote the development of the tourism industry, this paper carried out digital management of tourism information based on machine learning and digital management of information resources of different tourist attractions and surveyed and tested the number of tourists, expenditure of scenic spots, income of scenic spots, and satisfaction of tourists. The total result showed that the digital management of tourism information resources in scenic spots can increase the passenger flow, increase the income of scenic spots, reduce the expenditure of scenic spots by 6.7%, and increase the satisfaction of tourists by 4.1%. The digital management of tourism information resources based on machine learning can optimize the tourism industry and promote its development.

1. Introduction

With the continuous development of society and the improvement of people's living standards, tourism has become more and more popular and one of the largest and most powerful industries in the world today. With the popularization and application of the modern network, people's understanding of information about traveling is gradually changing to the network, and people's requirements for the tourism industry are also increasing. As the core technology of artificial intelligence, the tourism industry in the information age must provide efficient, fast, and convenient services, and the digital construction of tourism information resources is the basic work to improve the quality of tourism. Machine learning can divide the structure of information resources and effectively improve management efficiency.

Applying machine learning to the digital management system of tourism information resources can quickly classify and integrate tourism information, make the information resources in tourism more systematic and standardized, and quickly promote the development of the tourism industry.

As a simple and effective management method, digital management is used by many researchers. Matzner et al. discussed the significance of digital management of hybrid library, introduced one of the digital management system models LRP (Library Resource Planning) based on SCM, and analyzed the role of commercialization [1]. To solve the contradiction between heritage protection and tourism development, Huddar et al. explored through digital management and analyzed its principle based on coordination theory. The safeguard measures to strengthen the synergy effect of digitalization are put forward, and the digitalization

construction initially shows the good effect of coordinated management in protection and development [2]. Buchanan et al. has developed a digital management system for the management of raw materials. The actual demand and raw material management process are analyzed. Combined with the actual technology and production conditions, the developed system is applied to a large sintering yard. The actual running result of the application proves the effectiveness of the system [3]. Kovtunencko and But-Gusaim have developed a set of digital management information systems for the intensive dairy farm milking process, providing a series of convenient and intelligent raw data input interfaces, which can make statistics, analysis, and graphic display of milking data according to different types of cows or herds with different parity in a specific time period and can dynamically generate some important derivative data [4]. In order to reduce urban carbon emissions, Shmyhel used the digital model of urban management to manage cities, improve decision-making quality and efficiency, strengthen the connection between the Internet of things industry and the information industry, and improve the urban management level and quality [5]. Powell developed a digital management system to support the management process of historical building assets based on public participation, established a digital management framework system of tangible cultural heritage based on HBIM, and manages historical building assets in Malang. The framework of sustainable life-cycle heritage management has been realized [6]. Kim and Moon counted the automatic control drip irrigation device in digital management of macadamia nuts, including drip irrigation pipe, soil moisture sensor, motor, water storage room, water pump, and central controller, and gave the implementation plan. The device is not only convenient for laying and positioning but also convenient for controlling the overall irrigation water consumption and accurately using it during each drip irrigation period, thus improving the digital management level [7]. The above research shows the advantages of digital management, but with the emergence of new technologies and new situations, new problems appear.

As a mainstream learning method, machine learning has appeared in many research works and is deeply loved by scholars. Helma et al. used machine learning technology for oil spill detection and uses specific case studies to illustrate problems such as problem formulation, evaluation measure selection, and data preparation and links these problems with the attributes of oil spill applications to reduce the harm to the environment [8]. Sidiropoulos introduced the confusing results of different types of text and language data sets by using machine learning algorithm and discusses its application in automatic document indexing. Experiments show that machine learning has substantial and consistent improvement compared with standard latent semantic analysis [9]. Mullainathan and Spiess applied machine learning (ML) technology to the new research of IP traffic classification-the interdisciplinary integration of IP network and data mining technology. This paper discusses some key requirements of using ML-based traffic classifier in operating IP network and qualitatively criticizes the extent to

which the reviewed work meets these requirements [10]. Wang et al. described a fast filtering algorithm based on machine learning, which can be applied to deal with different problems. Tests using new methods, such as the first step of naive Bayes, model-based learning, decision tree, local weight loss, and preprocessing steps of the model tree, show that the decision tree and model tree constructed from preprocessed data are usually much smaller [11]. Chen and Asch proposed machine learning methods using positive definite kernel. These methods formulated learning and estimation problems in Hilbert space (RKHS), the reproduction kernel of functions defined in data domain, and extended them according to the kernel [12]. Voyant et al. proposed that Spark open source development should be distributed in MLlib machine learning library. MLlib provided effective performance for many training programs, including many basic statistics, optimization, and linear algebra, which can make users get started quickly [13]. Pound et al. designed a multimachine learning library to develop algorithms that are easy for machine learning, especially for deep connection networks. The combination of descriptive signal expression and special tensor parameters provides automatic differentiation to derive gradient [14]. The above results show that many researchers have achieved good results by using machine learning technology.

Machine learning is a method to encourage automatic use of the system and reduce errors, which is widely used. This paper adopts machine learning technology to manage information resources digitally, analyzes the distribution of tourism information resources, and uses the decision iteration tree and LambdaMART method to manage tourism information. We divide the information into documents one by one and extract keywords for classification; it can improve the timeliness and accuracy of information processing, save scenic spot expenditure for the tourism industry, promote the development of the industry, and bring more value to the tourism industry.

2. Digital Management System of Tourism Information Resources

2.1. Framework Design of the Information Resource Management Platform. Tourism resource management platform takes network communication as the channel of information exchange and transmission, and based on the application environment provided by data center as the main core for system application development technology, it provides "one-stop" service for content integration and application integration for tourism enterprises. Using artificial intelligence technology to process and analyze tourism information provides a comprehensive and effective information exchange and interactive sharing service platform for the travel industry and the public. Information management platform construction should include network communication, network construction, resource center construction, system environment construction, safe working environment construction, application development environment construction, information classification construction, and so on. They can provide "integrated" services for tourists,

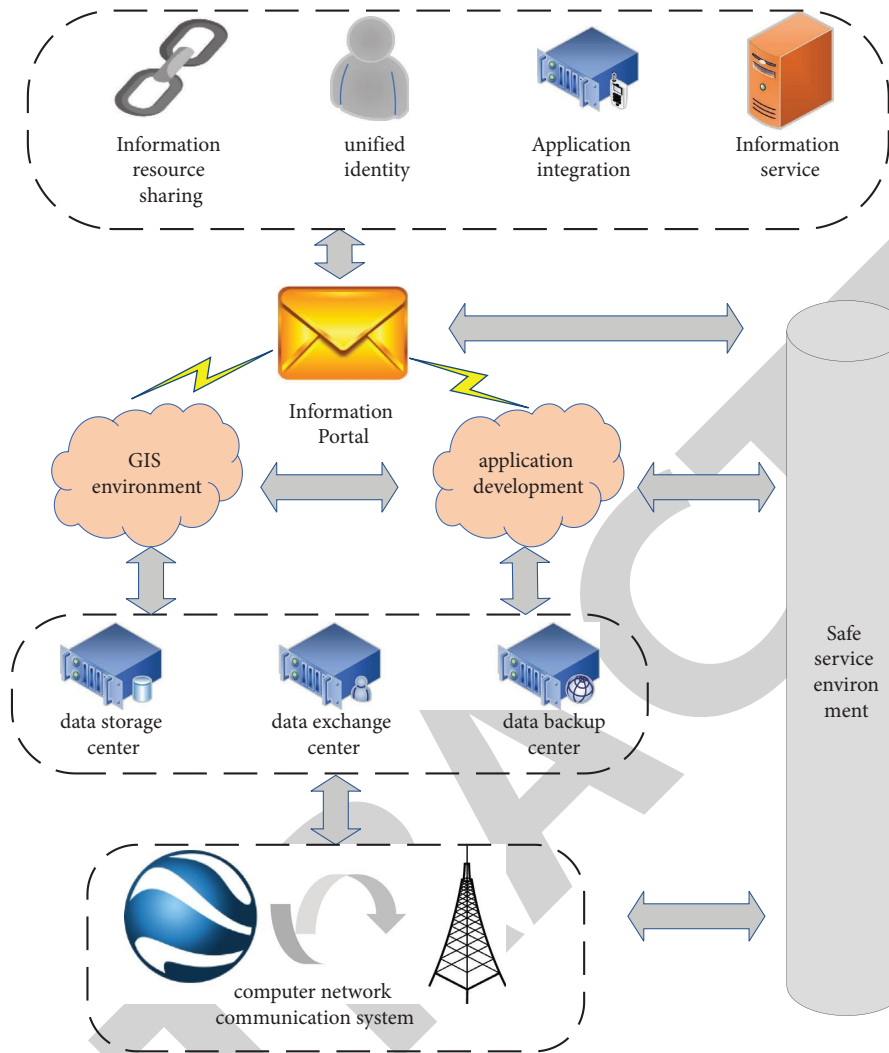


FIGURE 1: Framework design of the information resource management platform.

including information resource interaction services, tourist authentication services, integrated analysis services, application integration services, and information services, as shown in Figure 1.

Network communication environment is the transmission channel of the information resource management platform, the platform for information transmission, exchange, and distribution, which provides a shared platform for information management and analysis and communication support for information exchange. Data center is the main component of the tourism information management platform, and it is the center of storage, integration, exchange, and management of a lot of tourism information [15]. GIS environment is supported by technology, and a multisite information system framework is established to provide suitable integration areas for location data and various data types. The purpose of application development environment is to define and realize data sharing by compiling a unified data exchange template and data exchange system. The security service environment realizes the data security, application security, and network security of the

tourism information resource management platform through system security service configuration, constructs a security guarantee system and multilevel application of security access control, security control, identity authentication of tourists, security services, etc., defines security-related test contents and test methods, and automatically develops security control files. We ensure consistent security system and file synchronization. The information portal is the window through which the information management platform provides instant information services for tourists and managers at all levels of the tourism industry. Integrating multiple travel application systems with a unified information gateway system provides users with a unified system that supports terminal multi-interface devices and realizes the “integrated” system function.

2.2. System Business Flow Chart. Through the follow-up investigation of the business and demand of the travel industry, the data flow process of the tourism resource management information system is known in detail, and the

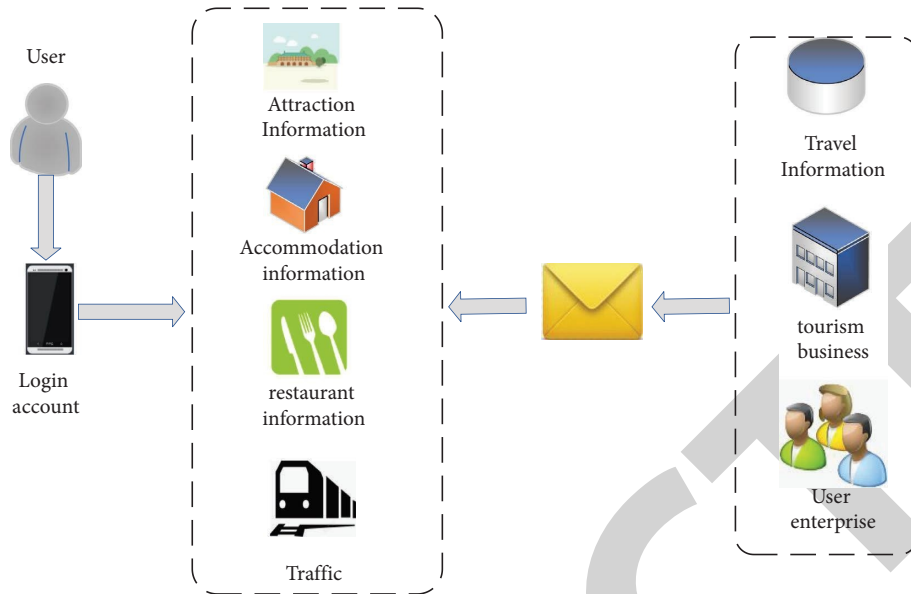


FIGURE 2: System business flow chart.

business flow chart of the tourism information resource digitization system is shown in Figure 2.

The system resources mainly include scenic spot information, accommodation information, restaurant information, and traffic information.

2.2.1. Scenic Spot Information. The information resources of scenic spots mainly include the basic information of all scenic spots in the tourism industry. Visitors can request source information to view the location of scenic spots under different conditions. In addition, the source information of scenic spots can also be read by different types.

2.2.2. Accommodation Information. Accommodation information is the basic information of hotels in and near tourist attractions, such as hotel names, templates, telephone numbers, prices, and others. Users can search scenic spots in the system to obtain accommodation information near the scenic spots.

2.2.3. Restaurant Resources. Restaurant information includes basic information of nearby restaurants inside and outside tourist attractions, such as restaurant names, locations, communication numbers, specialties, and others.

2.2.4. Traffic Resources. Traffic information includes bus resources, train resources, aircraft resources, and other related information, as well as sightseeing bus in the scenic spots of tourism enterprises.

2.3. Machine Learning-Based Tourism Information Resource Management Platform. Tourism information resource management platform is the creation, collection, exchange and implementation of tourism information resources and

the knowledge exchange and sharing between tourism subjects and objects so as to achieve the purpose of user interaction. For the tourism industry, it provides the right information and knowledge to the right people at the right time to increase the value of this information. The introduction of machine learning technology into the integrated tourism information resource management platform can enable employees to generate knowledge, update and maintain information in the system, and enable the system to obtain more tourism information resources while the investment of enterprise funds are reduced. At the same time, it can increase the interactivity of the platform and bring better experience to users. The platform is mainly composed of several parts, such as user end, tourism website promotion, tourism information inquiry, and support system, as shown in Figure 3.

2.3.1. Client. The platform of the tourism resource management system covers a wide range, including the staff who run the system, administrative staff, and travel platforms that use the platform to publish information. Among them, platform operators are the biggest contributors to information sources. Customers who use the platform can also interact through the platform, providing valuable related information mining information for the tourism industry [16].

2.3.2. Travel Website Interface. Tourism website interface is the entrance to the system platform. On the tourism website, tourism information and resources are presented in a centralized way that is easy for users to understand. Users inside and outside the platform can access this site through intranet and extranet, respectively. For users who have personal interests, they can subscribe by theme and customize their personal information to enter the homepage.

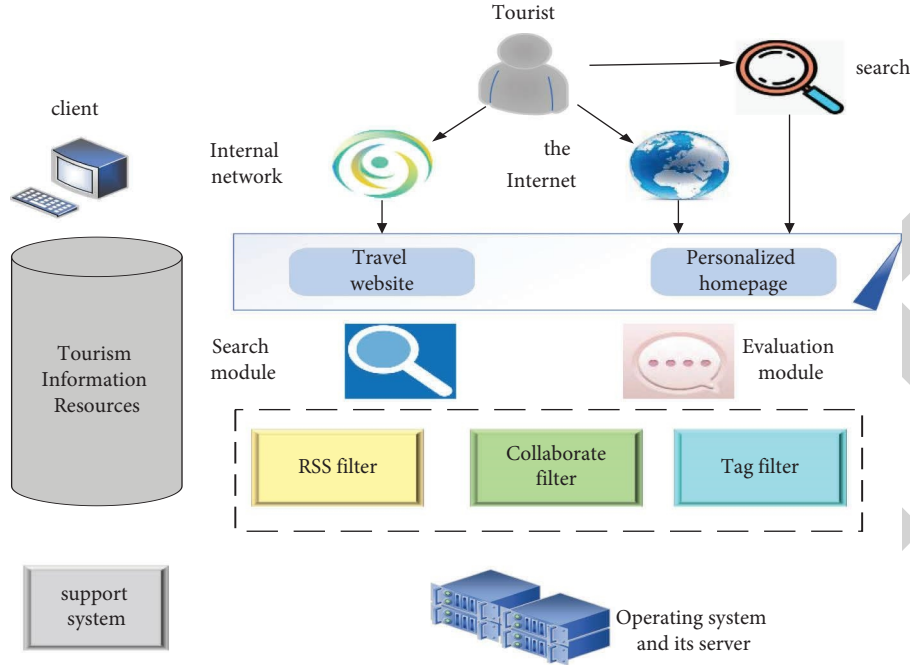


FIGURE 3: Tourist information resource management platform based on machine learning.

2.3.3. Information Service. Information service combines the functions of collaboration, communication, learning, and distribution in integrated tourism information management services and is used to integrate extensive information and knowledge inside and outside the system platform. Users can use the full-text search engine to input keywords, search for scenic spot information, and find the scenic spot information they want to know.

2.3.4. Support System. The system architecture is like a memory bank, which stores platform data, information, and knowledge, and provides a complete system platform interface through the operating system and other servers. Constructing a machine learning-based tourism information resource management platform is crucial to the shortcomings of the existing tourism information resource management platform, as well as the promotion, creation, organization, collection, dissemination, distribution, and implementation of tourism information resources.

2.4. Data Storage Center. In order to facilitate the management and use of travel information sources, we should reduce the error rate of network sources and improve the data transmission speed. The storage architecture of each data center adopts LAN architecture, which is an exclusive storage network composed of optical fibers and a cable switch with optical fiber converters. To connect servers and storage devices through storage device management software, many servers share multiple storage devices, as shown in Figure 4.

The main advantage of using storage architecture is to make full use of optical fiber switches to connect multiple servers and large-capacity storage devices, promote the

application of storage architecture, function, and performance, and bring the best open network interface for storage architecture.

2.5. Main Algorithms

2.5.1. LambdaMART Algorithm. This paper describes the method of system sorting state, and the document index method is the most effective method applied to model recovery at present, among which LambdaMART is the most important. Because of the variability of retrieval information options, documents with high relevance are more important than documents with low relevance, so an evaluation index is put forward. Because of the maintenance of these scores, the loss function cannot be increased, and the loss function is optimized with a large slope [17].

In the LambdaMART method, the gradient of each sorted data in the search is set as

$$\lambda_m = \sum_{n:\{m,n\} \in I} \lambda_{mn} - \sum_{n:\{n,m\} \in I} \lambda_{nm}, \quad (1)$$

where λ_{mn} refers to the influence of the sorted document N on the next round gradient of the document M , which is

$$\lambda_{mn} = \frac{-\sigma|\Delta Z_{mn}|}{1 + e^{-\sigma(s_m - s_n)}}, \quad (2)$$

where $|\Delta Z_{mn}|$ is the cost of exchanging the ordering positions of document M and document N .

The value obtained in formula (1) is applied to the function as a function of the training number, and then the value of the green node of the training tree is calculated according to Newton's method used for direct gradient derivation:

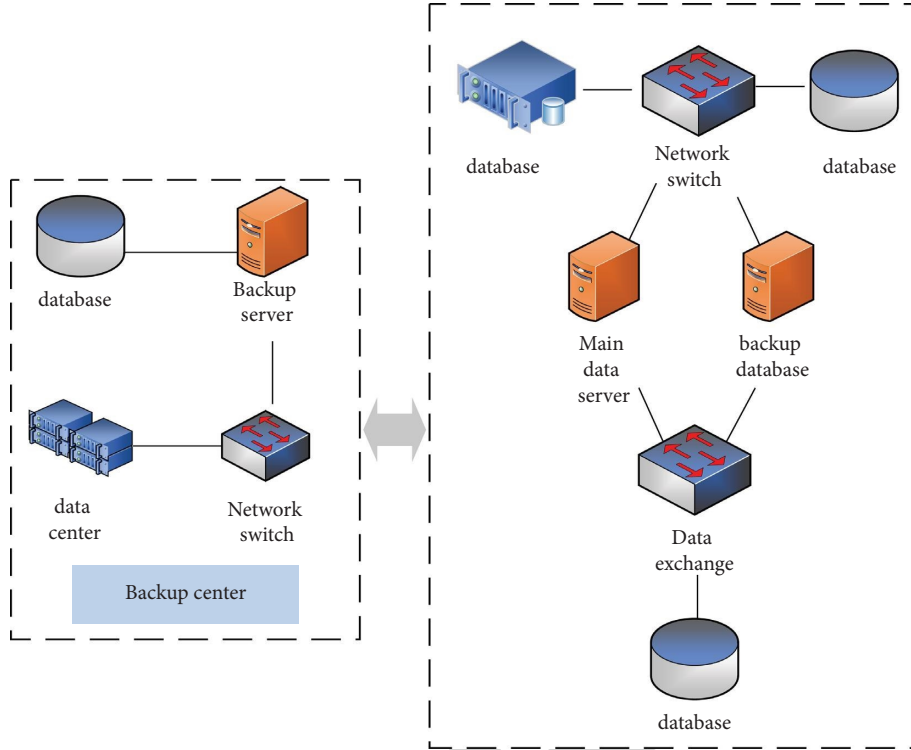


FIGURE 4: Data storage center.

$$\frac{\partial^2 C}{\partial s_m^2} = \sum_{\{m,n\} \Leftrightarrow M} \sigma^2 |\Delta Z_{mn}| \rho_{mn} (1 - \rho_{mn}). \quad (3)$$

Then, use Newton's method

$$\gamma_{kj} = \frac{\sum_{x_m \in R_{kj}} (\partial C / \partial s_m)}{\sum_{x_m \in R_{kj}} (\partial^2 C / \partial s_m^2)} \frac{-\sum_{x_m \in R_{kj}} \sum_{\{m,n\} \Leftrightarrow N} |\Delta Z_{mn}| \rho_{mn}}{\sum_{x_m \in R_{kj}} \sum_{\{m,n\} \Leftrightarrow N} |\Delta Z_{mn}| \sigma \rho_{mn} (1 - \rho_{mn})}. \quad (4)$$

Then, update the model as follows:

$$F_k(x_m) = F_{k-1}(x_m) + \eta \sum_l \gamma_{lk} I(x_m | \in R_{lk}). \quad (5)$$

Repeat until the training model reaches the end of training.

2.5.2. RankNet Method. RankNet is a pairwise-like algorithm in LTR [18]. In the process of using the search engine, when a keyword is queried, the search engine will find many URLs related to the keyword, then calculate the correlation between the URL and the topic according to the ability of each URL, and determine the order of the last URL.

The RankNet algorithm solves the positioning problem in a probabilistic way. First of all, the selection process needs to be considered, that is, when the model attributes are imputed, the "Score" command of the model to realize the classification can be output [19, 20]. In RankNet, location service is defined as a 3D network model. We input

command data related to sample size, output data as interface point, and the selection function is defined as follows:

$$f(x_i) = g^3 \left(\sum_m w^{32} g^2 \left(\sum_k w_{mk}^{21} x_{ik} + b_n^2 \right) + b_m^3 \right). \quad (6)$$

The indices of density parameter W and polarization parameter B represent the layer where nodes are located, and the subset represents the number of nodes in the same plane; x_{ik} represents the return component of vector attribute x_i , which is the input layer, and $f(x_i)$ the result is a score. Then, because RankNet is a sorted training algorithm, the examples are pairwise. For a pairwise ordered training algorithm, there are two kinds that may need to be calculated, one is the prediction of probability, which is given as follows:

$$P_{mn} \equiv P(U_m \triangleright U_n) \equiv \frac{1}{1 + e^{-\sigma(s_m - s_n)}}. \quad (7)$$

Its definition is the probability that the i th sample comes before the j th sample, where s_m and s_n are the result scores of the previous selection function.

Another probability is the real probability, which is defined as follows:

$$\bar{P}_{mn} = \frac{1}{2}(1 + S_{mn}). \quad (8)$$

For a given data command, where $S_{mn} \in \{0, \pm 1\}$, S_{mn} is 1, the relevance of the m th document is higher than that of the n th document, $S_{mn} - 1$ indicates that the relevance of the m th document is lower than that of the n th document, and $S_{mn} - 0$ indicates that the two documents have equal relevance.

Then, based on the cross entropy function, the loss function of the RankNet algorithm is established and solved by the gradient descent method as follows:

$$C_{mn} = -\bar{P}_{mn} \log P_{mn} - (1 - \bar{P}_{mn}) \log(1 - P_{mn}). \quad (9)$$

Through simplification, it is concluded that

$$C_{mn} = \frac{1}{2}(1 - S_{mn})\sigma(s_m - s_n) + \log(1 + e^{\sigma(s_m - s_n)}). \quad (10)$$

Then, the total cost function of all document pairs is

$$C = \sum_{(m,n) \in I} C_{mn}. \quad (11)$$

M represents the set of all document pairs, and each document pair contains only once.

The loss function C_{mn} takes the derivative of w_k in the ranking function and then uses the gradient descent method to obtain the best parameters as follows:

$$w_k \longrightarrow w_k - \eta \frac{\partial C}{\partial w_k}. \quad (12)$$

η is the step size, and the cost c varies along the negative gradient direction, which is expressed as follows:

$$\Delta C = \sum_k \frac{\partial C}{\partial w_k} \Delta w_k = \sum_k \frac{\partial C}{\partial w_k} \left(\eta \frac{\partial C}{\partial w_k} \right) = - \sum_k \left(\frac{\partial C}{\partial w_k} \right)^2 < 0. \quad (13)$$

This shows that updating the parameters along the negative gradient direction can indeed reduce the total cost, and by continuing to decompose $(\partial C / \partial w_k)$, we can get

$$\begin{aligned} \frac{\partial C}{\partial w_k} &= \sum_{(m,n) \in I} \lambda_{mn} \left(\frac{\partial s_m}{\partial w_k} - \frac{\partial s_n}{\partial w_k} \right) \\ &= \sum_m \lambda_m \frac{\partial s_m}{\partial w_k}. \end{aligned} \quad (14)$$

M only contains a collection of documents with different labels, and each document pair is only contained once. For convenience, we assume that M only contains (U_m, U_n) ,

which means that U_m has a correlation greater than U_n , that is, all the document pairs in M satisfy $S_{mn} = 1$, then

$$\lambda_m = \sum_{n: (m,n) \in M} \lambda_{mn} - \sum_{n: (n,m) \in M} \lambda_{nm}. \quad (15)$$

λ_m specifies the transmission direction and the size of the m th document in the repetition. The smaller the cover, the more documents behind U_m , which increases the gradient of the forward movement of U_m information documents (actually, more negative documents of λ_m). This shows that the direction and intensity of the next line of each information document depend on all other documents with different symbols in the same document.

The RankNet algorithm makes use of the relationship between sample pairs in the training process, especially in the prediction probability part, so it is a two-way method.

2.5.3. GBDT Algorithm. GBDT is a combination of AdaBoost and deadtree. AdaBoost-DTree is adopted, and gradient adjustment is used for training. Since AdaBoost-DTree, the decision has been used for weight test training, so it is necessary to reconfigure the decision. The sample sizes of different weights in the new system are balanced, and the decision configuration is not needed to train the recently designed model using decision [21].

In AdaBoost, the gradient weight of each information is calculated as $\alpha_f = \ln \sqrt{(1 - \varepsilon_f / \varepsilon_f)}$, where f is the error rate of the information document in the sample. Then, the formula for calculating the gradient weight of each sample in the $f+1$ round is

$$u_n^{f+1} = \Delta_f e^{-y_n \alpha_f g_f(X_n)}, \quad (16)$$

where Δ_f is $\ln \sqrt{(1 - \varepsilon_f / \varepsilon_f)}$, then it is concluded that

$$u_n^{(F+1)} = u_n^{(1)} \cdot \prod_{f=1}^F e^{(-y_n \alpha_f g_f(X_n))} = \frac{1}{N} e^{\left(-y_n \sum_{f=1}^F \alpha_f g_f(X_n) \right)}. \quad (17)$$

That is, the final model is $G(X_n) = \text{sign}(\sum_{f=1}^F \alpha_f g_f(X))$. According to this formula and the calculation formula $(y_n \cdot (W^F \Phi(X_n) + b / \|W\|))$ of margin in SVM, the smaller the margin in SVM, the better the model effect. The purpose of this method is to find the smallest $u_n^{(F+1)}$, that is, $\min u_n^{(F+1)}$.

Next, we have to find the best learning rate η , namely

$$\begin{aligned} \min_{\eta} \frac{1}{N} \sum_{n=1}^N (S_n + \eta g_f(X_n) - y_n)^2 \\ = \min_{\eta} \frac{1}{N} \sum_{n=1}^N (y_n - s_n) - \eta g_f(X_n)^2. \end{aligned} \quad (18)$$

That is, by finding the best η , the algorithm can make $\eta g_f(X_f)$ and the output of the information document close

TABLE 1: Attraction information table.

| | Level (A) | Type | Opening hours | Ticket price |
|---------------|-----------|--------------|---------------|--------------|
| A scenic spot | 5 | Architecture | 8:30~17:50 | 25RMB |
| B scenic spot | 5 | Mountain | All day | 50RMB |
| C scenic spot | 5 | Ocean | 7:00~19:00 | 30RMB |
| D scenic spot | 5 | Architecture | 8:30~17:50 | 50RMB |
| E scenic spot | 5 | Museum | 9:00~17:50 | 25RMB |

to the residual error of the actual sample label value to the greatest extent.

2.5.4. LambdaMART. The slope obtained above is applied to GBDT as a function of training numbers, and then the green node value of the training tree is calculated according to Newton's method used to get the template [22, 23] as follows:

$$\frac{\partial^2 C}{\partial s_f^2} = \sum_{\{m,n\} \in M} \sigma^2 |\Delta Z_{mn}| \rho_{mn} (1 - \rho_{mn}). \quad (19)$$

Then, use Newton's method

$$\gamma_{km} = \frac{\sum_{x_m \in R_{km}} (\partial C / \partial s_m)}{\sum_{x_m \in R_{km}} (\partial^2 C / \partial s_m^2)} = \frac{-\sum_{x_m \in R_{km}} \sum_{\{m,n\} \in M} |\Delta Z_{mn}| \rho_{mn}}{\sum_{x_m \in R_{km}} \sum_{\{m,n\} \in M} |\Delta Z_{mn}| \sigma \rho_{mn} (1 - \rho_{mn})}, \quad (20)$$

$\rho_{mn} = (1/1 + e^{\sigma(s_m - s_n)})$, where the model is then updated as follows:

$$F_k(x_m) = F_{k-1}(x_m) + \eta \sum_l \gamma_{lk} I(x_m | \in R_{lk}). \quad (21)$$

Iterate and loop in turn until the training model reaches the standard of training termination.

3. Experimental Design of Digital Management of Information Resources

3.1. The Experimental Process. Five tourist attractions were randomly selected for the experimental test. In order to avoid the experimental error, all the scenic spots were 5-year scenic spots. In the off-season (March and April) and the peak season (August and September), the digital management of information resources was carried out, and the number of tourists, expenditure of scenic spots, income of scenic spots, and tourists' satisfaction were investigated, respectively. After the investigation, compared with previous years, it analyzes the impact of digital management system of information resources on all aspects of scenic spots.

3.2. Experimental Data. Five tourist attractions were randomly selected for the experimental test. In order to avoid the experimental error, all the scenic spots were 5A scenic spots. The specific information of the scenic spots is shown in Table 1.

3.3. Experimental Purpose. Test whether digital information management based on machine learning can promote the development of tourist attractions and whether machine learning can optimize information digital management system.

3.4. Experimental Results and Analysis of Digital Management of Information Resources

3.4.1. Test of the Number of Tourists. Through the digital information management system of scenic spots, the number of tickets purchased in the scenic spots can be checked, the number of tourists in the off-season and peak season of five scenic spots can be counted, and whether there is any increase or decrease in the flow of people in the scenic spots can be observed after using the digital information management system compared with those without using the digital information management system in previous years. The results are shown in Figure 5.

As can be seen from the figure, due to the influence of off-season and peak season, the passenger flow in peak season is much higher than that in off-season. After the application of the digital information management system, the average passenger flow of five scenic spots in off-season is 151,000, compared with 138,900 in previous years, with an increase of 12,100. After the application of the digital information management system, the average passenger flow of five scenic spots in peak season is 574,000, compared with 501,900 in previous years, with an increase of 7.21. The increase rate of passenger flow in peak season is more obvious than that in off-season, and the digital tourism information management system based on machine learning can bring more tourists to the scenic spots.

3.4.2. Expenditure of Scenic Spots. The cost of building maintenance, equipment addition, and information system update in five scenic spots were investigated and tracked, and they were compared with the expenditure of scenic spots in previous years. Whether the expenditure of scenic spots after using the digital information management system increased or decreased compared with that of the unused

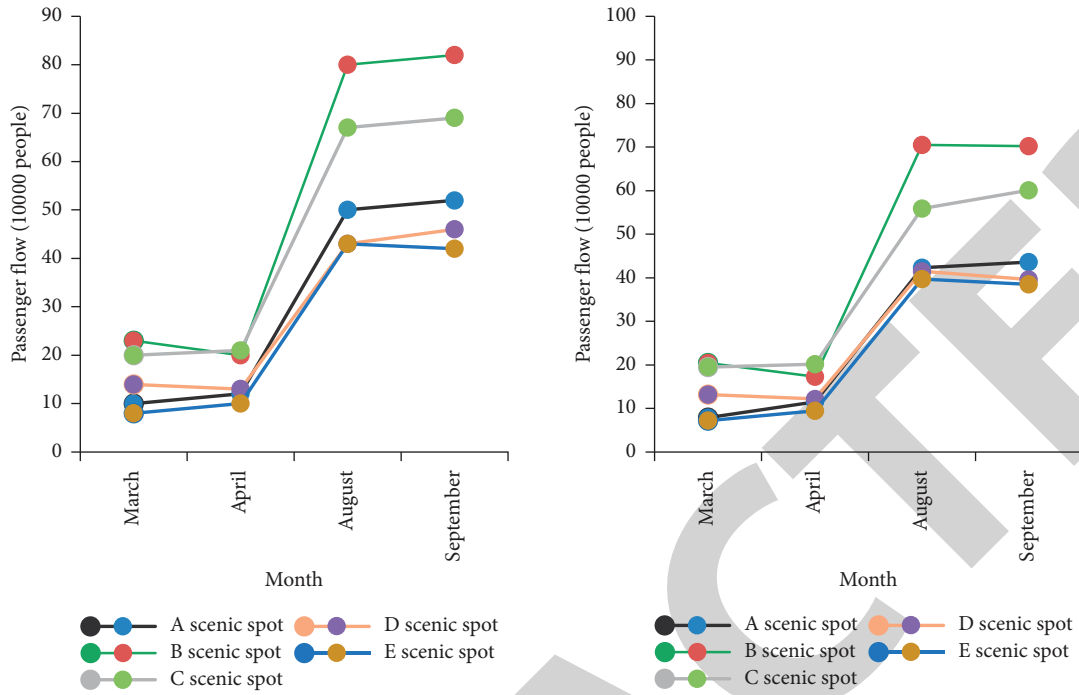


FIGURE 5: Graph of the test results of the number of tourists.

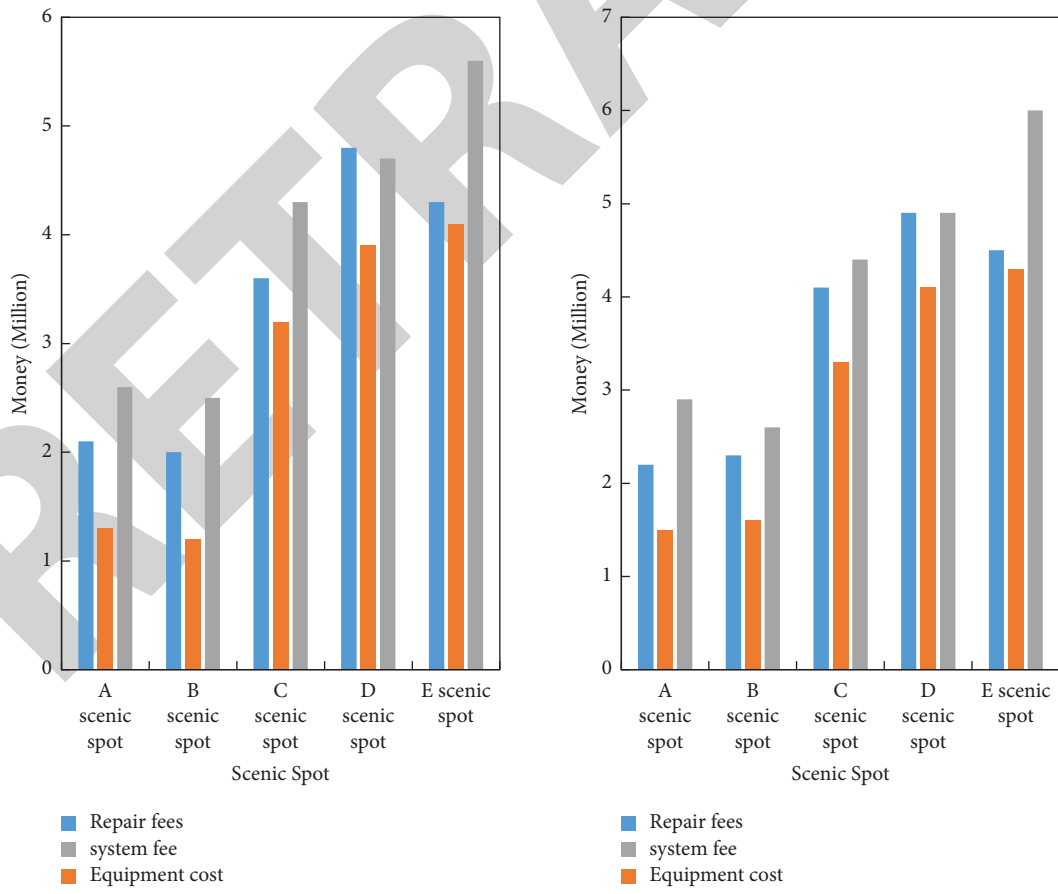


FIGURE 6: Comparison of scenic spot expenditures.

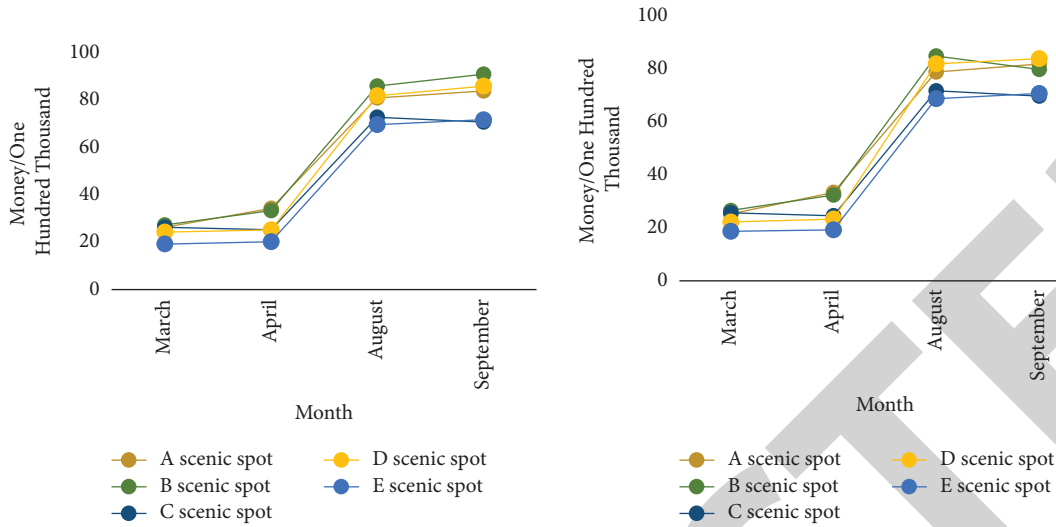


FIGURE 7: Scenic spot revenue impact.

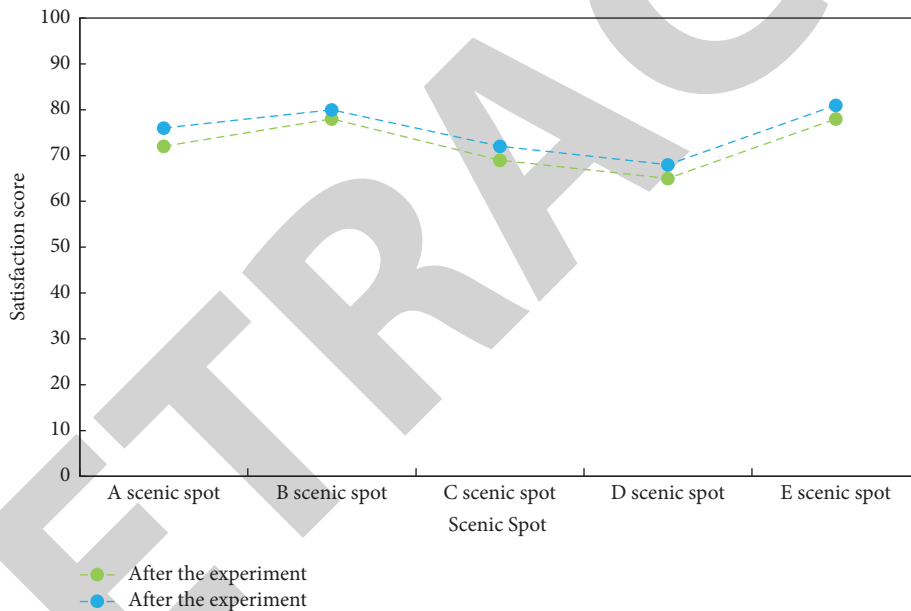


FIGURE 8: Comparison of tourist satisfaction.

digital information management system in previous years was observed. The results are shown in Figure 6.

As can be seen from the figure, the five scenic spots spend the most on information system update. After using the digital information management system, the average total expenditure of the five scenic spots is 100,400 yuan, and the average total expenditure of the scenic spots in previous years is 107,200 yuan, which reduces the expenditure by 6.7%. It can be seen that the digital management system of tourism information based on machine learning can reduce the expenses of scenic spots and optimize the economy of scenic spots.

3.4.3. Revenue from Scenic Spots. Investigate the income of scenic spots in off-season and peak season, and observe

whether the digital tourism information system based on machine learning has any influence on the income of scenic spots. The results are shown in Figure 7.

As can be seen from the figure, the income of the five scenic spots in peak season is much higher than that in peak season. After using the digital information management system, the average income of the five scenic spots in off-season is 5.18 million yuan, compared with 4.97 million yuan in previous years, and the income of scenic spots has increased by 210,000 yuan. After the application of the digital information management system, the average income of five scenic spots in peak season is 15.72 million yuan, compared with 15.28 million yuan in previous years, and the income of scenic spots has increased by 440,000 yuan. The increase rate of scenic spot income in peak season is more obvious than

that in off-season. The tourism information digital management system based on machine learning will bring higher revenue to scenic spots.

3.4.4. Tourist Satisfaction. After tourists' tour, 1,000 tourists were evaluated by using a questionnaire, and tourists were asked to evaluate the tourism system. The impact of the machine learning-based tourism information system on tourists was observed, and the results were compared with previous years' scores. The results are shown in Figure 8.

As can be seen from the figure, the digital tourism information management system based on machine learning is more popular among tourists, with an average score of 75.4 for tourists, 72.4 for tourists in previous years, and an increase of 4.1% for tourists.

4. Discussion

This paper mainly introduced the method of tourism information collection combined with machine learning and discussed it under the existing information and technology integration methods and current research progress. The LambdaMART method, which is widely used in data recovery, is explored. Finally, the whole derivative process of the LambdaMART method is converted from RankNet to LambdaMART. Combining GBDT, rating index, and the Lambdamart method, the problem that there is no original information in the system is solved, and the tourism information system based on machine learning is established. Finally, the digital system of tourism information resources is applied to scenic spots, all aspects of which are tested, and the research on digital management and optimization of tourism information resources based on machine learning is completed. There are still some shortcomings, such as too little data collection, and all of them are large scenic spots, so there may be experimental errors, and the small scenic spots have not been tested. Further research and exploration are needed.

5. Conclusions

At present, the informatization of tourism resources is not enough to promote the development of the tourism industry. Machine learning, as the mainstream technology of artificial intelligence, can be applied to the digital tourism information system, which can promote the development of scenic spots. In this paper, machine learning technology was applied to the digital system of tourism information resources, and the number of tourists, expenditure, income, and satisfaction of tourists in different scenic spots were investigated. It is found that the digital tourism information system can attract more tourists, reduce the expenditure, and increase the income of scenic spots, and tourists are more satisfied with the use of the digital tourism information system.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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