



Research article

Role of information security-based tourism management system in the intelligent recommendation of tourism resources

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Abstract: With the rapid development of tourism and the Internet industry, tourism activities have increasingly become a fashion behavior of people. The role of intelligent tourism resources in tourism activities has gradually become prominent. In order to meet the needs of all kinds of users, the tourism management system services are developing in the direction of diversification and individualization, and recommending the tourism resource products that best meet the needs of users to users has become a top priority. This article aims to improve the practical value of the system through the intelligent functions of the tourism management system based on information security in the intelligent recommendation of tourism resources. The tourism management system can display the received information about tourists. Through the experimental research of the accompanying information security algorithm and the analysis of the recommendation of the tourism system, the intelligent functions of the tourism management system based on information security can be captured in the intelligent recommendation of tourism resources. Develop the tourism management system to solve efficiency problems and realize tourism management information. Experimental results show that based on information security, 80% of tourists have become a popular choice for smart recommendation countries, which will bring more convenience to tourists during the game.

Keywords: information security; tourism management system; intelligent recommendation; association rule algorithm

1. Introduction

The Internet is more and more recognized by people. With the improvement of people's living

standards and the continuous development of the economy, travel has become people's choice. Through travel, people can reduce work pressure, obtain happiness and enjoy the highest level of quality of life. They have obtained the greatest spiritual gains. Nowadays, travel has gradually become a habit and fashion. In research on tourism information recommendation based on spatio-temporal data, time is usually classified, space is mapped to cities, and appropriate recommendations are provided according to the city, time interval, and other environments specified by the user. Such a recommendation method is insensitive to changes in the user's time and space, and is suitable for helping the user to make travel plans in advance, but is not suitable for providing recommendations of instant travel information.

The domestic tourism industry continues to develop. With the improvement of people's level, the domestic tourism industry continues to grow every year. Most of them are family groups that travel frequently. Through the online travel management system, diversified, safe, accurate and comprehensive services have been realized. With the continuous development of the economy and the improvement of people's living standards, the number of tourists has gradually increased. Through the development of the tourism industry, the problems that have arisen in the tourism industry have realized customer information in the tourism industry from multiple angles, and websites such as tourist routes and reservation services have been provided. If these services cannot meet the needs of customers or are not satisfied, please leave a message through the functional intelligent platform.

The intelligent and personalized recommendation service of travel resources can recommend the visual content results of travel smart products that conform to the user's spatial cognitive habits to users based on user needs and map environment information, helping to improve the usability and service quality of smart travel products. Meng Li believes that tourism-related resources and information should be sorted, and the information that customers care most about can be passed to it, so that the entire system has a clear structure and clear content, and can ask various questions, including driving routes, tourists, etc. On the one hand, tourist attractions, hotel accommodations, etc., tourists can choose their favorite way of travel, or they can choose their favorite tourist attractions. These functions can be requested through the system, but specific data is missing [1]. Xu L believes that all types of tourism resources can be stored and managed in an orderly manner, and the goal of resource sharing can be achieved through the Internet. It is convenient and fast, and computer management can effectively prevent the impact of employee turnover on business operations. For travel companies, it is even more important lack of tools. Provide solutions based on customer problems to facilitate users on business trips. Let customers understand the state of the entire trip before traveling, but the development is rather vague [2]. Shao Xiao hui promotes its travel website as an exclusive brand and builds brand awareness, which helps cultivate loyal customers for its travel products. You can also book vehicles, hotels and hotels in advance based on the estimated number of passengers through online booking products. The development of ticketing business and tourist routes in scenic countries is not only convenient, fast and efficient, but also brings you great convenience. National scenic area management and people travel, but there is no specific direction [3].

The innovation of this article lies in the analysis of the use of information security related algorithms and tourism management systems to show the intelligent and personalized recommendation service of tourism resources. According to user needs and map environment and other information, it can visualize tourism smart products that meet the user's spatial cognitive habits.

The content results are recommended to users, which will help improve the usability and service quality of travel smart products.

2. Recommended tourist attractions

2.1. Intelligent recommendation of tourist attractions

The current tourism industry is developing rapidly [4]. In order to cater to the preferences of users and increase the visit rate of the website, the search for personalized algorithms for recommending tourist attractions has been gradually expanded and deepened [5,6]. Currently, there are two main types of tourist attraction recommendation, one is called popular tourist attraction recommendation, and the other is called personalized tourist attraction recommendation [7]. The recommendation of popular tourist attractions is to recommend representative attractions in tourist destinations [8,9]. For most people going to Beijing, the first stop is basically Beijing Tiananmen Square or the Great Wall; when going to Shanghai, please choose attractions such as the Oriental Pearl Tower [10]. Most of the recommended attractions list on travel websites is a collection of popular attractions. Although they can meet the needs of users to a certain extent, they are not suitable for all users. For users who travel frequently, the recommendations of these popular tourist attractions do not meet user requirements [11,12].

2.2. Commonly used methods of information security data mining

(1) Regression analysis

The analysis method mainly reflects the characteristics of a certain attribute value in the database from the time point, and generates a data column by expressing the function of the current value predictor variable, and finds the dependency relationship between variables or attributes [13,14].

(2) Collection

The analysis method is to divide a set of data into multiples based on differences and similarities [15,16]. The main purpose is to make the similarity between data belonging to different categories and the similarity between data in the same category as small as possible [17].

(3) Association rules

The association rule method is a rule that describes the relationship between data items in the database. In other words, based on the presentation of certain items in the transaction, other items in the same transaction can be extracted [18].

2.3. Intelligent informatization of tourism

Tourism computerization is the only way for the sustainable development of tourism. In the future, the use of modern information and Internet technology in the tourism industry will continue to grow. Technology has brought unlimited vitality to the tourism industry, and it is also a direct driving force for the development of the tourism industry. The direct result is the continuous improvement of China's tourism service quality [19]. Technology has brought new service updates to the tourism industry, and it will surely bring new changes to management. Technology not only

brings simple, convenient and efficient management to the tourism industry, but also brings a variety of unexpected guest services [20].

3. Algorithm of information security association rules

3.1. Information security association rules

Association rules usually apply to physical stores or e-commerce systems, and mainly reflect the correlation and interdependence between things. For example, purchase product A when purchasing product B, dig out the results, adjust the shelf layout, create a perfect promotion combination and ultimately increase the possibility of product sales. The most classic case is "beer and diapers".

3.2. Key concepts of information security

The key concepts in association rule analysis include: support, trust and promotion.

(1) Support rate

The so-called support rate refers to the probability ($B \cap C$) of two products in the total sales volume (H), and the probability of buying products B and C. Similar to the connection, the original must meet the conditions at the same time. The formula is like the formula like

$$Support(B \cap C) = \frac{Freq(B \cap C)}{H} \quad (1)$$

(2) Confidence

The so-called confidence is the conditional probability of buying commodity A while buying commodity B. Simply put, it is the ratio of the intersection of product A and product B in product A. If the ratio is large, it means that customers who purchase product A will buy product B to a large extent. The formula is as follows:

$$Confidence = \frac{Freq(B \cap C)}{Freq(B)} \quad (2)$$

(3) Lift

Lift refers to the increase in the probability of purchasing product B first to the probability of purchasing product B. If it is greater than 1, the rule is valid, and if it is less than 1, it is invalid. The formula is as follows

$$Lift = \frac{Support(B \cap C)}{Support(B) * Support(B)} \quad (3)$$

3.3. Information security collaborative filtering algorithm

The information security collaborative filtering algorithm uses some common interests or the

same experience of the group to recommend information that may be of interest to the user. Algorithm steps: The focus of the steps is to calculate the degree of preference among users. Suppose there are two users a and b . Let $H(a)$ represent the collection of items liked by the user, and $H(b)$ represent the collection of items liked by the user b . Then use the cosine similarity formula to calculate the preference similarity between users a and b

$$W_{ab} = \frac{|H(a) \cap H(b)|}{\sqrt{|H(a)| |H(b)|}} \quad (4)$$

The second step is to compose a set of items liked by users who are similar to the target user, and then calculate according to the reference value of the similarity of preferences between users, and recommend the top K items to the target user. The formula for calculating user a 's preference for item c is as follows:

$$P(a, c) = \sum_{(a,k) \cap N(c)} W_{ac} r_{bc} \quad (5)$$

The user recommendation list is constructed based on the similarity between the user's historical behavior and the calculated items. The first step is to determine the similarity between items according to the formula

$$H = a + \frac{F - m}{M - m} \times c \quad (6)$$

In the recommendation system, the characteristic attribute value of the subject is sometimes discrete, such as whether the user has purchased a certain product, whether the user has browsed a certain news, etc. The first two methods measure similarity. In the face of this situation, when calculating the similarity of individuals, we can use the method of Jaccard correlation coefficient.

$$Jaccard(B, C) = \frac{|B \cap C|}{|B \cup C|} \quad (7)$$

4. Recommendation analysis of tourism management system

4.1. Function analysis

First of all, the travel recommendation system needs to record the user's historical behavior, including the user's purchase, browsing, and collection of those tourist attractions, the evaluation and scoring of the purchased attractions, the evaluation of some guides, and the interaction with the author of the guide. Finally, the recommended item set is displayed to the user, and the user's feedback results are recorded, whether they are satisfied with the recommended results, and what needs to be improved. The system analyzes and optimizes according to the feedback results, and adjusts a new user preference model. Therefore, the functions of a complete travel recommendation system can be divided into the following modules: user behavior collection, collection information preprocessing, collection information mining, building user preference models, item recommendation, and user feedback analysis. The functions of the recommended system are shown

in Table 1.

Table 1. Tourism information recommendation system based on data mining.

Serial number	Tourism information recommendation system based on data mining
1	User behavior collection, collected information preprocessing
2	collected information mining analysis
3	establishment of user preference models
4	item recommendation
5	item exhibition
6	user feedback analysis

4.2. Influence of tourist map factors

The content displayed on the tourist map includes catering, accommodation, transportation, attractions, shopping, entertainment, etc., which are affected by users and time the air, environment, and mission environment are affected, but each aspect is affected by specific factors that are not completely consistent. According to the user questionnaire Investigate and calculate the correlation of six factors. The specific content is shown in Figure 1.

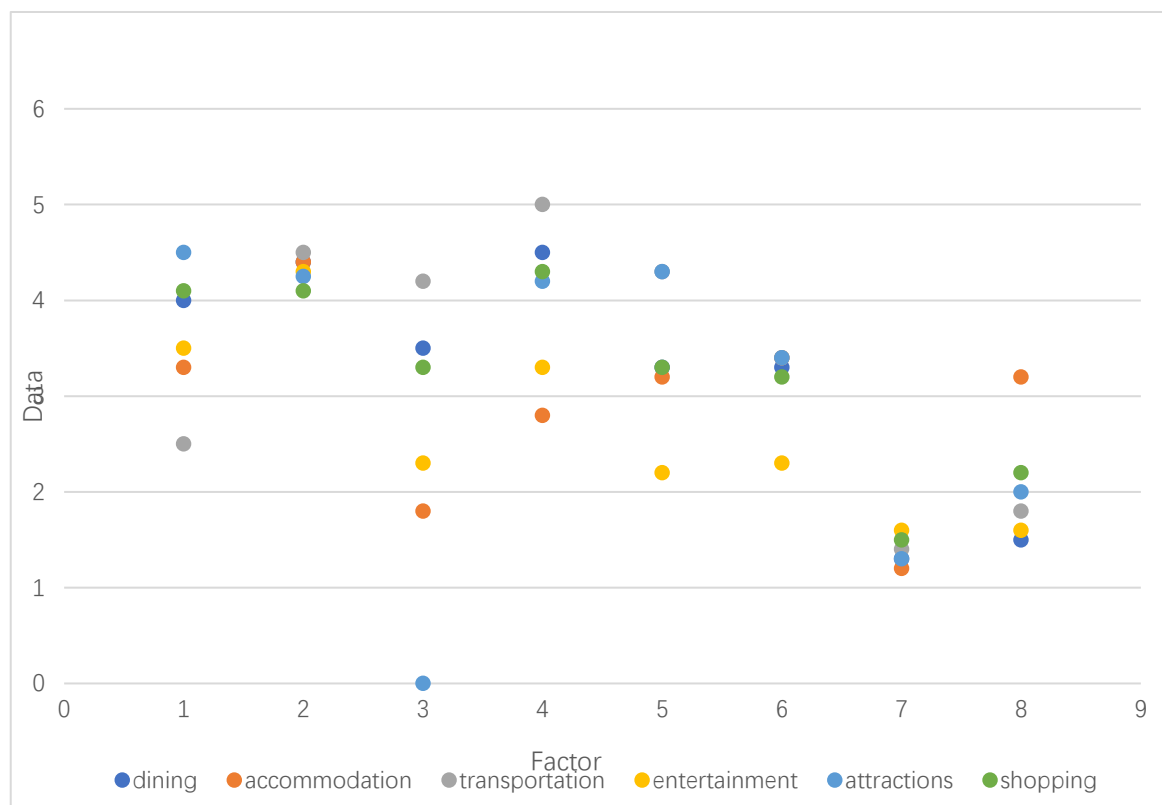


Figure 1. The influence of tourist map factors.

There are many multi-dimensional context factors that influence the personalized recommendation of travel maps, reflecting the diverse and personalized needs of travel map users. However, in practical applications, the display content and expression of travel maps are not affected

by all multi-dimensional contextual factors. For example, when users search for travel and catering information, they are not affected by the resolution of the carrier and the size of the display. Therefore, it is necessary to screen multi-dimensional contextual information, eliminate invalid information, and improve the efficiency and accuracy of interest acquisition experiments, as shown in Table 2.

Table 2. Relevance of task contextual factors.

Task context	style	size	density	brightness	color
Browse task	3.42	2.34	3.45	3.44	2.50
Search task	3.66	4.45	6.77	3.33	2.34
Planning tasks	3.30	2.80	4.45	1.50	2.30
Recorded tasks	1.66	1.59	1.44	2.40	2.30

4.3. Tourism management system official website

Obtain local tourism information in Shenzhen and Beijing from some official tourism websites, including the name, rating, recommendation index, and user comments of a certain attraction. To judge whether the user is a local order or a remote order, the user's travel season is distinguished by the time of the comment, because some of the data obtained cannot obtain the information we want, so it is filtered and the user is used according to the comment information, filter out whether the order is from a different place or from a local area. Through the time of travel, the season of travel is obtained as shown in Figure 2.

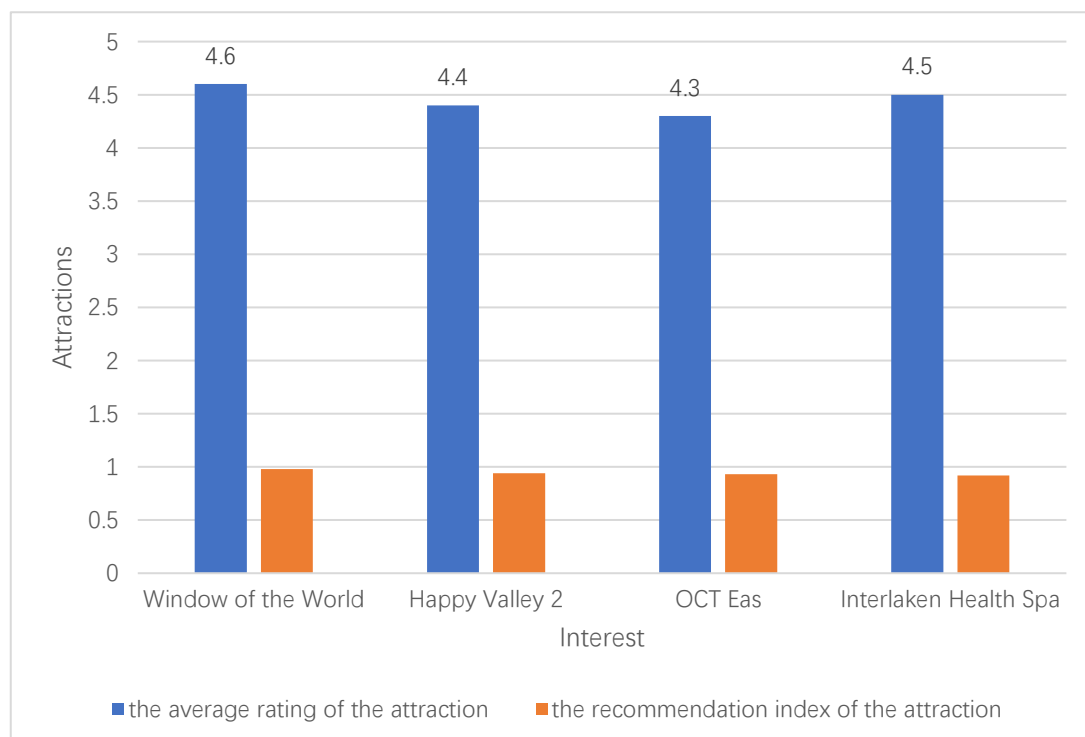


Figure 2. Obtain raw data of tourist information.

For example: one of the user comments, "I came to Shenzhen for the first time, come to Window of the World", we can judge that this user is a user from another place, and there are user comments, "Every time a friend comes to Shenzhen, I will bring them to play, it's no longer a concern", it can be inferred that this user is a local user. Some user commented information, as follows, "Buying tickets online is much cheaper than buying tickets on site", these comments can't tell whether the accident is local orders in different places, so these orders need to be filtered out.

There is also a user's popular city recommendation collection based on the hot-selling attractions of the local city. Each city has different distribution of tourism resources. Make recommendations If it is consistent with the score given by him, you also need to filter out this part of the order. After processing, as shown in Figure 3.



Figure 3. Recommended attractions in popular cities (<http://alturl.com/765w6>).

Since tourism resources change with seasons, it is not very reasonable to simply calculate the sales volume of a certain scenic spot. For example, in some water parks, in summer, its sales volume will be higher than in winter. If there are too many times, then calculating the overall sales volume does not reflect the popularity of the attraction within a certain period of time.

5. Conclusions

This paper discusses the unremitting efforts of the whole world on the road of information security-based tourism management system in the intelligent recommendation of tourism resources. People pay attention to information rights and attach importance to information security rights. Information security rights have their own independent value, and they have the necessity and possibility of being the content of rights. In order to solve the problems existing in traditional tourism, in order to solve these problems, the process of developing the informatization of tourism websites as the top priority of the tourism information industry is proposed. In the system design, the result is relatively ideal and the predetermined goal is basically achieved. However, it should also be noted that although travel websites have made up for the lack of traditional travel information to a certain

extent, some basic functions are still very imperfect, such as the introduction of web links, and the hotel reservation and payment functions are not considered. In the future development of computerization, the tourism management system will strengthen cooperation with railways, airlines, hotels, travel agencies and other parties to achieve transaction marketing, service sales standards and pre-sales convenience. Ensure the complete integration of after-sales and various systems, provide customers with the best quality services and develop new information development models.

Conflict of interest

All authors declare no conflicts of interest in this paper.

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