The Application of Big Data in the Intelligent Tourism Management Mode is Explored

Yanshuang Liu
Liaoning Jianzhu Vocational University, Liaoning, China

*Corresponding author e-mail: hdqijiao@lnjcxxy.edu.cn

Abstract. In recent years, with the rapid development of the tourism industry and the application of the new tourism management model, the statistics of big data in the tourism industry and the improvement of the technical level of big data in the intelligent tourism management have gradually become the most important tasks and objectives in the intelligent tourism management model. The purpose of this paper is to analyze the current development of tourism management by using big data in the light of the development needs of the current era, and to explain the shortcomings of big data in the current smart tourism application. This paper mainly through the review of relevant literature at home and abroad and the use of multi-mark learning algorithms to carry out experiments to achieve our experimental goal - to study the application of intelligent tourism management model based on the background of big data. The experimental results show that the use of big data technology can effectively carry out the construction strategy of the new intelligent tourism management model in-depth research and analysis, and has defined reference significance.

Keywords: Smart Travel; Management Mode; Big Data; Modeling

1. Introduction
The development of the times drives the rise of big data technology. Big data technology has changed the times and is bound to change the development and operation management mode of various industries in society. Nowadays, it is very common to apply information technology in various fields [1]. The combined application of big data technology and tourism industry has brought greater development space and good development opportunities. Tourism industry must make positive changes in response to the development of the times. Especially for the relevant tourism management mode, the new and efficient smart tourism management mode directly affects the development and operation of the whole industry. In order to further meet the comprehensive and specific needs of social development and the progress of the times, we must clearly and objectively recognize the value and role of big data in this process, and then actively apply relevant measures for in-depth reform And optimize the existing traditional tourism management mode to upgrade it to smart tourism management mode [2-3].

Intelligent tourism refers to fully mining the big data of tourism industry, combining information technology with tourism industry organically, so as to achieve the goal of tourism information management. At the same time, it can reasonably allocate resources, so that your visitors can get a
better travel experience [4]. With the rapid development of social economy, the number of people who choose to travel is increasing, so the tourism economy can develop rapidly. In terms of exhibition, the traditional tourism management mode cannot achieve the reasonable allocation of resources and services, and the goal of high quality has hindered the stable and sustainable development of China's tourism industry [5-6]. In order to alleviate this problem, under the background of big data era, it is very important to vigorously develop smart tourism. In the process of developing tourism, emphasizing the construction of intelligent platform and corresponding strengthening of intelligent management, rational use of data technology can improve the economic growth rate of intelligent tourism industry, and lay a good foundation for improving the comprehensive strength of the country [7].

Big data technology is a technology based on modern science and technology. Its function can not be separated from network, communication facilities and computer facilities, backup and other digital equipment support [8]. However, smart tourism is still in its infancy in China, and its development time is still very short. The understanding of tourism is not enough, which leads to the obvious shortage of investment in smart tourism in China. On the one hand, many tourist attractions also lack of perfect information network and digital monitoring network, resulting in the inability to comprehensively and timely record and store tourism data, which affects the construction of tourism data resource database [9]. On the other hand, between tourist attractions and travel agencies, between travel agencies and scenic cities, tourism information data sharing platform has not yet been established with cities, and major tourism websites are also competing, which seriously limits the in-depth application of big data technology in the tourism field [10].

2. Method

2.1. Multi-mark Learning

Because of the polysexuality of real-world objects, the multi-tag learning framework arises as a multi-meaning object learning modeling tool. Under this framework, each object is described by an example, each with multiple but limited category tags, and the purpose of learning is to give each unknown example the correct tag. In a mathematical language, a multi-tagging problem can be described as: Assume that there are samples and that each sample feature dimension is d, representing the corresponding set of tags for the sample.

\[ T = \{(x_1, Y_1), (x_2, Y_2), \cdots (x_n, Y_n)\} \]

\( x_i \in X, Y_i \in Y \)

Represents a training set, and the purpose of multi-tagging is to get a mapping relationship to predict the marking of new samples.

2.2. Conditions are Mutually Available

Defines a collection so that the probability of an element is defined, and the entropy of the information for the collection is:

\[ H(A) = -p(a) \log p(a) \] (1)

Information entropy can measure the degree of set uncertainty, and the greater the information entropy, the greater the instability of the collection. For the multi-mark feature selection algorithm, it is often used to select features with large information exchange between feature space and marker space through information entropy.

Define 2 Set a collection The condition entropy of a collection under the condition of a given collection is:
\[ H(B \mid A) = -\sum_{i=1}^{m} \sum_{j=1}^{n} p(a_i, b_j) \log p(b_j \mid a_i) \]

(2)

Conditional entropy measures the degree of uncertainty of a collection under the condition that \( B \) occurs.

Defines a collection of \( 3 \) 3 gather \( A = \{a_1, a_2, \ldots, a_m\} \), \( B = \{b_1, b_2, \ldots, b_n\} \) and the combined \( A \) entropy of the collection and is: \( B \) and

\[ H(A, B) = -\sum_{i=1}^{m} \sum_{j=1}^{n} p(a_i, b_j) \log p(a_i, b_j) \]

(3)

The relationship between information entropy, conditional entropy and joint entropy is:

\[ H(A, B) = H(A) + H(B \mid A) = H(B) + H(A \mid B) \]

(4)

Define 4 given a collection and \( A \) a collection, \( B \) define the mutual information \( A \) between \( B \) a collections and is:

\[ I(A; B) = -\sum_{i=1}^{m} \sum_{j=1}^{n} p(a_i, b_j) \log \frac{p(a_i, b_j)}{p(a_i)p(b_j)} \]

(5)

2.3. About the Establishment of a Multi-mark Learning Model System

For multi-label feature selection, because each label is a different feature, the correlation between the feature set and the label set is determined by the amount of mutual information. In the calculation, features with strong correlations may have greater redundancy, and features with weak correlation capabilities may not play an important role in the classification of markers, and features with weak correlations usually play a decisive role in the final classification results. Considering this scenario, you can establish a local subspace model to resolve this issue. As shown in the relevant literature, when the characteristic dimensions of a dataset are small, the number of subspaces can be a feature that contributes significantly to certain markers, taking into account more features and factors that have strong correlations, but the correlation between features and tags is weak, so the sample rate for each feature subspace can be set to large to small measures.

3. Experiment

3.1. Select 150 Professional Management Staff from 4 Well-known Tourist Hotels for the Survey

A random survey of 150 professional management staff from four well-known tourist hotels was conducted. Two sets of questionnaires were used, the first was about the use of the traditional old tourism management model, and the second set was about the use of big data technology combined with a new type of intelligent tourism management model. For these 150 professionals, our questionnaire is divided into three parts, namely, our view of the smart travel management model that applies big data, and its impact on the operation of the travel industry and its view of the management level.

3.2. Sample other Outstanding Relevant Professionals

Because of the diversity of experiments, we not only surveyed hotel management professionals, but also used a sample survey to select other relevant professionals online who did not use the smart travel
management model but provided their views and perspectives for a more comprehensive and objective evaluation.

4. Results

4.1. The Results of the Questionnaire are Displayed

The results of this survey are as shown in Table 1 and Figure 1. Combining the results of Tables 1 and 1, it's not hard to see how smart travel management models that apply big data technologies are more popular than traditional strategies.

| Evaluation attitude | The new mode | Old mode | Total number of copies / servings |
|---------------------|--------------|----------|----------------------------------|
| Good.               | 112          | 10       | 122                              |
| So so.              | 26           | 108      | 134                              |
| Not good.           | 12           | 32       | 44                               |
| Total number of copies / servings | 150          | 150      | 300                              |

As shown by the data results of Table 1, through the visual data image to express the appreciation of management professionals for the new smart tourism management model, we can see that about 70% of the people have indicated their approval of the new smart tourism management model, less than 20% before the investigators more satisfied, part of the data mainly comes from the previous evaluation of the traditional model of the general professional attitude changes, a strong illustration of the new smart tourism management model is still effective.

Figure 1 is a column chart based on Table 1, which highlights the advantages of the new model by highlighting the more intuitive way in which the management professionals surveyed rate the old and new models.
Through this survey we mainly selected a part of the participants in the questionnaire to make further survey inquiries detailed attitude to evaluate, in order to brainstorm ideas to find better ways and solutions. It turned out that the survey was still too one-sided, so we tried to get some attitude from the bystanders, so the results were shown below.

4.2. The Views of Other Tourism Management Professionals

![Figure 2. Views on other travel management professionals](image)

According to the survey results of Figure 2, the vast majority of tourism management professionals in the see this intelligent tourism management model expressed obvious praise and support, and hope that in their own management to implement the new intelligent tourism management model, which shows that China's tourism industry is still not familiar with the application of big data technology smart tourism management model, so we should further improve the model, tourism industry as the main experimental research object, from the internal organizational structure to describe the traditional tourism management model in the operation of the whole process of deficiencies, and find out the root causes of these problems. Finally, we decided that the application of big data technology smart tourism management model should be updated over and over again to stabilize in a stable situation that can withstand various problems, and finally promote it to all the management of the tourism industry, so that it will continue to promote the development of China's tourism industry, will certainly turn this model into a veritable good system for the people.

4.3. On the Application of Smart Tourism

For those who want to go out, they can order a service plan online first, or the travel company can recommend the corresponding service standards according to the tourists, so that the tourists can personalize to meet the maximum demand over the years with the rapid development of the tourism industry, tourism management will face increasing pressure. As the number of tourists continues to increase, effective measures can only be taken to improve the efficient tourism management of the tourism industry, provide quality tourism services to tourists, solve all kinds of unexpected problems encountered in the tourism process in a timely manner, and then maximize the high level of tourist satisfaction. By using big data technology, we can master more visitors and then adapt the service management system appropriately so that visitors can get a satisfying journey.

4.4. About the Construction of the Management Platform

The construction of the government tourism management platform mainly includes two aspects: First, the supervision of tourism and other government departments. The platform includes the tourism
department, the market supervision department, the emergency management department, the meteorological department, the transportation department, etc., and the corresponding number according to the information report and feedback port is opened in the platform, so that the regulatory data of each department can be enjoyed in the platform. The second is to add data and information feedback using the analysis and comparison module, through which the city's tourism data information is summarized and recorded to form a city tourism information database; Each department then returns the monitoring data to the platform, and the module compares the feedback data to the previous data to be more specific. It reflects the current tourist situation in the city. Tourism enterprises can use the platform to grasp the recent market dynamics of the tourism industry in real time, adjust their business direction in a timely manner better understand gender, age structure, consumption, level, tourist travel and then use cloud computing technology in the platform to analyze the hidden information contained in the above information Tibetan values including the current major tourism groups, tourists to provide tourism services and the main channels to obtain tourism information.

4.5. Modeling Methods Based on Big Data Technologies
The talent flow analysis system based on big data focuses on the user and uses the business use case diagram to model the business analysis of the whole system. The administrator is responsible for the system's user management and rights management. After the user registration is complete, the system function can be used normally. Users can view different visual information according to their needs, including talent distribution information, talent flow information, etc. After a systematic study of the factors of talent mobility, basic information such as regional characteristics, economic impact, time, gender, learning experience, etc. of talents was extracted. As a classification of the sample set, the weights of stable talent, mobile talent and regression talent are assigned respectively. Each dataset has its own central node. It is clearly shown on the sat axis that the purple triangle is the mid-point of each classification. When you enter new talent information, different types of center distances are calculated, and new talent is then divided into specific talent categories. This is a new data processing model in the era of big data that through many areas such as networking and deep learning, information analysis, natural language, machine learning, and cognitive computing, which means that they can continuously learn and improve themselves to form new knowledge content based on the relevance of existing data.

5. Conclusion
The above is the reader in the study and discussion of the current tourism industry management model process, in-depth thinking about the current industry development of the real needs and development of the status quo, and from the perspective of information sharing for the new intelligent tourism management model of exploration and summary. Synthesis of the above discussion, the author believes that the current management model of China's tourism industry should be combined with big data technology, after information sharing in the purposeful collection of consumer demand, enabling travel supporting hardware and software products, to help air tickets or hotel reservations, scenic tickets or ticket inspection, hotel check-in, car rental, travel products purchase and other key business links to reduce efficiency.

References
[1] Ballina F J, Valdes L, Valle E D. The Phygital experience in the smart tourism destination. International Journal of Tourism Cities, 2019, 5 (4): 656-671
[2] Perea-Medina B, Andrade M J, C. Rosa-Jiménez. Cruise tourism in the Mediterranean port-city interface: New era of the waterfront, with benefits in a smart destination Cuadernos de Turismo, 2018 (42): 659-663.
[3] Wei-Chih C, Wen-Hui C, Sheng-Yuan . A Big Data and Time Series Analysis Technology-Based Multi-Agent System for Smart Tourism. Applied Sciences, 2018, 8 (6): 947.

[4] Tomasz Hueckel, M. Ciantia, Boleslaw Mielniczuk. Modeling Physico-Chemical Physico-Chemical Phyler of Mechanical Properties to Assess Resilience of Geomaterials. Journal of Non-Crystalline Solids, 2018, 27 (2): 273-283

[5] Lee L, Petter S, Fayard D, et al. On the use of partial least squares path modeling in accounting research. International Journal of Accounting Information Systems, 2018, 12 (4): 305-328.

[6] Xu W, Zhou H, Cheng N, et al. Internet of Vehicles in Big Data Era. IEEE/CAA Journal of Automatica Sinica, 2018, 5 (1): 19-35

[7] Singh S, Yassine A. Big Data Mining of Energy Time Series for Behavioral Analytics and Energy Consumer Forecasting. Energies, 2018, 11 (2): 452.

[8] Wang Y, Kung L A, Byrd T A. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. 2018, 126 (JAN.):3-13.

[9] Liang X, Zuo M J, Feng Z. Dynamic modeling of gearbox faults: A review. Mechanical Systems and Signal Processing, 2018, 98 (jan.): 852-876.

[10] He Q, Huang B. Satellite-based mapping of daily high-resolution ground PM 2.5 in China via space-time regression modeling. Remote Sensing of Environment, 2018, (206):72-83