

Design of Smart Tourism Platform Operation System Based on Big Data

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Abstract: For online tourism can't meet the demand of personalized travel, unable to depth matching problem such as tourism resources, unable to provide decision data, with large data, such as artificial intelligence, VR, AR technology as the support, combined with the principle of wisdom tourism, analysis platform characteristics and determine the operation objectives, design data fusion model, test and evaluation, global travel wisdom big data platform is established. It is of great significance to promote the orderly, standardized and free flow of information flow on the smart tourism platform, and achieve the co-creation of multiple values by related tourism entities, which is of great significance to the innovation of smart tourism services.

1. Introduction

The Internet provides a standardized online tourism platform and realizes the connection and sharing between tourists and tourism destinations. However, there are still some problems such as unable to meet the complex and personalized tourism needs of tourists, information asymmetry and poor matching degree of tourism elements. The latest technology can meet the innovation of tourism management and service, and it is necessary to study the smart tourism platform according to the principle of big data.

Foreign scholars have been studying the impact of information technology on tourism. Poon (1993), Sheldon (1997), Werthner et al. (1999) studied information and communication technologies (ICTs) required for tourism development^[1]. Mahmood & Ricci (2009) focused on intelligent man-machine dialogue system^[2]. The United States has developed a free flight delay inquiry system; Brussels, Belgium, has launched a smartphone-based micro-travel encyclopedia. Smart tourism is a part of smart cities, not just a form of consumption. Domestic scholars such as Zhang Lingyun (2012) and Du Peng (2013) studied the development power of smart tourism from the driving factors^[3]. Huang Chao et al. (2011) introduced the relationship between smart city and smart tourism, and elaborated the role of smart tourism from multiple perspectives^[4]. Liu Junlin et al. (2011) studied the process, framework, value and development trend of smart tourism^[5]. Yao Guozhang (2012) believes that smart tourism involves multiple sectors and groups of people^[6]. Jin Weidong (2012) studied the shortcomings of smart tourism by analyzing and evaluating the relevant research and current situation of smart tourism and big data concepts at home and abroad.

This paper combines relevant theories of tourism management and big data mining, designs specific implementation methods of smart tourism, explores tourism big data mining, provides potential business opportunities, and at the same time provides some thoughts for the deep combination of big data and operation management.

2. Theoretical Research on Intelligent Tourism

2.1. Research on the Concept of Intelligent tourism

In the process of putting forward the concept of smart tourism, scholars put forward various thoughts on smart tourism based on different research directions. Zhang Lingyun (2012) believes

that smart tourism is based on the integration of new-generation information and communication technology, while Jin Weidong (2012) believes that smart tourism is a comprehensive application platform. Deng Hui (2015) believes that smart tourism is a special kind of creative tourism. Jigenbao et al. (2015) believe that smart tourism is first and foremost a change in development concept.

In recent years, the Internet of things, artificial intelligence, the new transaction such as cloud computing gradually familiar to the masses, wang (2015), Zhang Ji identity (2015) believed that these new things without exception is inseparable from the big data support, at the same time, in the big data provide power in the process of transformation and upgrading of industry has also emerged a large number of research results. The research of Li Wei et al. (2015) and Hu Shungeng et al. (2015) shows that the combination of big data and cloud computing can be mastered by operators

Yang Huihui et al. (2015), Lu Shan et al. (2016), Feng Guohua (2016) believe that the use of big data can bring new ideas to the operation and management of the hotel industry. Liu Zhixia (2016), Zhang Miaoying (2016) and Li Xiyan (2016) believe that the application of big data will make an important contribution to the development of tourism management and region-wide tourism.

2.2. Development and Practice of Smart Tourism Research

Based on the rapid development of information technology, the theory of intelligent tourism has been studied in the developed countries in the 1990s. After nearly two decades of exploration, at the beginning of the 21st century, these developed countries have started a series of practices and implementation of "smart tourism", and have obtained rich practical results. While in our country in the "wisdom tourism" research started relatively late, began to explore its in recent years, the mobile Internet, Internet of things, but as a result of today's society the rapid development of cloud computing technology, especially due to the existence of the demographic dividend in China let's exploration on tourism big data have a certain advantage compared with other countries, This paves the way for the in-depth study and exploration of "smart tourism" in China, and makes it possible for "smart tourism" to land in China.

In recent years, with the rapid development and popularity of mobile Internet and big data, domestic research on smart tourism has not only stayed at the theoretical level, but further began to combine it with big data and cloud computing, trying to explore a way to make smart tourism applied in practice. Lin Aihua (2016), Wu Li (2016) and others try to explore the operation mode of smart tourism by combining value chain management, supply chain management and other related operation management theories. Xu Shaofu (2017) and Zhang Zhanzhao (2017) hope to make smart tourism more practical by studying the technological realization mode behind it. Yang Jia et al. (2017), Li Yan (2018) and Liu Shuna (2018) explored and studied the combination of smart tourism and rural tourism from different perspectives.

2.3. Surface Curvature of Large Data Point Cloud

Curvature of curve (CURVATURE) is the Angle increment of normal direction per unit arc length of a point. In order to study the feature area with large variation, sample the dense area of point cloud and select the point with the largest variation of normal vector direction from the sampling points as the feature point.

$$k = \lim_{m_1 \rightarrow m_2} \left| \frac{\Delta \theta}{\Delta S} \right|$$

Specifically, the point with the greatest change of normal vector in the area around the sampling point was selected as the feature point of the region, and its normal vector was calculated. The approximate expression of curvature FI was defined as PI at any point in the region, and the normal vector of this point was the arithmetic mean of the Angle included with the normal vector of its k neighbor point. The calculation formula $f(p_m)$ could be expressed as:

$$f_i = \frac{1}{k} \sum_{j=1}^k \theta_{ij} \quad ; \quad f(p_m) = \max[f(p_{m1}), f(p_{m2}), \dots, f(p_{mk})]$$

3. Smart Tourism Platform Environment and Feasibility Analysis

3.1. Analysis of Internal and External Environment of Smart Tourism Platform

China Tourism Statistics Big Data Platform, which integrates the data sources and algorithm models required by China's tourism statistics system, solves the problems such as statistical difficulties, serious omissions, and imbalance with supply data caused by the comprehensive industry in China's tourism statistics.

As the tourism industry is special and highly complex compared with other industries, the newly established platform will face great operational risks. Therefore, before the feasibility analysis of the platform, the internal and external environment facing the platform must be studied and analyzed first.

The advantages of building a smart tourism platform, the platform has a group of well-known experts in the national tourism industry, including IT industry experts, tourism management experts, experts from the National Tourism Administration; The companies involved in the research include China Unicom, Alibaba, China Unicom, etc. They jointly develop the smart tourism platform project, introduce Unicom's mobile signaling data source, and use big data processing algorithms for data collection, storage and mining.

The disadvantages of building a smart tourism platform include, first, personnel risk. A small core of researchers underpins vital work. Second, manage risks. At present, the organization has just been established, and senior management personnel and management experience are relatively scarce. Third, technological risk. Due to the rapid development of modern information technology, the technology of smart tourism platform is also changing. Fourth, the risk of imitation. The current core business is at the forefront of market and platform development. It may be imitated and copied by competitors.

Platform construction wisdom tourism opportunities, as one of the three leading industries, tourism industry has a larger industry scale, rich tourism resources conditions, more perfect information infrastructure, include more distinctive tourism resources, such as red tourism, tropical and coastal tourism services, these advantages for the development of intelligent tourism services, Build the core competitive ability to lay a solid foundation.

3.2. Feasibility Analysis of Building Intelligent Tourism Platform

Wisdom tourism value chain analysis platform, using the modern Internet technology to build virtual transactions online space, will shift the traditional offline payment online, the big data with the Internet technology and Internet technology, the combination of dynamic update related information, directly or indirectly through the network was formed by unicom and interactive network node.

Using artificial intelligence to perform complex calculations. At present, the Internet has been subdivided into PC Internet, mobile Internet and Internet of things, among which PC Internet is the basis, making the information transmission beyond the limitation of space; Mobile Internet makes data statistics, information collection and decision-making more accurate, and at the same time, it matches and optimizes intelligent transactions between tourists and tourism elements, forming differentiated competitive strategies.

Intelligent tourism platform supply chain analysis, online tourism platform, in general, hotels, scenic spots, tourism hotels, transportation and other tourism factors providers belong to the upstream of the online tourism supply chain system, it provides six basic tourism elements; Travel agencies and distributors belong to the middle reaches of the supply chain system. They form products by packaging and combining basic elements and provide them to the online tourism platform. As the online tourism platform itself, it is the most downstream of the online tourism supply chain system because it faces consumers directly. All the data are collected into the big data system of the smart tourism platform, processed by the algorithm of the smart tourism platform, and then fed back to three types of customers. The value co-creation of the intelligent tourism platform is realized in the process of information flow transmission in the supply chain.

4. Intelligent Tourism Platform Operation System Design

4.1. Characteristics of Intelligent Tourism Platform

Tourist information actively, passive tourist information service mode and the traditional tourism industry, wisdom tourism platform can obtain tourist data by means of large data acquisition, such as the Internet public information is extracted, the cooperation unit interface data acquisition, including cameras, sensors, etc, all kinds of Internet hardware information access, etc., Therefore, it can actively record the whole process, whole region and whole information of tourists before, during and after the tour.

The platform will actively perceive various data of tourists, including consumption habits, aesthetic preferences, risk expectations and so on. After the data is recorded in the big data system, the smart tourism platform will use artificial intelligence algorithms and combine various existing resources and conditions to push the plan accurately through the terminal of tourists. Visitors can customize their own travel plans or adopt other visitors' travel plans. Smart tourism platforms can acquire a large number of tourism elements based on social networks, e-commerce, segmented market platforms and various tourism related data sources, automatically coordinate the supply of various tourism elements, provide tourism solutions, and meet tourists' preferences, affordability and various additional related needs.

4.2. Operation Objectives of Smart Tourism Platform

To improve the management level of tourism departments. First of all, in terms of data, the big data platform can automatically generate the required data, and automatically analyze and report it, so that the whole data reporting process is accurate, smooth channels and timely.

Secondly, the industry management and control data should be updated in real time to strengthen the monitoring of tourism elements, focusing on hotel accommodation, scenic spots, tourism catering, shopping and other elements, so as to improve the management and service level. Finally, through public opinion monitoring, it connects with the platform of tourist complaint receivers to obtain all kinds of complaints and public opinion data in real time, so as to enhance the timely response and disposal ability of complaint events and online public opinion events..

Enhance the ability to deal with emergencies. First of all, through the geographic information system platform, combined with real-time data feedback and deployment in the key position of the monitoring terminal, to strengthen the early warning and monitoring of holiday travel, strengthen emergency handling ability, and secondly, the platform can be through to the details of the incident, the long time of emergency data analysis, the platform can rapidly promote the tourism authority, in dealing with all kinds of emergencies, The ability to judge, deal with and coordinate emergency resources in a timely and accurate manner..

Improve the forecasting and analysis ability of tourism industry and provide decision basis for business intelligence analysis; Improve the calculation capacity of tourism-related industries and increase social benefits.

5. Problems and Countermeasures of Platform Design

5.1. A Survey on the Realization of Tourists' Demand for Tourism Public Service

The content that swims industry covers is very extensive, its covered many industries in national economy. The goal of building a smart tourism platform based on big data is to achieve value co-creation for tourism authorities, tourism factor providers and tourists. Platform required for the competent department of tourism and tourism elements providers provide more accurate data analysis and forecasting services, also need to provide tourists with more wisdom convenient travel services, in the process will inevitably produce some questions: how big data sources for tourism selection is the chief problem of platform construction to face; How to obtain data from the selected data source.

Big data center core model design problems and countermeasures. After obtaining various data

sources, how to apply them to the actual operation of smart tourism platform? The main problems are as follows: In the process of statistical analysis, the analysis results may contradict themselves, the prediction is far from the reality and so on. The analysis process seems scientific, but the analysis results are ridiculous. Such results are usually caused by two kinds of problems. One is incomplete and inaccurate data contained in the data source; the other is immature design of the algorithm, which needs to be trained and corrected by accessing a larger amount of data and constantly comparing with the correct results.

In order to solve this problem, by analyzing a goal at the same time using the algorithm of multiple data access at the same time, a variety of operations, multiple results than in the way at the same time, avoid single data source is not all no problem, make the results more accurate reliable, data algorithm to realize the shortcomings, so as to constantly bug fixing algorithm, to prepare for the next more accurate analysis.

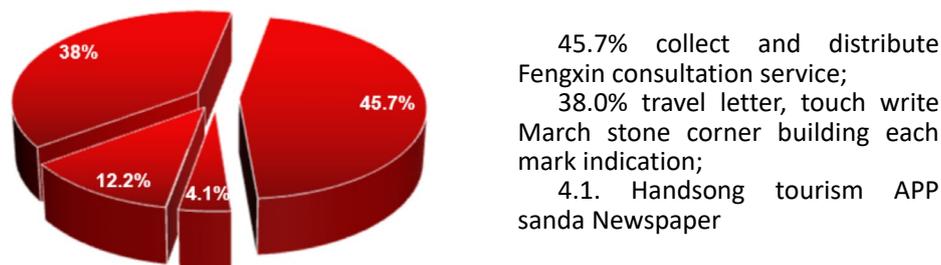


Figure 1 Composition of tourists' demand for public service in tourism.

5.2. Problems in Platform Design

Smart tourism can realize the active and comprehensive perception of the huge information data of the whole region tourism. The problem of efficient storage of tourism information can be solved by using the technology of concurrent processing of big data and the combination of distributed data file system and non-relational database. Government departments in charge of tourism at all levels can also manage related services and businesses and make statistics and analysis of all kinds of tourism data through information aggregation background. In order to achieve the operation goal of smart tourism big data center, each sub-platform of the big data center will be constructed in the following ways:

Big data acquisition platform, through the travel data acquisition platform construction, complete the department in charge of tourism industry and the related data, GIS geographic information system to pay data, tourism enterprise data, OTA mobile data collection, and through the establishment of perfect cleaning mechanism of the classification, formation of intermediate data platform, In order to business application system data analysis, display, etc.

The data storage management system adopts distributed storage architecture, big data analysis platform of data storage, Hadoop architecture and cloud computing core computing mode to realize distributed file storage and management, so that it has high fault tolerance ability. The tourism data management platform and related data are integrated into a data platform. So as to meet the operation needs of the tourism industry big data set.

Wisdom management application platform, can be used for data analysis and research of tourism resources of forms, formulate unified tourism data collection standards, build the mechanism of tourism data collection, safeguard the integrity of the underlying data, realize the scenic area the automatic acquisition of information, such as rural tourism information, tourism toilet, catering accommodation industry field information, travel information, etc. Solving the difficulty of manual data collection can save a lot of time..

6. Conclusion

To solve modern tourism problems, big data, artificial intelligence and other technologies as the support, combined with the principle of smart tourism, to solve information asymmetry and tourism

elements matching and other issues.

The design process of the platform is the application process of new technology in the tourism industry. Combined with the principles of smart tourism, the characteristics of the platform are analyzed, the operation objectives are determined, the multi-data source fusion model is designed, inspection and evaluation are conducted, and the big data platform of global smart tourism is established.

The whole tourism industry needs to study and solve the problem. In the process of high-quality development, we can better meet the all-round, whole-process and multi-angle needs and experience of tourists, break the inherent mode of tourism enterprises providing value for tourists unilaterally, and realize value co-creation.

The construction of big data and its algorithm model is the basis and key technical means for the construction of intelligent tourism platform and the provision of intelligent tourism services for various parties. It can promote the orderly, standardized and free flow of information flow of intelligent tourism platform, and achieve the goal of promoting the formation of multi-party value co-creation by tourism science and technology related subjects. The development of global smart tourism and service innovation of smart tourism have a wide range of application value.

The application research of the operation system of the smart tourism platform based on big data is of great significance to further enrich the role of big data in the smart tourism platform and improve the management theory system of the smart tourism platform, and provides a certain basis for the further combination of big data and smart tourism.

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