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# Research on the New Mode of Smart Tourism in Zhangjiajie Based on the Big Data

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***Abstract:*** *With the advent of the era of big data, traditional tourism has begun to turn to smart tourism. Using big data, cloud computing and other related technologies, this paper puts forward the construction idea of smart tourism platform, which aims to strengthen the connection between tourists and tourism information, provide domestic and foreign tourists with a highly stable, safe and reliable smart tourism personalized recommendation platform—Smart travel, improve the service quality of tourism and ensure the development of tourism informatization. In view of the lack of traditional tourism information and incomplete tourism services, the collaborative filtering algorithm of the project is adopted and improved, which mainly analyzes the historical data of tourists and the interaction behavior between tourists and the system, and uses mahout to realize the distributed intelligent tourism recommendation system to provide tourists with more efficient personalized service information.*

***Keywords:*** *Big Data, Smart Tourism, Zhangjiajie, personalized platform*

## 1. Introduction

With the rapid development of information technology, the traditional tourism industry is constantly being impacted. We must conform to this trend, integrate modern technology into tourism development, create a new environment for smart tourism, and realize the sustainable development of tourism. The traditional tourism industry has incomplete tourist information; Tourist data sharing is not strong; Data loss and low quality of tourism services[1]. Taking Zhangjiajie as an example, starting from the current tourism situation, this paper puts forward the construction idea of smart tourism platform (smart travel), creates a new mode of "smart personalized" tourism, and makes a deep research on how to develop Zhangjiajie tourism with high quality under the guidance of the "Three high fields and Four new achievements" strategy.

## 2. Analysis on the current situation of major scenic spots in Zhangjiajie

At present, the tourism industry in Zhangjiajie has been seriously impacted by the COVID-19. In 2020, the development of tourism was almost suspended. From the perspective of tourist supply, the whole tourism industry has been affected. In the first half of 2021, the tourism market gradually recovered, and the number of tourists increased significantly year-on-year. However, in July 2021, Zhangjiajie was affected by the spillover epidemic, all scenic spots were closed, unable to generate revenue, and it could not immediately usher in a rebound in passenger flow after the epidemic ended. The stock market value of the tourism sector fell sharply, and the stocks of sub industries such as scenic spots, travel agencies and catering also followed suit; The salaries of tourism practitioners have been significantly reduced.

In 2019, Zhangjiajie received 79.123 million domestic tourists in the whole year. According to the work report of Zhangjiajie Municipal People's Government in 2020, it is estimated that the number of tourist reception in 2020 will increase by 15%, that is, about 90.9915 million people. However, due to the impact of the epidemic, the total number of tourists received in 2020 was only 49.4906 million, 37.45% lower than the total number of tourists received in 2019. At the beginning of the outbreak, Chinese people responded to the call of the state to isolate at home, and tourists decreased sharply. The epidemic not only sharply reduced domestic tourists in Zhangjiajie, but also had a huge impact on the number of foreign tourists. In the first half of 2020, Zhangjiajie received only a few hundred inbound tourists per month. Compared with 2019, the cumulative number of overseas tourists received in 2020

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decreased by 97.75%.

According to the data released by Zhangjiajie government, the total tourism revenue of the city in 2019 was 90.56 billion yuan. It is expected that the total tourism revenue will increase by 23% in 2020, about 111.388 billion yuan. However, due to the impact of the epidemic, the total tourism revenue in 2020 was only 56.895 billion yuan, with huge economic losses. From the perspective of demand, due to the severe situation of the epidemic, tourists' willingness to travel to Zhangjiajie has decreased sharply, and the tourism industry of Zhangjiajie has suffered the most serious blow and damage in history. This paper aims to make use of the tourism data published by Zhangjiajie government to make suggestions on the long-term development of its tourism industry, and put forward the construction idea of developing a personalized platform for smart tourism[2].

## 3. Related concepts on Smart Tourism

### *3.1 Smart Tourism*

Smart tourism, a brand-new proposition, refers to the use of cloud computing and other technologies of the Internet to enable users to understand tourism related information through mobile terminals to meet the interactive experience of tourists, so as to obtain a better tourism experience. It also belongs to a kind of service, management and marketing behavior, and is a new form of tourism oriented to intelligence[3]. This concept was first proposed by Zhenjiang City, Jiangsu Province in 2010. With the development of mobile Internet, the popularity will gradually increase. The construction and development of smart tourism should be systematized through tourism management, tourism service and tourism marketing. From the perspective of users, smart tourism mainly includes four basic functions: navigation, tour guide, tour guide and shopping guide (hereinafter referred to as "four guidelines").

### *3.2 Big data on tourism*

Tourism big data is to use Internet of things devices to obtain tourism related data, analyze and process it, and get valuable information from it. Excavate the relevant data of tourists, enterprises involved in tourism, and government industry authorities, and analyze and deal with the needs of tourists, scenic spot management and other problems. Tourism big data not only provides better services for tourists, but also brings management convenience to enterprises and government industry authorities involved in tourism, analyzes the development trend of the tourism industry, predicts the development direction, and strongly promotes the development and progress of the tourism industry.

## 4. Research trends and policy guidance at home and abroad

### *4.1 Domestic policy guidance*

On April 2022, the general office of the State Council issued the opinions on further releasing consumption potential and promoting the sustainable recovery of consumption, which pointed out that to meet the needs of normalized epidemic prevention and control, promote new consumption, accelerate the organic integration of online and offline consumption, expand and upgrade information consumption, cultivate and expand smart products and smart retail, smart tourism, smart radio and television, smart elderly care, smart housekeeping Digital culture, intelligent sports, "Internet plus medical health", "Internet plus nursery education", "Internet plus home decoration" and other new consumption formats. The 14th five year plan for tourism development proposes to promote the development of smart tourism. Innovate the public service mode of smart tourism, effectively integrate tourism, transportation, meteorology, surveying and mapping and other information, comprehensively apply the fifth generation mobile communication (5G), big data, cloud computing and other technologies, and timely release real-time information such as meteorological early warning, road traffic and tourist reception. Build tourism monitoring facilities and big data platforms, promote "Internet plus supervision", and establish a precise supervision mechanism for big data[4].

Zhangjiajie Municipal government will focus on the tourism industry, deeply implement the smart tourism big data project, promote the construction of smart scenic spots in Zhangjiajie, widely apply new generation information technologies such as big data, artificial intelligence and cloud computing, accelerate the construction of domestic first-class tourism information big data platform, smart tourism

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marketing platform, intelligent tourist service center and smart tourism security support system, Build a world-class and domestic leading digital boutique scenic spot, and realize the vision of "Online Zhangjiajie".

### *4.2 Domestic research development*

At present, the overall development of China's smart tourism industry is not mature, and the industry market penetration is not high. In 2019, the market scale of China's smart tourism industry was 435.5 billion yuan. In 2020, affected by the epidemic, the market scale contracted, down 30.5% from 2019. With the rapid recovery of China's economy after the epidemic and the reopening of tourism around the country, By the end of 2021, the market scale of China's smart tourism industry will increase by 48% compared with 2020. According to enterprise survey data, from 2019 to 2021, the number of Enterprises above the scale of smart tourism in China increased from 26 in 2019 to 39 in 2021, and the number of enterprises continued to increase.

The domestic outstanding researches on the concept of "smart tourism" include Zhang Lingyun, Liu Junlin, Li Yunpeng and Zhao Hui. For example, Zhang Lingyun and Li Gu stated that smart tourism is different from traditional tourism in the past. It focuses on using new information technology and high-quality intelligent services to meet the needs of tourists, so as to realize the sharing of social resources and tourism resources, and effectively use intensive and systematic change management. Li Yunpeng, Hu Zhongzhou, Zhao Hui and others analyzed the concept of smart tourism from the perspective of tourism information service, which is more practical based on China's tourism informatization, and more inclined to understand smart tourism as the tourism information service accepted by tourists in tourism activities.

### *4.3 Foreign research development*

Many foreign scholars took the lead in putting forward theories related to smart tourism and put theoretical research into practice. Foreign scholars first put forward the concept of "Intelligent Tourism", which focuses on how to combine "intelligence" with "tourism". Sheldon (1997) gave a comprehensive introduction to the application of it in tourism. Klein and werthner (1999) elaborated that the traditional tourism industry is impacted and affected by the development of information technology. In 2000, Gordon Phillips elaborated that in the early stage of the concept of smart tourism, it was defined as a business that carries out overall and continuous innovation and upgrading for the whole process of planning, development, marketing and management of tourism business. BUHALIS (2014) described the characteristics of the industrial chain of smart scenic spots from the perspective of interest correlation, informatization process and address flexibility. To sum up, foreign related research mostly focuses on the combination of superficial "intelligence" and "tourism", but lacks systematic, holistic and cutting-edge research.

## 5. Construction of smart travel platform

Smart travel platform integrates food, accommodation, tourism route planning, tourist attractions and scenic spot projects, and creates a new smart tourism product integrating art sound applet and art sound website[5]. Based on Zhangjiajie, smart travel platform integrates "smart travel" applet and "smart travel" website, and customizes personalized Zhangjiajie, surrounding travel routes and travel strategies based on Naive Bayesian algorithm in machine learning. While improving the tourism economy of Zhangjiajie, it can effectively promote the revitalization of Zhangjiajie and its surrounding villages, protect and inherit intangible cultural heritage culture, and make exclusive cultural and creative products in Zhangjiajie and its surrounding areas, so as to deepen the red memory of tourists.

The essential task of the platform is to connect tourists and tourism information. On the one hand, it helps tourists find valuable tourism information for themselves, on the other hand, it enables all kinds of tourism related information to be displayed in front of users who are interested in it, so as to achieve a win-win situation for information consumers and information producers. The big data based Yisheng smart tourism recommendation platform understands tourists' preferences by analyzing tourists' historical records, so as to actively recommend information of interest to tourists and meet users' personalized recommendation needs.

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### *5.1 Working principle and technical route*

Generally, the data sources required by the recommendation engine include: scenic spot name, scenic spot introduction, travel strategies, and peripheral product data sources; Basic information of system users, such as gender, age, playing days, departure date, number of visitors, etc. The applet plans to adopt the uview framework, which is a UI framework dedicated to the uni app ecosystem, and the uni app uses vueJS is a framework for developing all front-end applications. Developers can publish a set of code to IOS, Android and other small programs[6].

The web page plans to use springboot plus mybatis as the mainstream framework, and the front end adopts the open source web page format layui. The purpose of using HTML and layui is to facilitate the rapid development of the system. Layui has a developed front-end page framework, which only needs nested calls when writing back-end code; The back end uses springboot and mybatis to layer the system functions and quickly access the content in the database[7]. The application of the above technical points can well coordinate the interaction between the front and rear ends, and facilitate the later maintenance of the system. In addition, the system uses personalized recommendation algorithm and user based collaborative filtering algorithm to realize personalized recommendation function.

### *5.2 Recommendation mechanism—recommendation based on collaborative filtering*

The principle of collaborative filtering recommendation algorithm is to analyze users' interests according to users' preferences for items or information, find similar users of designated users in user groups, and synthesize the evaluation of these similar users on a certain information to form a system prediction of the preference of the designated user for this information[8]. At present, collaborative filtering recommendation algorithms mainly include: user based collaborative filtering; Item based collaborative filtering and modelbased collaborative filtering. The main methods of user based and item based are nearest neighbor search and Optimization on this basis. Modelbased is to establish a model based on historical data, and then use the model to predict.

### *5.3 Platform advantages*

#### *5.3.1 Personalized service*

Based on the needs of tourists, naive Bayesian algorithm, content-based recommendation algorithm and collaborative filtering recommendation algorithm are used to make personalized recommendations according to the information provided by users, and customize tourist routes and strategies that meet their travel standards for tourists[9]. ① The system provides a user operation interface, which provides gender, number of peers, playing days, departure place, departure date, proposed means of transportation and travel mode for users to choose, such as lovers' travel, family travel, solo travel, group travel, etc. Users must complete the page according to the above prompt information; ② The system calls the tourism route map in the database, analyzes and compares it through a variety of recommendation algorithms, and predicts the tourism planning that tourists are most likely to choose; ③ Users can choose the appropriate tourism planning according to the predicted tourism route and their own reality according to the interface. If the route is consistent, the interface will rank in descending order with the number of likes of the tourist route as the second keyword.

#### *5.3.2 Packaged service*

Tourism involves six basic elements: transportation, food, housing, entertainment, shopping and tourism. At the beginning of the design, smart travel takes meeting the requirements of tourists as the first element, and cooperates with Zhangjiajie's local B & B and farmhouse. When customizing the tourist route, it plans to recommend Zhangjiajie's local farmhouse and B & B residence, which not only meets the requirements of tourists for a pure natural green life in Zhangjiajie, but also drives the revitalization of Zhangjiajie and its surrounding villages. In terms of travel strategies, the products will recommend learning activities of intangible cultural heritage, and it is planned to arrange learning and practice activities such as Tujia brocade, Phoenix paper bar, self-made Miao painting, etc., to drive the inheritance of China's intangible cultural heritage.

#### *5.3.3 Immersive experience*

Smart travel platform plus VR technology. The interactivity of virtual reality technology enables people to experience and appreciate the virtual space and experience the local cultural heritage of Zhangjiajie online. Through modern virtual simulation technology, the tourist attractions can be traced

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back to the project experience from the characteristics of scenic spots to the display. This can span time and region, thus shortening the distance between scenic spots, scenic spot culture and tourists[10]. With the help of VR technology, we can reconstruct the ecological symbols of rural folk language, literature, music, dance, myth, etiquette, habits, handicrafts, architecture and other art forms in some specific historical environment.

#### *5.3.4 Personalized customization*

Cultural and creative peripheral product design module. This platform designs cultural and creative products of Western Hunan culture, selects personalized recommended tourists, and clocks in the Yisheng smart travel applet to randomly obtain a cultural and creative product around western Hunan[11]. You can pick it up at the designated place or mail it. Among them, the platform is designed and conceived for "Tianmen fox Fairy". Tianmen fox fairy is a story adapted from Liuhai Qiaoqiao and a love story widely spread among Hunan people. Through the depiction of the fox fairy in the design, it expresses the tortuous and romantic love experience of the white fox fairy who has cultivated in Tianmen Mountain for thousands of years. Among them, the transformation of the concept of the third act of moonlight lovesickness and the fifth act of Millennium watch hopes to show this earthshaking love through the cartoon image of white fox fairy, and also share this good wish for love with every couple of lovers in the world. I wish lovers in the world will eventually become married.

## 6. Conclusion

This paper basically achieves the personalized recommendation platform of smart travel based on big data, which has made good effects, but it is not perfect enough. This paper aims to cultivate new and traditional drivers of tourism, transform and upgrade them, develop virtual operations and intelligent services, and achieve the intelligent development of "Internet plus tourism" in Zhangjiajie. The smart travel platform is still in its infancy. With the increasing development of technology and the continuous increase of business demand, the requirements for smart tourism related technologies will also be higher and higher. This platform will be gradually popularized to bring better tourism experience for tourists who pay a visit to Zhangjiajie.

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