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Research Article

Design and Implementation of Smart Tourism Service Platform from the Perspective of Artificial Intelligence

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With the advancement of science and technology and the further improvement of people's living standards, tourism has become a hot topic in today's society. This paper is aimed at studying the development of a smart tourism service platform using artificial intelligence recognition technology and automatic program design. This paper proposes functions such as online ticket booking through the design of intelligent access control in scenic spots (combined with intelligent voice, face recognition, and other technologies), scenic miniprograms, and WeChat public accounts. Tourists can collect tickets automatically through the intelligent assistant designed by the intelligent service system. This allows tourists to consult and interact with intelligent machine assistants, reducing human-to-human contact during travel, thereby reducing the probability of epidemic infection (mainly spread by coughing or sneezing, close contact with sick people, touching contaminated surfaces, etc.). Finally, the smart tourism service platform is promoted, and an online questionnaire survey is conducted on 2,000 tourists who use the service platform to understand the actual use of the system. The results of the questionnaire survey showed that among the 2,000 tourists' evaluations, 55.15% were satisfied with the system, 41.5% were very satisfied, 3.1% felt average, 0.25% felt dissatisfied, and 0% were very dissatisfied. At the same time, a large number of positive evaluation words were received in the feedback results of tourists, which shows that the smart service system designed in this paper is very popular with tourists. Meanwhile, a great deal of positive evaluation words were received in the feedback results of tourists (such as full of technology, special convenience, and special safety). This shows that the intelligent service system designed in this paper is very popular with tourists.

1. Introduction

With the advent of the economic era, the demand level of tourism consumers is gradually shifting from the level of experience dissemination to the level of undifferentiated that everyone can enjoy the same travel experience equally. The highlight of the experience economy lies in unique feelings. From this perspective, tourism is an important way for people to seek novelty, difference, wonder, beauty, and knowledge. The traditional way of mass travel ignores the interaction with tourism consumers, so it cannot provide tourism consumers with a unique and differentiated experience. Smart tourism overcomes the contradiction of popularized and standardized services. That is, while satisfying the tourists to enjoy the same experience products, it can also satisfy the personalized experience effect of the tourists. With the increase of urban population, people's thinking has also changed. In addition to meeting the basic living needs of clothing, food, housing, and transportation, people have begun to have more requirements for tourism, vacation, recreation, and other aspects [1]. However, the epidemic has had a great impact on the tourism industry in the past two years, and traditional travel methods are no longer suitable.

Academia representatives said that smart tourism refers to the provision of smart tourism services for tourists through Internet devices on mobile devices combined with

current Internet technology, and timely access to jobs and travel plans [2]. Smart tourism means that tourism enterprises and scenic spots are based on high-tech information technology, provide high-quality services, make full use of social resources, and meet the growth of tourism consumers' personalized needs. Leading industry representatives believe that smart tourism refers to tourism. With the help of a new generation of information network technology and the infrastructure of the tourism industry, the entire tourism system will be able to obtain and use relevant tourism information in a timely manner to realize intelligent service, management, and marketing, which is a new trend in the development of the tourism market [3, 4]. In fact, smart tourism is the effect of intelligent identification, which is necessary for mobile terminals to actively identify, receive, and feedback travel information in real time, and refers to the convenient use of various travel methods [5, 6].

Artificial intelligence is AI, and its realization of the concept of intelligence will have a self-evident impact on the relationship between computer science and intelligence [7]. The most concentrated expressions are intelligent algorithms and intelligent information processing. Computer science is the fundamental driving force behind the realization of intelligence. The relationship between neuroscience and intelligence can be divided into two levels: system structure level and operating mechanism level. The most concentrated expression is intellectual behavior and intellectual cognition, which as a way to achieve machine intelligence. As far as human intelligence is concerned, the overall structure of neurons is the condition that produces human intelligence. The constant interaction and stimulation between neurons leads to infinite sensory cognition and provides a good model for intelligent cognition.

It is a very good idea to use AI to combine various intelligent identification technologies, intelligent control programs, etc., to design a smart tourism service system. At present, many fields have begun to combine AI for intelligent services. Designing a smart tourism service system through AI can facilitate the management of scenic spots and facilitate tourists' sightseeing. During the epidemic, it can reduce personnel contact and better prevent and control the epidemic. It can be said that the realization of the intelligent service system has particularly important value and significance.

The innovations of this paper are as follows: (1) This paper analyzes the problems existing in the current form of tourism services and the methods that need to be improved. (2) This paper designs a multiservice platform such as a smart travel mobile APP that combines AI, WeChat public account, and small programs. (3) This paper conducts a questionnaire survey on the designed smart tourism service platform to understand the actual use effect of the system. (4) The smart tourism service platform in this paper combines smart access control, multinetwork terminals such as mobile APP, applet, and portal website, and smart technologies such as 3DVR.

2. Related Work

Regarding the research and design of smart tourism, many scholars have explored this. Naseri et al. expounded the innovation of smart tourism public service mechanism based on neural network. The construction of smart scenic spots not only needs to pay attention to the investment of basic hardware equipment but also needs to understand the needs and goals of tourists from the perspective of tourists and constantly innovate soft services (soft services refer to those services that are intangible and inseparable, including information services, management consulting, and health care services). Smart tourism is still lacking in the world, but it focuses on sustainable development, deep participation in tourism, deep connection between tourists and destinations, and the overall development impact of tourism economy and society and explores the overall evolution from tourism to smart tourism. Traditional tourism management concepts and models can no longer meet people's travel needs. The use of big data has promoted the development of tourism to a certain extent and solved the problem of tourism management [8]. Smart tourism is a real-time tourism service that utilizes cloud computing, network, and mobile internet platforms [9]. Zhou analyzed the cultural orientation of smart tourism systems in traditional villages. To protect the traditional village landscape, it is necessary to respect the credibility of the village landscape and protect the form and image of the landscape. The key to building a cultural tourism brand is the construction of traditional village source culture. Exploring the new path of "culture + tourism + Internet" will determine the final realization of the rise of tourism in the central plains [10]. With the rapid development of the times, tourism has become one of the main pillar industries of our era. Under the trend of informatization, a new smart tourism model has begun to take shape, bringing more opportunities and challenges to the development of the entire tourism industry. Li analyzed the concept and definition of new smart tourism and also analyzed the shortcomings of new smart tourism. He summarized the application of smart tourism in all aspects of the industrial chain and also summarized a smart tourism model evaluation project, which provided specific theoretical support and scientific basis for the overall development of tourism [11]. Today, tourism plays an important role in urban development, and cities are vying for tourism upgrades. As a new strategy for tourism development, night tourism needs the attention of stakeholders. The two most important aspects of night tourism development are nighttime environment and atmosphere. The increase in night tours is inseparable from local intelligence. Berastagi is one of the most popular tourist destinations in Caro Agung, where nightlife destinations can be found. Veronica S aims to explore the development of the environment and atmosphere of Belastaki night tours based on local wisdom. Veronica et al.'s research uses descriptive qualitative techniques to analyze data collected through field observations and in-depth interviews. Research has shown that integrating local wisdom into the environment to create a nighttime atmosphere can establish a unique identity for nighttime tourism in small towns [12]. Demolinggo et al.'s research identifies the potential and tourism characteristics of Pentinsari Village and analyzes the current state of tourism in Pentinsari Village's local wisdom, Memayu Haunin Bawono. He also studies the implementation

process of this smart tourism in sustainable tourism management using "multi-methods" or mixed methods in particular. In addition to non-participatory observations in the Pentinsari tourist village, Demolinggo et al. conducted in-depth interviews using a detailed sampling method with a total of 72 respondents (tourists). Research by Demolinggo et al. found that tourism and local wisdom combined appear to reinforce each other. In other words, by harmonizing the environment, art, culture, local life, and local wisdom, it can become a tourism product. Demolinggo et al.'s research can be used as a sustainable tourism management model for local knowledge [13]. As a spiritual tourism destination, the Basilica of Masetti is managed based on the exploration and learning of local wisdom. From sanctuary to spiritual resort, Masetti focuses on developing strategies for developing temples. Surveys in Putra I are qualitative and descriptive surveys using observations, interviews, surveys, and document collection. The results of Putra I suggest that amenities such as road transport and additional services in the area are in the good category. The philosophies and attitudes of the community unanimously agreed to develop the management of the sacred area of the Masetti Temple into a spiritual tourism destination based on local wisdom [14]. Smart tourism is one of the government-funded alternative tourism that is aimed at shifting from mass tourism to a more personal and culturally sensitive approach to provide a more professional travel experience. Famous for its unique large cave shape, Goalawa Temple is home to thousands of bats and is a tourist attraction for domestic and foreign tourists. The purpose of the study of Wismayani et al. was to explore the potential of the Goalawa Temple area and to understand the general perception of Goalawa Temple as a spiritual tourism development based on local wisdom. Using both descriptive and qualitative analytical methods through observations, interviews, surveys, and collection of document data, they detail the potential of the Goalawa Temple area. The potential of the Goarawa Temple area is spiritual and cultural tourism, and the supporting facilities, roads, and additional services in the area have been done very well. Desapesingahan's views and attitudes towards the development of the Goarawa Temple area as a spiritual tourism destination are highly appreciated and positively evaluated [15]. Although the above research can promote the development of smart tourism to a certain extent, the solutions they designed are either too complicated or cost a lot of money, or the system reliability is not enough, so it is difficult to pass.

3. AI-Based Smart Tourism Service Method

3.1. Smart Tourism

(1) Current situation of tourism

As an activity or phenomenon, tourism has existed for thousands of years in history, and it is one of the most basic human activities in the development of human society to a certain stage. Tourism is deeply rooted in the hearts of the people and is well known to the public.

(1) *Inbound Tourism Situation*. Figure 1 shows the trend chart and growth rate of the number of domestic inbound tourists. The following data are all compiled from public information. From 2004 to 2018, the number of inbound tourists received by the country increased from 14.8 million to about 22 million, with an increase of about 7.2 million and an increase of about half of the number in 2014. In 2012, the country's inbound tourism market accelerated its recovery, from a negative growth rate of about 27% to a positive growth rate of 75%, with rapid development. In addition to the negative growth in the number of inbound tourists due to the financial crisis in 2008 and the new crown epidemic in 2019, the number of inbound tourists has continued to increase. This shows that the domestic tourism industry has a very strong ability to respond to emergencies [16].

It can be seen from Table 1 that in 2012, 13 million foreign tourists were received in China, and the growth rate was as high as 75%. The growth rate showed a downward trend, and the impact of the epidemic in 2019 began to show a negative growth. After the financial crisis in 2008 to 2012, the number of tourists from Hong Kong, Macao, and Taiwan reached 2.15 million, which is related to the various convenience strategies implemented by Hong Kong, Macao, and Taiwan after the financial crisis (for example, inbound tourists can shorten the issuance time and extend the visa extension).

Figure 2 shows the foreign exchange earnings of inbound tourism. As shown in Figure 2(a), the foreign exchange earnings of domestic inbound tourism in 2012 reached US$3 billion. From 2,000 to 2012, foreign currency earnings increased with the increase in inbound tourists. The foreign exchange income in 2008 was the lowest in recent years, and the foreign exchange income declined due to the impact of the 2008 financial crisis and the epidemic in the past two years. As shown in Figure 2, from 2012 to 2016, the foreign exchange income of domestic inbound tourism maintained a growth rate of more than 25%. This shows that the domestic tourism industry has achieved remarkable results in innovating development ideas, changing development methods, highlighting characteristics, producing high-quality products, and improving quality [17, 18].

(2) *Outbound Tourism and Domestic Tourism*. Outbound tourism began in the mid-1980s when it first produced families in the fast-growing Guangdong province. This kind of outbound travel is paid by foreign relatives and friends, and it is guaranteed to return on time. At that time, tourist destinations were limited to Hong Kong, Macao, and Taiwan. Since the early 1990s, the number of people who have left Hong Kong, Macau, and Taiwan to visit relatives has increased rapidly. From 1993 to 1997, the number of outbound tourists organized by travel agencies increased by an average of 300,000 person-times per year, with an average annual growth rate of 42%. There is still a big gap between the scale of China's outbound tourism and the scale of inbound tourism, and the development of outbound tourism is slow [19].

Since 1997, the domestic outbound tourism strategy has undergone major adjustments, from family travel to overseas travel at own expense, which also shows from the side that outbound tourism is becoming more and more popular. And because of the deepening of reform and opening up, China's outbound tourism has expanded from Singapore, Malaysia, Thailand to the Philippines, New Zealand, Egypt,

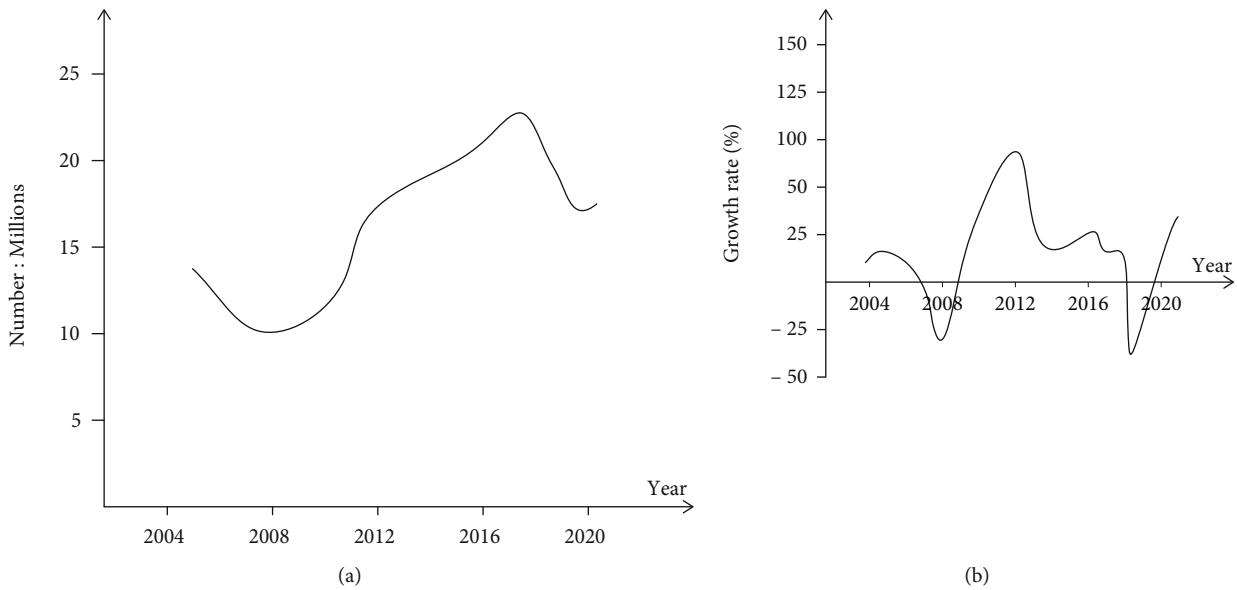


Figure 1: Inbound tourism situation. (a) The number of inbound tourists received in China. (b) The growth of the number of inbound tourists.

Table 1: Distribution of overseas tourists:thousand.

Year	Hong Kong, Macau, and Taiwan	Foreigner
2004	132	1348
2008	57	941
2012	215	1137
2016	361	1583
2020	121	1362

Germany, and other more than 30 countries and regions. In general, domestic travel to Hong Kong and Macau is becoming more and more mature, and border travel is gradually becoming more formalized. The three major elements of Chinese outbound travel, Hong Kong and Macao travel, border travel, and overseas travel, have initially formed a unified direction. In 2,000, the World Tourism Organization made a forecast for the development of world tourism in the first two decades of the 21st century. Due to its special political background and many historical reasons, Chinese outbound tourism refers to the travel activities of mainland Chinese citizens who cross national borders and cross specific borders to other countries or specific regions. Chinese outbound travel at their own expense has developed from outbound travel to visiting relatives [20].

Table 2 and Figure 3 show the statistics of domestic outbound tourism and domestic inland tourism. From 2004 to 2016, the number of domestic outbound tourists increased from 16.32 million to 32.06 million, a net increase of about 16 million. Especially from 2008 to 2012, the number of outbound tourists increased by more than 26 million, and the growth rate reached an astonishing 100%. At the same time, domestic tourism increased from 73.1512 million in 2004 to 148.752 million in 2016, with an average annual growth of 8.94%. The development of domestic tourism is relatively stable, and judging from the recent development, its development rate is generally between 4% and 5%. Since 2004, the average annual development rate of domestic tourism has been 6.54%.

As shown in Table 3, tourism is a part of the tertiary industry, and the development of tourism plays an important role in promoting the development of the tertiary industry. The tourism industry and other cultural tourism industries play a role in promoting the transformation of traditional industrial structure. The development of the cultural tourism industry can adjust the relationship between the secondary industry and the tertiary industry, and at the same time, it can also derive new categories from the traditional service industry and is conducive to the upgrading of the traditional service industry. The tourism industry and other cultural tourism industries can promote the integration and utilization of related industrial resources and the value-added benefits. For example, a book bar combined with a bookstore and a coffee shop can not only integrate the original market of bookstores and coffee shops but also drive the combination of the two to derive new consumption patterns.

(2) Smart Tourism Service Platform

Speaking of smart tourism, RFID technology has been used in some scenic spots in the United States as early as 2006, allowing tourists to carry portable smart devices to check in and check out, open doors, and purchase goods at hotels, which can be conveniently operated from time to time. Since 2009, some European countries have applied information technology to the tourism industry, established extensive tourism wireless networks, and built tourism management systems. Vehicle dispatching systems and portals in smart tourism can provide functions such as automatic navigation, safety monitoring, early warning, and emergency management. A mobile phone guide assistant was designed by a British company to help travelers provide travel services such as route planning, travel commentary, original scene

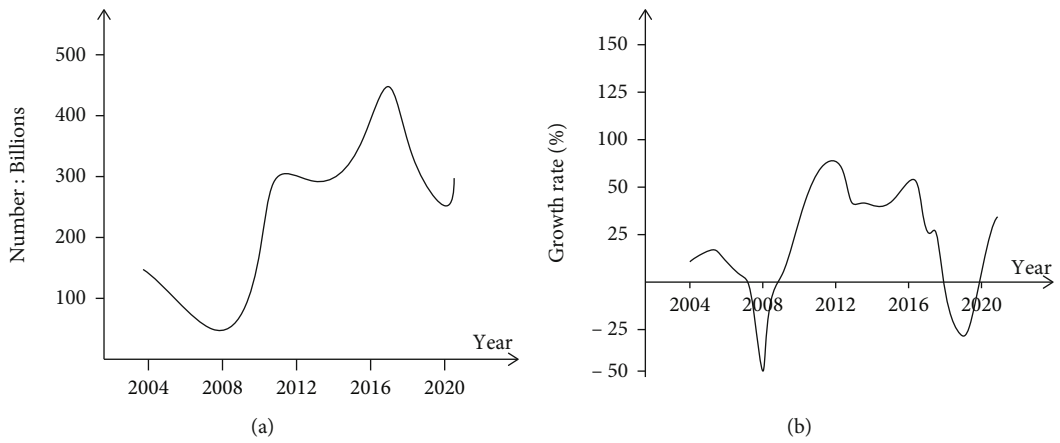


Figure 2: Inbound tourism revenue. (a) Foreign exchange income from inbound tourism. (b) Growth rate of foreign exchange income.

Table 2: Statistics on the number of domestic outbound tourism and domestic tourism:millions.

Year	Outbound tourism	Domestic tourism
2004	16.32	7315.12
2008	1.36	4212.45
2012	27.54	12453.5
2016	32.06	14875.2
2020	13.20	4215.49

reproduction, animation simulation, and video playback during the travel process [21, 22]. At present, smart tourism projects are also being launched with great fanfare in China. For example, the online virtual tourism system is currently used in the Forbidden City in Beijing. Before tourists travel, the system can project and restore the actual scene of the Forbidden City, making it easier for tourists to understand the scenic spot. Many Internet companies, such as Bao.com, Queer, and Ctrip, have developed many smart functions for convenient travel, such as the following: booking hotels, train tickets, air tickets, online ticket payment, and electronic navigation, which can greatly promote travel.

3.2. Artificial Intelligence. Artificial intelligence was formally proposed in the 1950s and 1960s. In 1950, a senior named Marvin Minsky (later known as the "Father of Artificial Intelligence"), along with his classmate Dunn Edmund, built the world's first neural network computer. This is also seen as a starting point for artificial intelligence. Artificial intelligence technologies include deep learning, data mining, and human-computer interaction based on big data. Among them, intelligent voice technology has always been a hot spot in the industry and has become the most widely used core representative in the industry. Intelligent speech technology is a system engineering, mainly including speech recognition, natural language understanding, dialogue management, natural language formation, speech synthesis, and other technologies. Among them, the processes of natural language understanding, dialogue management, and natural language generation, also known as intelligent dialogue systems, are the core technical difficulties of the entire intelligent voice dialogue process. In conclusion, there are two main directions of intelligent speech technology: speech recognition technology (ASR) and speech synthesis technology [23, 24].

Artificial intelligence is a branch of computer science that attempts to understand the essence of intelligence and produce a new type of intelligent machine that responds in a similar way to human intelligence. Research in this area includes robotics, language recognition, image recognition, natural language processing, and expert systems. Since the birth of artificial intelligence, the theory and technology have become more and more mature, and the application field has also continued to expand. It is conceivable that the technological products brought by artificial intelligence in the future will be the "containers" of human intelligence. Artificial intelligence can simulate the information process of human consciousness and thinking. Artificial intelligence is not human intelligence, but it can think like human beings and may surpass human intelligence.

3.3. Scheme Design. This paper proposes a system functional framework to meet the needs of tourists in scenic spots for "food, accommodation, travel, shopping and entertainment." According to different functions, the system can be divided into four layers, namely, platform layer, service layer, application layer, and user layer. The frame diagram is shown in Figure 4.

The user layer of the framework mainly includes mobile phone APP, WeChat public account and applet, and electronic tour guide certificate and roaming client; the application layer mainly includes VR scenic roaming applications, portal websites, and user monitoring systems; the service layer mainly includes Beidou positioning system, electronic map system, and data storage system; the platform layer mainly includes radio base stations, Beidou satellites, servers, and various base station equipment [25, 26].

The platform layer provides a good operating environment for the service layer and application layer above, ensuring that the system can run stably for a long time; the service layer is built on the platform layer to provide data services and operating environment for the application layer; the

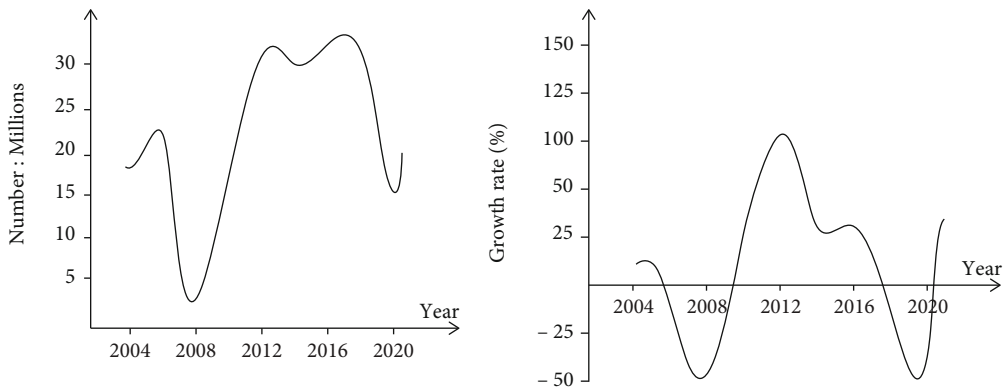


Figure 3: Outbound tourism situation. (a) Number of domestic outbound tourists. (b) Growth of domestic outbound tourists.

Table 3: Comparison of the growth of China's outbound tourism, GDP, and tertiary industry:billion.

Year	Outbound tourism	GDP	Tertiary industry
2004	221.37	1370000	453360
2008	151.02	3006700	567820
2012	564.07	5194700	752420
2016	671.63	7435850	845620
2020	261.08	10135670	1024520

application layer is mainly the specific implementation of each subsystem of the tourism platform; the user layer is mainly to allow users to use the digital functions of the scenic spot through various terminals.

The image processing difference algorithm designed by the system application layer is as follows:

$$d(u,v) = \sum_{i=1}^{m}\sum_{j=1}^{n}|S(i+u,j+v) - T(i,j)|, \quad (1)$$

where m and n represent the pixel size, (u, v) are the reference points, T is the reference template, and S is the test image.

The image processing equalization algorithm designed by the system application layer is as follows:

$$\text{Min}\bar{\sigma}^2 = \frac{1}{mn}\sum_{i=1}^{m}\sum_{j=1}^{n}(S(i+u,j+v) - T(i,j))^2. \quad (2)$$

In the formula, σ represents the error function algorithm.

$$\text{Min}\bar{D}(u,v) = \frac{1}{mn}\sum_{i=1}^{m}\sum_{j=1}^{n}|S(i+u,j+v) - T(i,j)|. \quad (3)$$

In the formula, $\bar{D}$ represents the mean value function algorithm.

$$\text{PDC}(u,v) = \sum_{i=1}^{m}\sum_{j=1}^{n}S(u,v). \quad (4)$$

In the formula, PDC table is the pixel difference.

The image processing normalization algorithm designed by the system application layer is as follows:

$$\sigma(u,v) = \frac{\sum_{i=1}^{m}\sum_{j=1}^{n}S(i+u,j+v)}{\sqrt{\sum_{i=1}^{m}\sum_{j=1}^{n}S(i+u,v+j)^2}\sqrt{\sum_{i=1}^{m}\sum_{j=1}^{n}T(i,j)^2}}. \quad (5)$$

Image detection absolute error method is as follows:

$$\varepsilon(u,v,m_k,n_k) = \left|S_{u,v}(m_k,n_k) - \bar{S}(u,v) - T(m,n) + \bar{T}\right|. \quad (6)$$

In the formula: $\bar{S}(u,v)$ represents the average range of the detected image.

Screening method for image detection is as follows:

$$I(u,v) = \left\{R\left|\min\left[\sum_{k=1}^{r}\varepsilon(u,v,m_k,n_k) \geq T_k\right]\right.\right\}. \quad (7)$$

In the formula, R represents the R-th detection, and ε represents the error with the detection template.

The processing method of system feature points is shown in Figure 5. Among them, V_1, V_2, V_3, and V_4 are the sum of squared differences in four different directions, respectively.

$$V_1 = \sum_{i=-k}^{k-1}\left(f_{c+i,r} - f_{c+i+1,r}\right)^2, \quad (8)$$

where (c, r) represents the center point and f represents the coordinate of the feature point.

$$V_2 = \sum_{i=-k}^{k-1}\left(f_{c,r+i} - f_{c,r+i+1}\right)^2, \quad (9)$$

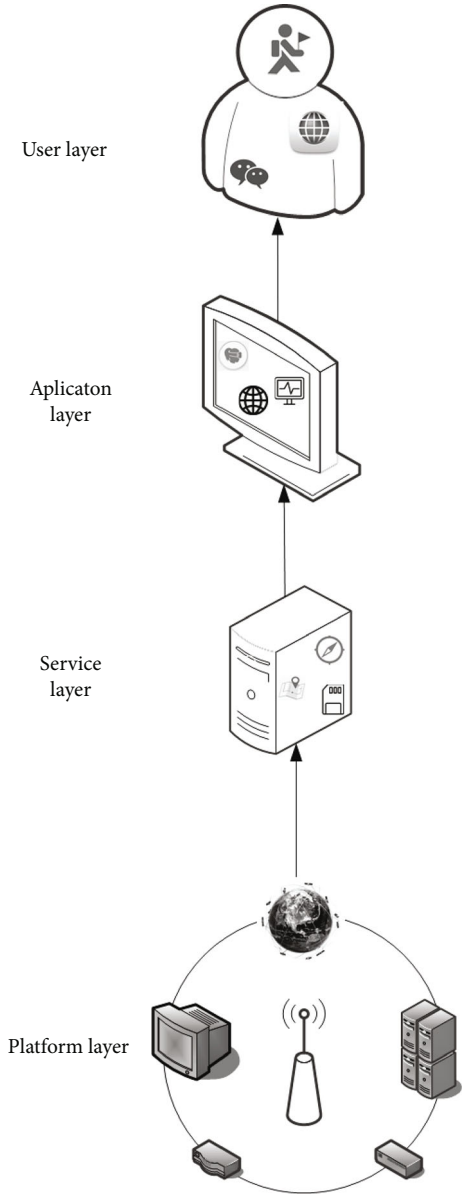


Figure 4: Overall framework of smart tourism.

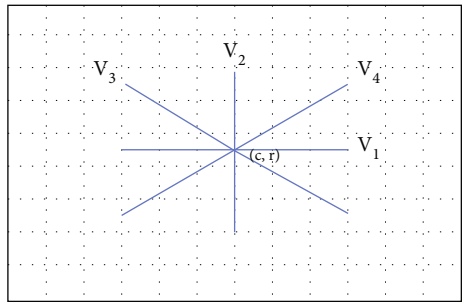


Figure 5: Detection of system image features.

$$V_3 = \sum_{i=-k}^{k-1} \left(f_{c+i,r+i} - f_{c+i+1,r+i+1}\right)^2, \tag{10}$$

$$V_4 = \sum_{i=-k}^{k-1} \left(f_{c+i,r-i} - f_{c+i+1,r-i-1}\right)^2. \tag{11}$$

In order to reduce the noise generated by the system detection process, the algorithm introduces the following function to set a detection range and reduce the amount of calculation.

$$G(x, y) = \frac{1}{2\pi\sigma^2} e^{-\left(x^2+y^2\right)/2\sigma^2}. \tag{12}$$

After the image point (x, y) changes according to the (u, v) direction, its image changes as follows:

$$E(u, v) = \sum_{x,y} G(x, y)[I(x + u, y + v) - I(x, y)]^2. \tag{13}$$

In the formula, $I(x, y)$ represents the detection corresponding point.

According to the above formula, it can be transformed into the following:

$$E(u, v) = \sum_{x,y} G(x, y)\left[I_x u + I_y v + O\left(u^2 + v^2\right)\right]^2, \tag{14}$$

where O represents the approximate point.

When the direction change is small, the image change can be considered as the average change, which can be calculated as follows:

$$E(u, v) = \sum_{x,y} G(x, y)\left\{\left[I_x, I_y\right]\begin{bmatrix} u \\ v \end{bmatrix}\right\}^2 = [u, v]M\begin{bmatrix} u \\ v \end{bmatrix}. \tag{15}$$

However, when the average change is relatively fast, the amount of calculation will be very large, so the eigenvalue R is introduced:

$$R = \det M - k\left(\tilde{M}\right)^2. \tag{16}$$

Use a fast detection algorithm for less feature points:

$$N = \sum_{i \forall P} |I(x) - I(p)| > \varepsilon_d. \tag{17}$$

Use a simple detection algorithm for feature points that are obvious:

$$\tau(p\,; x, y) = \begin{cases} 1 & \text{if } p(x) < p(y), \\ 0 & \text{otherwise}, \end{cases} \tag{18}$$

where p represents the range to be measured.

Table 4: Overall design framework of smart tourism.

Layer	Include	Estimated power consumption
User	Applets, Web, WeChat	1.5 W
APP	3dAR, Web portals, user positioning	3 W
Service	Position, Web, maps, 3D source	5 W
Basic	Beidou satellite, computer room, signal station	3KW

(a)

(b)

Figure 6: Positioning system desktop display.

For nd feature points to be tested, the feature set is as follows:

$$f_{nd}(p) = \sum_{1<n<nd} 2^{i-1}\tau(p; x_i, y_i). \tag{19}$$

The detection accuracy can be represented by e, and its formula is as follows:

$$e(H) = \frac{1}{N}\sum_{i=1}^{N}\sqrt{(x_{ci}-x_{ei})^2 + (y_{ci}-y_{ei})^2}. \tag{20}$$

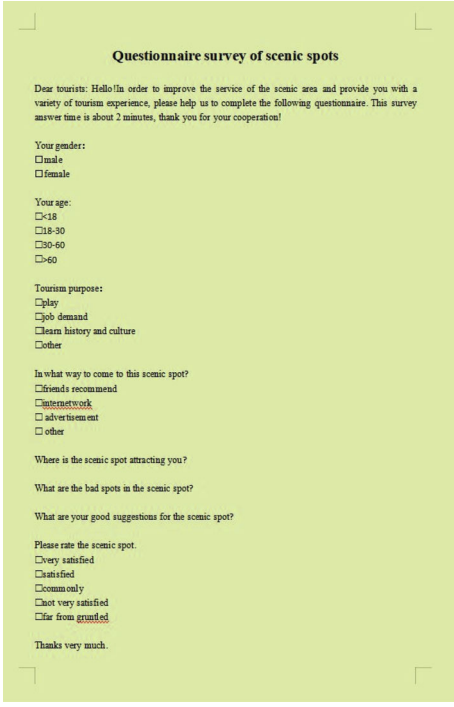
In the formula, H represents the detection matrix, and N represents the corresponding detection point [26, 27].

4. AI Smart Tourism Platform Design

4.1. Design of the Model. The overall design framework is shown in Table 4. The service platform includes a tourist

Figure 7: 3D modeling software desktop.

Figure 8: VR scenic roaming scene.



Questionnaire survey of scenic spots

Dear tourists: Hello!In order to improve the service of the scenic area and provide you with a variety of tourism experience, please help us to complete the following questionnaire. This survey answer time is about 2 minutes, thank you for your cooperation!

Your gender:
☐male
☐female

Your age:
☐<18
☐18-30
☐30-60
☐>60

Tourism purpose:
☐play
☐job demand
☐learn history and culture
☐other

In what way to come to this scenic spot?
☐friends recommend
☐internetwork
☐ advertisement
☐ other

Where is the scenic spot attracting you?

What are the bad spots in the scenic spot?

What are your good suggestions for the scenic spot?

Please rate the scenic spot.
☐very satisfied
☐satisfied
☐commonly
☐not very satisfied
☐far from gratified

Thanks very much.

Figure 9: Questionnaire form.

positioning system, a three-dimensional scenic spot roaming system, a WeChat-based microexhibition system, a smart tourism information release portal website, and a background management system. These four systems cooperate with each other to better serve the smart tourist attractions, improve the service quality of the scenic spots, enhance the publicity effect of the scenic spot culture, and improve the travel experience of tourists.

The Beidou satellite positioning system is used in the positioning system of this paper, and the desktop display of visitor positioning is shown in Figure 6.

The 3D scene background building software used in this paper is 3D building, as shown in Figure 7.

The roaming effect of the 3D scene is shown in Figure 8:

4.2. Questionnaire Survey. In order to facilitate the understanding of the actual effect of the smart tourism service platform designed, this paper conducted a random questionnaire survey on the WeChat applet set up in a scenic spot, the WeChat public account, the portal website, and tourists visiting the scenic spot. A total of 2,000 questionnaires were selected in this paper. The content of the questionnaires included the gender and age of tourists, the purpose of tourists' travel, and the way to arrive at the scenic spot, as well as the evaluation and suggestion of the scenic spot, as shown in Figure 9.

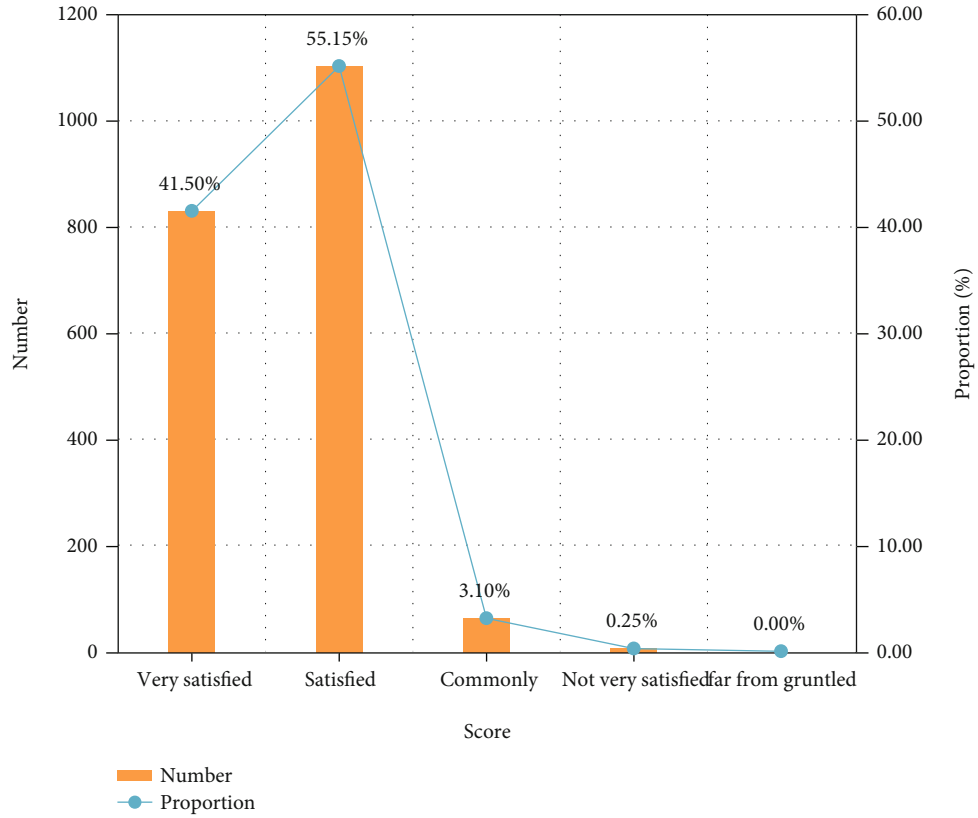


Figure 10: The results of the tourist survey of scenic spots.

4.3. Experimental Results. Finally, this paper summarizes all the obtained questionnaire results. Among the 2,000 questionnaires surveyed, 300 were filled out by tourists in scenic spots, 1,200 were from WeChat platform, and the other 500 were from other Internet platforms such as scenic portals and mini programs. All scores are shown in Figure 10. As can be seen from the figure, more than half of the survey results expressed satisfaction with the service of the scenic spot, 41.5% expressed great satisfaction, and a total of 96.65% were satisfied. This shows that the AI intelligent tourism service system designed in this paper has been recognized and loved by the majority of tourists. Some of them also expressed that they have a special sense of technology and are very convenient during travel and hope to be vigorously promoted. However, in this article, 3.1% of the tourists also said that they were in general, and 0.25% of the tourists said they were not satisfied. This part of tourists said that although VR roaming is very convenient to visit, the VR equipment will feel uncomfortable after wearing it for a long time. It has a relatively large radiation to the eyes, and the scene of VR roaming is not as good as actual viewing. This also shows that the design of this paper still needs to be improved.

5. Discussion

Under the background of the digital information age and the continuous development of personal computer hardware, the smart tourism platform proposed in this paper can bring people a new visual experience. It has broad market prospects and application prospects and will develop rapidly in the future. However, there are still many areas that need to be improved and perfected.

During the research period of this paper, since the tourism big data analysis platform of the scenic spot has not been substantially constructed, only the basic analysis platform of tourism big data has been developed according to its own data and technology. This platform has verified some functions of the smart tourism service platform based on big data, and more applications of big data in smart tourism services need to be further improved and improved. This paper does not have enough understanding of the relevant concepts, framework systems, technical systems, and related basic theories of "smart tourism," and the combination of basic theories and papers is still at a shallow level. This requires further systematic integration and exploration of tourism disciplines and information technology fields to strengthen theoretical research on the application of smart tourism in the field of rural tourism.

The prediction algorithm in this paper is not accurate enough, and it is necessary to further filter the input parameters to optimize the algorithm performance. A large amount of data in the virtual roaming subsystem model is useless for network transmission, resulting in problems such as long user delay and freezing; therefore, the modeling technology needs to be further optimized. In the construction of 3D scenes, the operation efficiency of the roaming system needs to be further improved, which requires optimizing the algorithm for recommending content to reduce the request time for content

recommendation services and improve the experience of tourists. In addition, the research method of the paper is relatively simple, most of which are analyzed and researched in a qualitative way, and there are few quantitative analysis methods, and the data statistics method of the questionnaire is also very simple.

Due to the limitations of the author's time, energy, and research funding, this article needs further market research. It analyzes the market development of customized travel demand and forecasts customized travel trends. The survey should be carried out all over the country, but this paper only selects the field survey of a certain scenic spot, so the conclusions of the survey may have certain limitations.

6. Conclusions

This paper first briefly describes the background of the topic selection in the abstract section and briefly introduces artificial intelligence and smart tourism services. Then, a detailed introduction and explanation are given in the introduction part, and then, an example analysis is carried out in the relevant work part to illustrate the current research status and shortcomings of smart tourism. Then, it proposes the significance of designing artificial intelligence smart tourism in this paper and then summarizes several innovations of this paper. It focuses on the introduction and explanation of smart tourism and artificial intelligence in the theoretical research part and then introduces the calculation method of the system image processing in the algorithm part. The experimental part first introduces the framework of the smart tourism service system designed in this paper and then shows the system desktop and 3D scenic scenes and other pictures. In the end, this paper selected 2,000 questionnaires through field investigation and online investigation of a scenic spot. The survey results show that the artificial intelligence smart tourism service platform designed in this paper is recognized and loved by the vast majority of tourists. The survey results show that 41.5% of them are very satisfied, and 96.65% are satisfied and very satisfied. The artificial intelligence smart tourism service platform designed in this paper has been recognized and loved by the vast majority of tourist.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

References

[1] M. Atiquzzaman, N. Yen, and Z. Xu, "Big data analytics for cyber-physical system in smart city," *International conference on Big Data Analytics for Cyber-Physical-Systems*, vol. 1303, 2021.

[2] G. Xiao, Q. Cheng, and C. Zhang, "Detecting travel modes using rule-based classification system and Gaussian process classifier," *IEEE Access*, vol. 7, pp. 116741–116752, 2019.

[3] M. Adil, M. A. Jan, S. Mastorakis et al., "Hash-MAC-DSDV: mutual authentication for intelligent IoT-based cyber-physical systems," *IEEE Internet of Things Journal*, 2022.

[4] M. Adil, H. Song, J. Ali et al., "EnhancedAODV: a robust three phase priority-based traffic load balancing scheme for Internet of Things," *IEEE Internet of Things Journal*, 2022.

[5] F. Zhu, C. Zhang, Z. Zheng, and A. Farouk, "Practical network coding technologies and softwarization in wireless networks," *IEEE Internet of Things Journal*, vol. 8, no. 7, pp. 5211–5218, 2021.

[6] A. Farouk, M. Zakaria, A. Megahed, and F. A. Omara, "A generalized architecture of quantum secure direct communication for _N_ disjointed users with authentication," *Scientific Reports*, vol. 5, no. 1, pp. 1–17, 2015.

[7] M. Adil, M. K. Khan, M. Jamjoom, and A. Farouk, "MHADBOR: AI-enabled administrative distance based opportunistic load balancing scheme for an agriculture internet of things network," *IEEE Micro*, vol. 42, no. 1, pp. 41–50, 2022.

[8] M. Naseri, M. A. Raji, M. R. Hantehzadeh, A. Farouk, A. Boochani, and S. Solaymani, "A scheme for secure quantum communication network with authentication using GHZ-like states and cluster states controlled teleportation," *Quantum Information Processing*, vol. 14, no. 11, pp. 4279–4295, 2015.

[9] S. Wang, "Innovation of tourism public service mechanism of wisdom tourism based on neural network," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 20, pp. 82–89, 2017.

[10] Z. Zhou, "Research on source culture orientation of wisdom tourism system in the traditional villages of the central plains," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 6, pp. 19–24, 2017.

[11] X. Li, "Research on the composition structure model of new wisdom tourism," *Agro Food Industry Hi Tech*, vol. 28, no. 1, pp. 1370–1374, 2017.

[12] S. Veronica, N. Ginting, and A. Marisa, "Local wisdom-based on development of the environment and atmosphere aspect of Berastagi night tourism," *International Journal of Architecture and Urbanism*, vol. 4, no. 2, pp. 144–155, 2020.

[13] R. H. Demolinggo, D. Damanik, K. Wiweka, and P. P. Adnyana, "Sustainable tourist villages management based on Javanese local wisdom 'Memayu Hayuning Bawono' best practice of Desa Wisata Pentingsari, Yogyakarta," *International Journal of Tourism & Hospitality Reviews*, vol. 7, no. 2, pp. 41–53, 2020.

[14] I. Putra, W. Maba, I. K. Widnyana, and A. A. K. Sudiana, "The management model of Masceti Pura Temple area in Bali as a spiritual tourism destination based on local wisdom," *International Journal of Research -GRANTHAALAYAH*, vol. 9, no. 2, pp. 291–298, 2021.

[15] P. Wismayani, I. A. Wiswasta, and I. K. Sumantra, "Development of Goa Lawah Temple as a spiritual tourism based on local wisdom," *International Journal of Contemporary Research and Review*, vol. 10, no. 2, pp. 21395–21400, 2019.

[16] J. W. Bi, Y. Liu, Z. P. Fan, and J. Zhang, "Wisdom of crowds: conducting importance-performance analysis (IPA) through online reviews," *Tourism Management*, vol. 70, pp. 460–478, 2019.

[17] I. Gst Ng Ag Gd Eka Teja Kusuma, N. Landra, and I. W. Widnyana, "Construction of Balinese local wisdom based on social model in the tourism sector in creating happiness to enhance

community satisfaction," *Asia Pacific Management and Business Application*, vol. 8, no. 1, pp. 53–64, 2019.

[18] R. Chatila, K. Firth-Butterflied, J. C. Havens, and K. Karachalios, "The IEEE global initiative for ethical considerations in artificial intelligence and autonomous systems [standards]," *IEEE Robotics & Automation Magazine*, vol. 24, no. 1, pp. 110–110, 2017.

[19] H. Lu, Y. Li, C. Min et al., "Brain intelligence: go beyond artificial intelligence," *Mobile Networks and Applications*, vol. 23, no. 7553, pp. 368–375, 2017.

[20] D. Hassabis, D. Kumaran, C. Summerfield, and M. Botvinick, "Neuroscience-inspired artificial intelligence," *Neuron*, vol. 95, no. 2, pp. 245–258, 2017.

[21] S. Makridakis, "The forthcoming artificial intelligence (AI) revolution: its impact on society and firms," *Futures*, vol. 90, pp. 46–60, 2017.

[22] R. Li, Z. Zhao, X. Zhou et al., "Intelligent 5G: when cellular networks meet artificial intelligence," *IEEE Wireless communications*, vol. 24, no. 5, pp. 175–183, 2017.

[23] S. D. Baum, "On the promotion of safe and socially beneficial artificial intelligence," *AI & SOCIETY*, vol. 32, no. 4, pp. 543–551, 2017.

[24] S. Price and P. A. Flach, "Computational support for academic peer review: a perspective from artificial intelligence," *Communications of the ACM*, vol. 60, no. 3, pp. 70–79, 2017.

[25] A. F. Chen, A. C. Zoga, and A. R. Vaccaro, "Point/counterpoint: artificial intelligence in healthcare," *Healthcare Transformation*, vol. 2, no. 2, pp. 84–92, 2017.

[26] M. Nasr, A. Mahmoud, M. Fawzy, and A. Radwan, "Artificial intelligence modeling of cadmium(II) biosorption using rice straw," *Applied Water Science*, vol. 7, no. 2, pp. 823–831, 2017.

[27] J. Lemley, S. Bazrafkan, and P. Corcoran, "Deep learning for consumer devices and services: pushing the limits for machine learning, artificial intelligence, and computer vision," *IEEE Consumer Electronics Magazine*, vol. 6, no. 2, pp. 48–56, 2017.