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Research Article

Wisdom Tourism Management Mode in the Background of Big Data of the Internet of Things

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Since the rapid development of the global economy, tourism has become an indispensable entertainment and relaxation item in people's lives. However, the traditional tourism management mode is slow in conveying tourism information, and there is no reasonable planning of tourism projects for tourists, and it is even more difficult to accurately locate the travel preferences of travelers and make specific travel plans, so that travel resources cannot be fully utilized. Therefore, the Internet of Things big data technology and travel management are combined. For this reason, a wisdom tourism management model based on the big data background of Internet of Things (IoT) is developed. In order to timely arrange and adjust work and travel plans, wisdom tourism makes use of cloud computing, IoT, and other new technologies, with the help of portable mobile terminal devices, so that the tourists can receive timely information about tourism resources, tourism activities, and tourism surroundings to achieve intelligent perception of tourism information, timely arrangement effect. Wisdom tourism can make use of undeveloped tourism resources as much as possible and drive the development of surrounding industries, and promote the economic development of tourist areas. This paper mainly compares the smart tourism management mode with the traditional tourism management mode. The experiment shows that the development degree of the wisdom tourism management mode accounts for 82.8% of the total tourism resources. The traditional tourism management model is only 70.1%, and the GDP of the economy around the tourist area in the wisdom tourism management model in one year is 1.4 times higher than that of the traditional tourism management model. In terms of tourism experience, the wisdom tourism management model is also much better than the traditional tourism management model. And the lower the average age of the experimenter, the higher the favorability of wisdom tourism, up to 98%. It highlights the advantages of the wisdom tourism management model in personalized tourism, tourism development, and surrounding economic growth.

1. Introduction

Since the 1970s, the development of tourism has gradually developed with the improvement of people's living standards. Tourism resources can drive the economic development of a region, so making the best use of tourism resources is the most important issue for the Tourism Administration. However, tourism resources themselves have the characteristics of intangibility and scarcity, and most of them are located in mountainous or remote areas with backward economy and slow information dissemination. Urban residents are the main tourist groups. The traditional tourism management model cannot timely deliver the tourism information resources to the people who need tourism, nor can it accurately locate the tourism needs of tourists, resulting in waste of tourism resources. Tourism plays a role in stimulating the economy, and has an obvious role in promoting the economy of related industries and regions. Therefore, it has also become a key industry that supports and prioritizes development in various regions. However, with the improvement of living standards and the change of residents' tourism concept, the tourism market has also undergone new changes. It is difficult for traditional tourism methods of sightseeing tours and group tours to adapt to diversified market demands. The individual leisure travel and self-driving travel have become new tourism concepts, and the individual needs of tourists are increasingly strong, so the demand for information services has greatly increased. The single service provided by the traditional tourism management model is more and more difficult to meet the market demand, which greatly limits the development of the tourism industry.

The wisdom tourism management model based on the big data of the IoT can effectively and accurately locate the needs of tourists through data mining, and provide personalized tourism solutions. Combined with the surrounding services, a modern tourism management model can be created, providing better services for tourists and promoting the development of tourism. This paper has the following innovations in the study of smart tourism management mode: (1) The wisdom tourism management mode is studied by combining the technology of IoT and big data. (2) Through comparative experiments, it is proved that the wisdom tourism management mode can make full use of tourism resources and attract tourists more than the traditional tourism management mode.

2. Related Work

With the combination of IoT technology, big data, cloud computing, and many fields, more and more people have begun to pay attention to the tourism industry. Subramaniyaswamy et al. helped people in their daily life by developing an automatic recommendation system using Internet technology [1]. Kuilboer experimental research used big data technology to collect and organize tourism information, which provided important information for hotel tourism and promoted the development of tourism [2]. The study of Mountasser et al. showed that by introducing big data to analyze tourism-related data, it was possible to better understand the actual needs of tourists and promote the development of tourism [3]. Alaei et al. had a huge impact on the development of tourism by studying the use of social platforms of Internet media to share tourism content [4]. Ayuni and Priyana found that tourism was the fastest growing project in the world, and the development of tourism could greatly improve the surrounding economic level [5]. Through the analysis of tourism information, the general trend of the tourism industry can be analyzed, but there is still a certain lack of the development of tourism without a systematic management model.

In order to make full use of tourism resources, many researches have been put into the ranks of wisdom tourism management models. Muniz et al. served the tourist experience of tourists by developing a wisdom tourism management model [6]. The purpose of Wijayanti et al. research was to use data analysis to grasp the many contents of tourist attractions, which could be used to realize educational tourism [7]. The research content of Freitas and Mendes Filho was to analyze the purpose of smart tourism, and summarizes four aspects of smart tourism [8]. Through the research on smart tourism, Bouchon and Rauscher made full use of the tourism space to avoid the problem of people congestion [9]. Through the research of wisdom tourism management based on artificial neural network, Wang et al. experiment found that technological innovation can drive the development of tourism [10]. Zhou applied the smart tourism management model to rural tourist attractions through cloud computing, big data, and other technologies, and achieved amazing results [11]. This method can solve many tourism problems, but it is not optimal in the use of algorithms and technologies.

3. Methods of Constructing a Wisdom Tourism Management Model

3.1. IoT Technology. The IoT technology realizes the information exchange between things or between people and things by relying on information sensing technologies such as radio frequency identification (RFID) and global positioning system (GPS) [12]. The Internet of Things technology is a way to go online and offline, and the Internet of Things technology can be applied to the wisdom tourism management model.

The structure of the IoT is complex, and it covers a wide technical area, including sensors, computers, and terminal servers [13]. The IoT architecture is divided into four layers, from top to bottom: application layer, service layer, transport layer, and perception layer. The IoT structure diagram is shown in Figure 1.

In Figure 1, the perception layer is located at the bottom of the system structure, which contains many sensors and identification devices to sense the external information. Common technologies for the perception layer include RFID, two-dimensional codes, and sensors. It is often used in mobile payment and credit card entry and exit. Bluetooth transmission is a low-end signal transmission. The transport layer is used to transmit data information, upload the underlying data to the service layer, and the transport layer is composed of a series of gateways, which are transmitted through the TCP/IP protocol [14]. The service layer is where the information is processed, which can store information and analyze and process information. The top is the application layer, which is in direct contact with people. The application layer has system responses such as system management, real-time monitoring, and parameter anomalies.

Due to the large amount of information processing in the IoT and the complex connection of routers, the system is often overloaded. Therefore, a distributed solution to complex line problems is needed, and the ant colony algorithm has distributed computer control, self-learning organization ability, and optimal line planning ability. It can well solve the complex information interaction problems of the IoT.

Ant colony algorithm was first used to solve the traveling salesman problem, that is, in some cities, each city is separated by a certain distance, starting from a city and passing through the city only once, to find the shortest distance. In short, it is a problem of finding the optimal solution. These cities can be regarded as a router, and the ant colony algorithm can find a route that has recently reached the destination in a network group, and the algorithm can be used in wisdom tourism to recommend the optimal travel plan. The specific implementation of the ant colony algorithm is as follows:

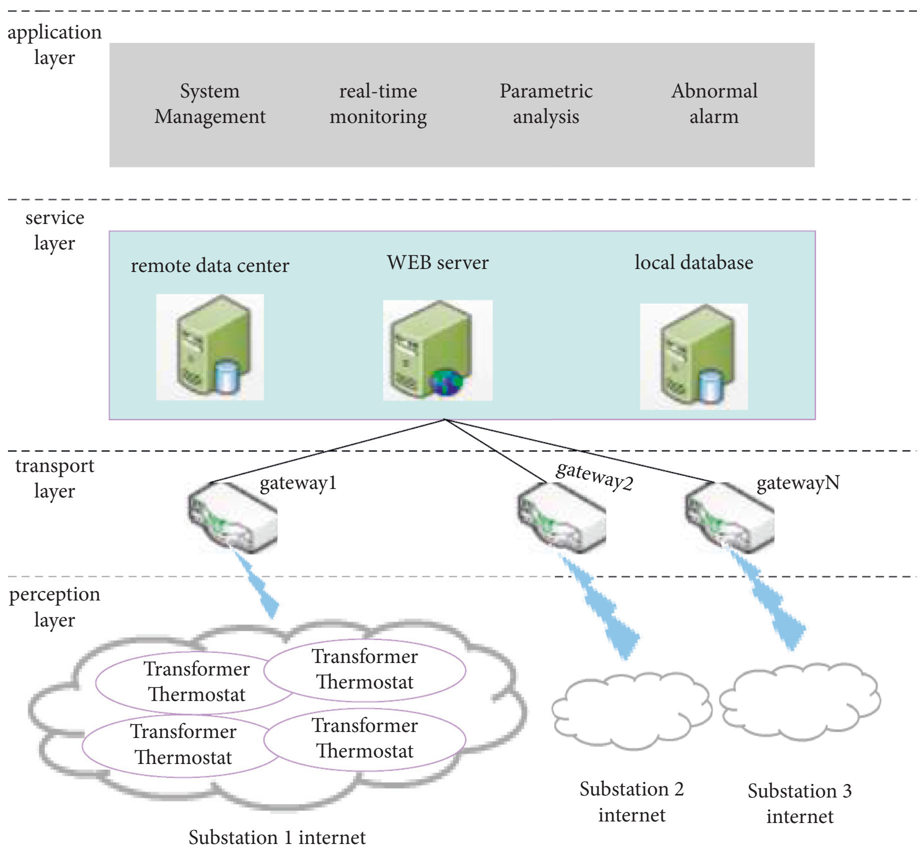

FIGURE 1: IoT structure diagram.

There are n routers in the network, then $C = \{c_1, c_2, \ldots, c_n\}$ can represent the entire router group, and the transmission distance between two routers is represented by l_{ij}, where i and j represent the number of routers. The initial value $\lambda_{ij}(0)$ of the information concentration is a constant. As time goes by, when the time is k and the information concentration is $\lambda_{ij}(k)$, then the transition probability of the information moving from router i to router j at time k is $P_{ij}(k)$.

$$P_{ij}(k) = \begin{cases} \dfrac{\lambda_{ij}(k)^{\alpha}\eta_{ij}(k)^{\beta}}{\lambda_{ij}^{\alpha}\left(\eta_{ij}\right)^{\beta}}, & i, j \in (1, 2, \ldots, n) \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

$$\eta_{ij} = \frac{1}{l_{ij}}. \tag{2}$$

In formulas (1) and (2), $\lambda_{ij}(k)$ is the information concentration of j when passing through router I. α represents the pheromone, β represents the threshold of the heuristic factor, and η_{ij} represents the heuristic factor to transfer from router i to router j.

As time goes by, the information leaves pheromone through the router, and the path will be updated again, then the pheromone concentration after Δt time is updated as:

$$\lambda_{ij}(t + \Delta t) = (1 - \theta)\lambda_{ij}(t) + \Delta\lambda_{ij}(t), \tag{3}$$

$$\Delta\lambda_{ij}(t) = \sum_{a=1}^{m} \Delta\lambda_{ij}(t). \tag{4}$$

In formulas (3) and (4), θ is the coefficient of the pheromone, $\Delta\lambda_{ij}(t)$ is the increment of pheromone passing through router i and router j in the time Δt, where a represents the a-th information, and m represents a total of m information.

3.2. Big Data Technology. Big data has a strong ability to gain insight into data and the ability to process massive data. In smart tourism, in the face of massive passenger data, big data must be classified and processed to find useful information for passenger tourism in the huge data, and discard useless data [15]. By building a Hadoop platform and implementing data mining technology and artificial neural network algorithms, the complex data problems in the wisdom tourism management model can be well solved.

3.2.1. Hadoop Platform. Hadoop is a distributed architecture platform that is widely used in facility management, energy control, user monitoring, etc. [16]. Data-related work such as data processing and data mining is carried out on the Hadoop platform. The structure diagram of the Hadoop platform is shown in Figure 2.

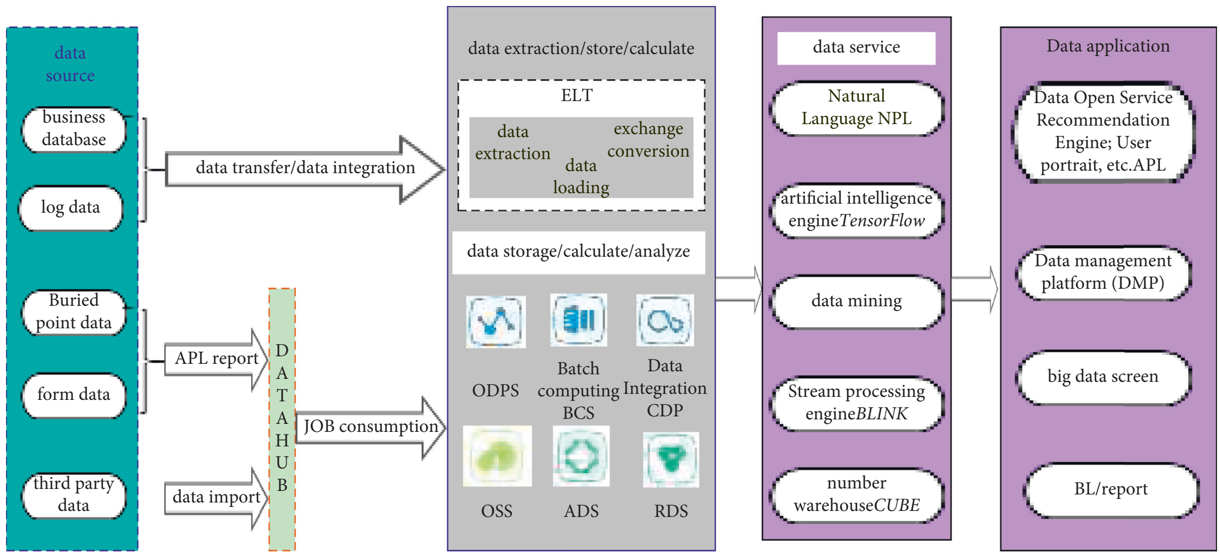

Figure 2: Hadoop structure diagram.

Hadoop distributed systems are usually used to store large amounts of data and process data efficiently [17]. Hadoop can automatically allocate resources to computers, avoiding the problem of uneven distribution of resources. The Hadoop platform has the following advantages:

(1) Fast Processing Speed. Since the Hadoop platform is a distributed platform, it can process the concurrent files. By adjusting the balance of each node, it can speed up the processing of data information.

(2) Good Expansion Performance. Hadoop work generally achieves simultaneous processing of the system by adjusting the dynamic data of each node, so Hadoop can be expanded by modifying the information of the nodes.

(3) Low Cost Requirements. Hadoop is an open source software that does not need to be paid to the software side to provide it, and the matching hardware equipment is relatively cheap.

(4) High Reliability. Hadoop has the function of automatically backing up and restoring the files, and it will be automatically repaired after platform errors.

3.2.2. Data Mining. With the advent of the era of big data, data mining has been widely used in various fields. Data mining is not only limited to data collection and data storage, but also uses its data value, which is the core function of big data technology [18]. Data mining is to extract the required information from a large amount of fuzzy and impurity data. The process of data mining from data preparation to data development and application is shown in Figure 3.

The general process of data mining is: collecting business data. Business data is divided into data in the database or file data. Data is cleaned, transformed, loaded, and stored in a data warehouse. Multi-dimensional data sets are obtained through data storage of different dimensions. Online transaction queries can be performed on cubes, such as online data analysis, data loading, and data access. The client obtains the queried information through the server.

3.2.3. Artificial Neural Network. The artificial neural network simulates the process of stress response when the human brain is stimulated, and transforms the axons and dendrites in the biological nerves into neuron nodes of the artificial neural network. The calculation process of artificial neural network is realized by the information transmission between neuron nodes [19]. The structure of the neural network can be adjusted by modifying the thresholds of neurons.

The artificial neural network studied in this experiment is the BP neural network, which is the most widely used neural network and has excellent generalization and dynamic learning ability. It mainly changes the structure of the neural network by continuously adjusting the neuron nodes through an error feedback mechanism, so that the actual output of the neural network can reach the expected output. Most of the other neural network models are improved versions of the BP neural network model. The BP neural network is a three-layer network model, and its structure is shown in Figure 4.

The working principle of BP neural network is forward transfer from input layer to hidden layer to output layer, reverse error transfer from output layer to hidden layer to input layer, and threshold adjustment of neuron nodes [20].

The input signal of the input layer is $x \in \{x_1, x_2, \ldots, x_n\}$, the neurons through the hidden layer are $g \in \{g_1, g_2, \ldots, g_n\}$, and the neurons become $\sigma(g_j)$ when the hidden layer is activated. j is represented as the jth neuron node of the hidden layer, and the activated neuron node finally outputs data in the output layer through calculation. The neuron node of the output layer is denoted as $y \in \{y_1, y_2, \ldots, y_n\}$, and there is an error between the actual output of the output layer and the expected output. If the error is not within the acceptable range, the error will be

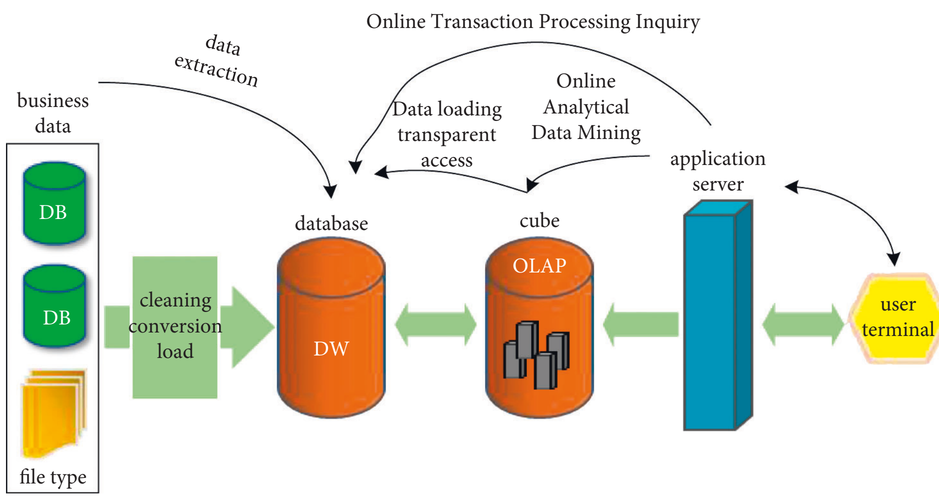

Figure 3: Data mining structure diagram.

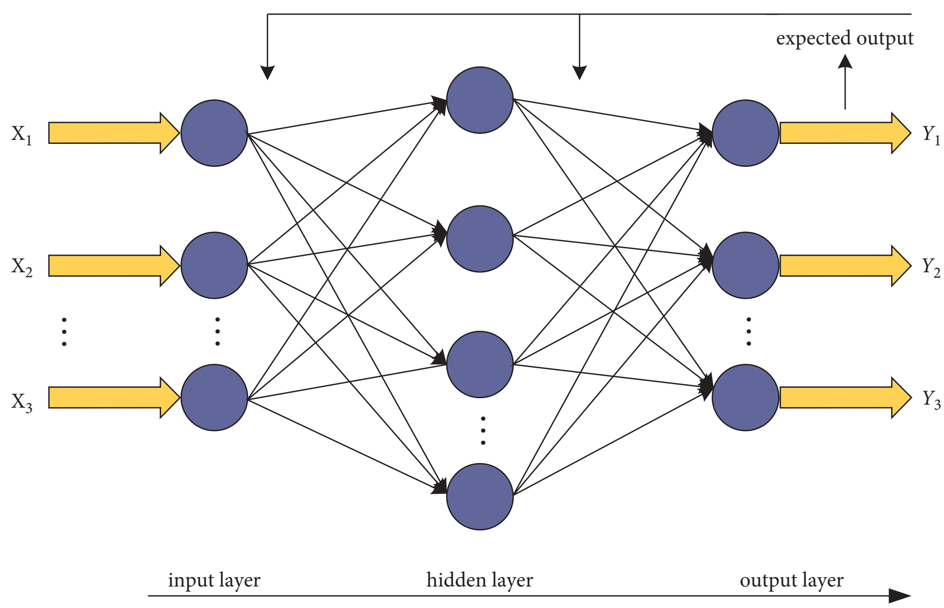

Figure 4: BP neural network structure diagram.

back-propagated from the output layer, and the actual output will be changed by adjusting the threshold of the neuron, and the loop will stop until the error reaches the acceptable range. The specific process algorithm of BP neural network is as follows:

The data of the input layer is transmitted to the hidden layer. The connection weight between neurons is represented by W_{ij}, i represents the initial neuron node, j represents the terminal neuron node, then the output of the target neuron is

$$y_i = \sum_{i=0}^{n-1} W_{ij} x_i. \quad (5)$$

After the target neuron is activated by the activation function σ, it is g, then the neuron node of the hidden layer is

$$g_j = \sigma\left(\sum_{i=0}^{n-1} W_{ij} x_i\right). \quad (6)$$

In formula (6), $0 \le g \le 1$, σ is the Sigmoid function.

The error of forward propagation is set to E, which is obtained by summing the squared difference of the output result y:

$$E(e) = \frac{1}{2}\sum_{j=0}^{k} e_j^2 = \frac{1}{2}\sum_{j=0}^{k}\left(y_j - t_j\right)^2. \quad (7)$$

In formula (7), k is the kth neuron node of the output layer, t_j represents the corresponding target output, and e_j represents the error of the jth neuron in the output layer. y_j represents the jth neuron node of the output layer.

The backpropagation of the error is to use the principle of gradient descent, so that the neuron node changes with the direction of the gradient, and the partial derivative of the neuron in the output layer is

$$\phi_i = e_i \cdot \sigma'(g_i), \tag{8}$$

$$\phi_j = \sigma'(g_j) \cdot \sum_{i=1}^{k} \phi_i \cdot W_{ij}. \tag{9}$$

In formulas (8) and (9), ϕ_i and ϕ_j both represent the partial derivatives of neurons in the output layer.

The threshold change from the output layer to the hidden layer, or from the hidden layer to the input layer can be obtained by updating the threshold through backpropagation:

$$\Delta W = \lambda \phi_j \cdot \sigma(g_j), \tag{10}$$

$$W' = \Delta W + W. \tag{11}$$

In formulas (10) and (11), λ is the learning rate, W is the initial threshold, W' is the updated threshold, and ΔW is the weight change.

Through the forward propagation of the data and the backpropagation of the error, the BP network can achieve a certain accuracy, and the global error can be expressed as:

$$E = \frac{1}{2m} \sum_{k=1}^{m} \sum_{j=1}^{n} \left(y_j - t_j\right)^2. \tag{12}$$

In formula (12), E is the global error, m is the number of cycles, k is the kth neuron node of the output layer, and t_j represents the corresponding target output. n represents the number of neurons in the target layer.

When the global error E is less than the expected value, it will jump out of the error propagation loop.

3.3. Cloud Computing Technology. Cloud computing can achieve random and unrestricted access to network resources, and applying cloud computing technology to the tourism industry can organize tourism information. The cloud platform can obtain information about all online activities of passengers, including query records, preferences, online payment, and other information [21]. Through sorting and analysis, this messy information can provide passengers with intelligent guidance solutions and intelligent itinerary arrangements for passengers. Cloud computing plays a very important role in smart tourism and is the center of tourism resource processing. The cloud computing architecture diagram is shown in Figure 5.

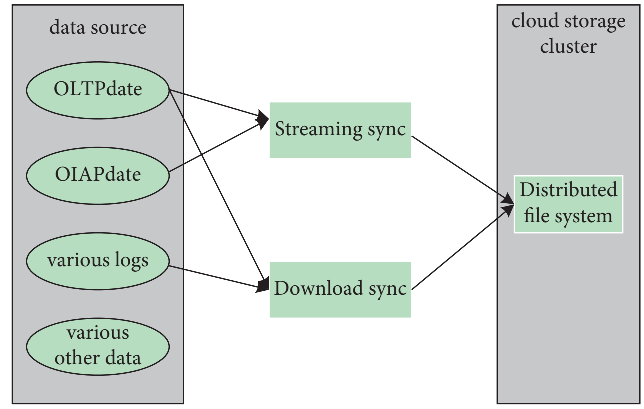

Figure 5: Cloud computing architecture diagram.

Using cloud computing can solve many data problems, but the complex and changeable data of wisdom tourism is difficult to process. Artificial fish swarm algorithm is an optimal algorithm for simulating fish predation [22]. Through repeated iterations, the entire space is searched.

To this end, the entire cloud network can be set as N, the state of the i-th server is $X_i = (x_1, x_2, \ldots, x_n)$, and the variable x represents the optimization variable. $Y_i = f(X_i)$ represents the working progress of the i-th server, X_k is the server that the i-th server finds in the surroundings that are better than itself, and the surrounding distance is represented by L.

Then, the server update state formula is

$$X_k = X_i + \text{Rand} \cdot L. \tag{13}$$

In formula (13): Rand() is a random number.

The next server to connect to is

$$X_{next} = X_i + \text{Rand} \cdot H \cdot \frac{X_k - X_i}{\left\| X_k - X_i \right\|}. \tag{14}$$

In formula (14): X_{next} is the next optimal server, and H is the number of servers passing through to find the next optimal server.

If the total number of servers that the i-th server can connect to is n and the central server X_c,

Then, the update status of the server is

$$\begin{aligned} n &= \left| N(X_i, L) \right|, \\ X_{next} &= X_i + \text{Rand} \cdot H \cdot \frac{X_c - X_i}{\left\| X_c - X_i \right\|}. \end{aligned} \tag{15}$$

If in the i-th server, the optimal server detected first is $X_{\max}$, and there are n connectable servers for $X_{\max}$, then the update status of the server is

$$Y_{\max} = \text{MAX}(f(X_{\max})). \tag{16}$$

In formula (16): $\text{MAX}(f(X_{\max}))$ is the optimal choice in the i-th server.

$$\begin{aligned} n &= \left| N(X_{\max}, L) \right|, \\ X_{next} &= X_i + \text{Rand} \cdot H \cdot \frac{X_{\max} - X_i}{\left\| X_{\max} - X_i \right\|}. \end{aligned} \tag{17}$$

3.4. Artificial Intelligence Technology. Artificial intelligence technology is the core of wisdom tourism, it can classify and summarize the processed information, and associate various parts of the wisdom tourism management model. Different targeted services can be provided according to the different needs of passengers. Personalized travel routes can be formulated to meet the needs of all passengers during the itinerary. Some peripheral services can also be provided based on tourist information, such as nearby hotel services and taxi services. [23]. The artificial intelligence module diagram is shown in Figure 6.

As can be seen from Figure 6, artificial intelligence technology is divided into three parts:

3.4.1. Perception. The perception layer includes computer vision, audio processing, and image recognition through artificial intelligence technology to obtain information from the outside world, and can analyze and process these information [24].

3.4.2. Comprehension. Through the data information transmitted from the perception layer, the data in the wisdom tourism management model is processed in natural language, and expressed through voice or video to form a form that can be understood by the people.

3.4.3. Action. After analyzing and identifying the data, it is necessary to implement machine learning, so that the machine can grow itself, and finally achieve intelligence [25].

4. Experiment of Wisdom Tourism Management Based on IoT Big Data

4.1. Experiment on the Effectiveness of Tourism Management

4.1.1. Sample Data. In order to make an all-round comparison of the two tourism management modes of smart tourism management and traditional tourism management, the experimental samples should be strictly controlled to prevent the selection of samples from interfering with the experiment. The selection of samples should be random and cover all levels. In order to ensure the fairness of the experiment, the experiment selected 60 young people (10–20 years old, 20–30 years old), 60 middle-aged people (30–40 years old, 40–50 years old), and 60 old people (50–60 years old, 60–70 years old). The number of people of all ages is 20, and the gender is equal to half. By investigating some of the places they travel frequently, the indicators that can affect their travel experience in tourism are calculated. Table 1 is a statistical table of tourism indicators.

It can be seen from the data in Table 1 that among the statistical tourism indicators, whether young people, middle-aged people, or the elderly are greatly affected by these indicators.

4.1.2. Correlation Analysis of Samples. The quality of the selection of tourism samples can directly reflect the success of the experiment, so in the face of tourism indicators, the experiment must also test the degree of correlation between these tourism indicators and the tourist's sense of travel experience. Correlation analysis is to solve the problem of improper selection of these sample data. Through correlation analysis, the main characteristics can be made clear, and it can be clearly seen which indicators have a greater impact on the travel experience of tourists. As in Table 1, there are many people in each age group occupying the tourism indicators in this table, so all tourism indicators in the data in Table 1 are selected for the correlation analysis. Table 2 is the correlation analysis table of tourism indicators.

From the analysis of the data in Table 2, the degree of relevance of personalized tourism programs is the highest, and the degree of tourism hygiene is the lowest. However, the impact of each tourism index on the system is quite large, and the data dimension used in this experiment is not high. Therefore, the six tourism indicators in Table 1 are all used as sample index data for evaluating this tourism management experiment.

4.1.3. Validity Analysis of Samples. In order to test whether the tourism index is effective for the tourism management experiment, the experiment adopts the method of k-fold cross-validation. The experiment divides all data into k equal parts. Among them, $k-1$ is the test data of the experiment, and the remaining one is the test data. The experiment is carried out k times, and the test data of each experiment come from different groups, so that each group of data can be tested and verified. The result of the final test is the average of the k results. In this experiment, due to the low data dimension, the k of the experiment is set to 4, which is called 4-fold cross-validation test. The experiment will select 400 groups of data, of which 300 groups are test data, and the remaining 100 groups are test data. The experiments will be carried out on the wisdom tourism management model and the traditional tourism management model, respectively. The four-fold cross-check results of the experiment are shown in Table 3:

From the data in Table 3, in the smart travel experience of passengers, the best experience is the speed of ticket purchase, while the best experience in the traditional travel experience is tourism transportation. However, the average sense of travel experience of the two methods exceeds 75%, and both have a high sense of travel experience, so a comparative experiment between the two travel management modes can be carried out.

4.2. Comparative Experiment of Wisdom Tourism Management and Traditional Tourism Management. The wisdom tourism management model adopts the IoT and artificial intelligence technology to realize the automatic management of tourism parks. Through modern technology, the tourism information is delivered to the hands of those who need it as much as possible, while the traditional tourism management mode still adopts the way of handing out flyers and tour guides. The experiment will conduct a detailed comparative analysis of three aspects: the degree of tourism resource development, the economic changes around the tourist area, and the sense of travel experience of tourists.

4.2.1. Comparative Experiment of Tourism Resource Development Degree. To measure the quality of a tourism

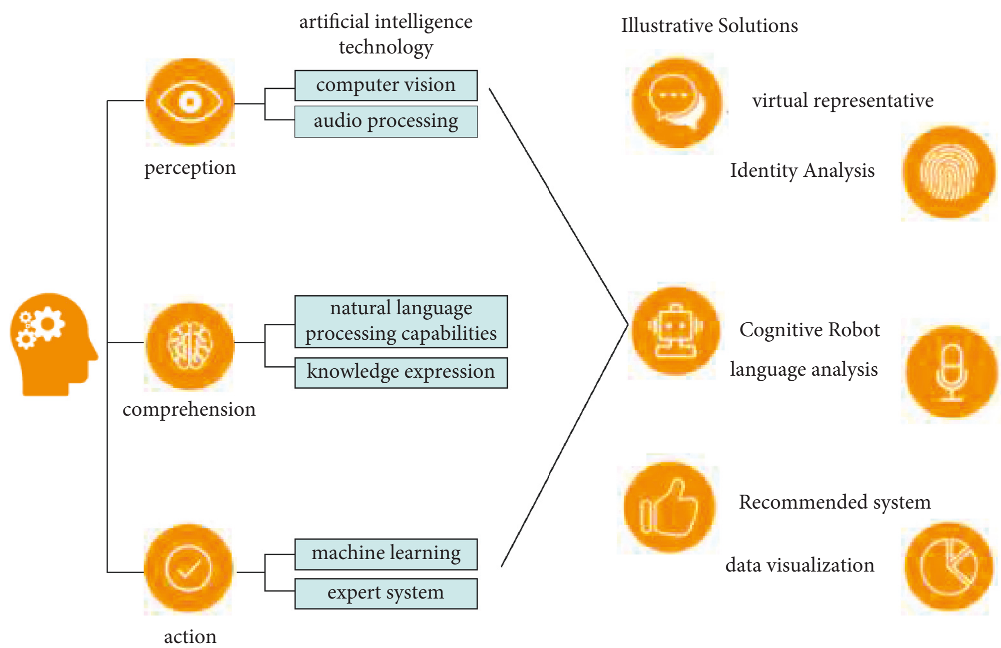

Figure 6: AI module diagram.

Table 1: Statistics of tourism indicators.

Tourism indicators	Young people (%)	Middle-aged (%)	Elderly (%)
Ticket purchase speed	80	60	60
Personalized travel plan	90	60	30
Travel information dissemination	80	68	45
Tourist traffic	85	90	86
Travel hygiene	70	53	45
Security problem	60	70	75

Table 2: Tourism index correlation analysis table.

Number of sample groups	Tourism indicators	Relevance
1	Ticket purchase speed	0.166
2	Personalized travel plan	0.216
3	Travel information dissemination	0.116
4	Tourist traffic	0.291
5	Travel hygiene	0.041
6	Security problem	0.166

Table 3: Cross-check result table.

Tourism indicators	Smart travel experience (%)	Traditional travel experience (%)
Ticket purchase speed	95.3	75.7
Personalized travel plan	98.8	78.5
Travel information dissemination	94.4	65.4
Tourist traffic	75.6	86.9
Travel hygiene	86.0	76.0
Security problem	84.9	69.9
Average	89.2	75.4

management model, the degree of tourism resource development is a very important point. The actual tourism resource development degree refers to the proportion of the tourism development resources developed by the tourism area and provided to the outside world in the total tourism resources. The experiment adopts the control variable method, and selects two parks with similar tourism resources for comparative experiments. One of the parks adopts the smart tourism management mode, and the other circular zone adopts the traditional tourism management mode. According to the development degree of tourism resources, the experimental tourism resources are divided into natural landscape resources and human landscape resources. Natural landscape resources include four categories: landform, hydrology, climate, and biology. Human landscape resources include cultural attractions, cultural traditions, folk customs, sports, and entertainment. The tourism resources are shown in Table 4.

The experiment will select 10 professional tourism survey teams and divide them into two teams to survey the development degree of tourism resources on the smart tourism management mode and the traditional tourism management mode in turn. Through data statistics, the

Table 4: Tourism resource table.

Natural scenery resources	Human landscape resources
Landform	Cultural attractions
Hydrology	Cultural tradition
Climate	Folk customs
Biology	Sports entertainment

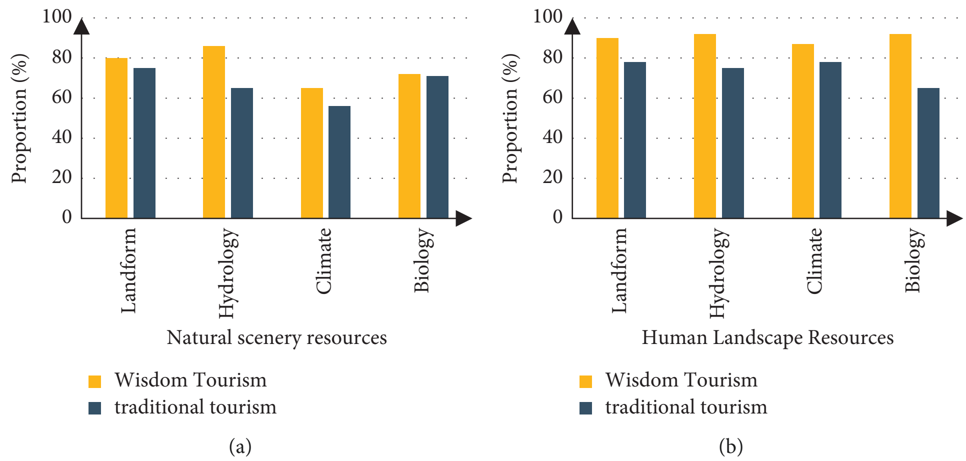

Figure 7: Tourism resource development degree map. (a) Development degree map of natural landscape resources. (b) Development degree map of human landscape resources.

tourism resource development degrees of the two tourism management modes are shown in Figure 7.

From the data in Figure 7, the wisdom tourism management model is much better than the traditional tourism management model in terms of both the development of natural landscape resources and the development of human landscape resources.

4.2.2. Comparative Experiment of Surrounding Economy of Tourist Area. Another criterion to measure the quality of a tourism management is the development of the surrounding economy of the tourism area. There are two purposes of developing tourism: one is to relax people's body and mind. The other is to promote the development of surrounding economies through tourism development. After all, the tourist areas are relatively remote, and the effective use of tourism can greatly promote the development of the local economy. For this reason, the experiment will compare the economic changes around the tourist area for 12 months, and observe the impact of the two models on the surrounding economy of the tourist area. The economic changes around the tourist area are shown in Figure 8.

From the analysis of Figure 8(a), the average monthly growth rate of smart tourism in the first half of the year is 50%, while the average monthly growth rate of traditional tourism in the first half of the year is 10%. After 6 months of changes, the smart tourism management model brings twice the economy to the surrounding area than the traditional tourism management model. In figure 8(b), the overall economic trend is like that in figure 8(a). However, since the second half of the year is the off-season for tourism, the economic growth rate will be lower than that in the first half of the year.

4.2.3. Comparative Experiment of Tourism Experience. The most direct feeling of tourists on tourism, that is, the sense of tourism experience can best reflect the success of a tourism model. There are only four aspects that affect the travel experience of tourists: clothing, food, housing, and transportation. Clothes represent shopping in tourist areas, food represents food and beverage issues in tourist areas, accommodation represents accommodation issues in tourist areas, and transportation represents travel issues for tourists. Because people of different ages have different understandings of tourism experience, in order to ensure the reliability of the experiment, 300 people are selected for the experiment, including 100 young people, 100 middle-aged people, and 100 elderly people. The experimental results of the sense of travel experience are shown in Figure 9.

From the analysis of Figure 9(a), in the wisdom tourism management model, the young people's favorable impression of all aspects of experience is above 90%, while the average favorable impression of all aspects of the traditional tourism management model is 50%. In the figure 9(b), the middle-aged people's sense of travel experience under the smart travel management model is about 80%, and the traditional travel management experience is almost unchanged. In the figure 9(c), the sense of travel experience of the elderly under the smart travel management model has

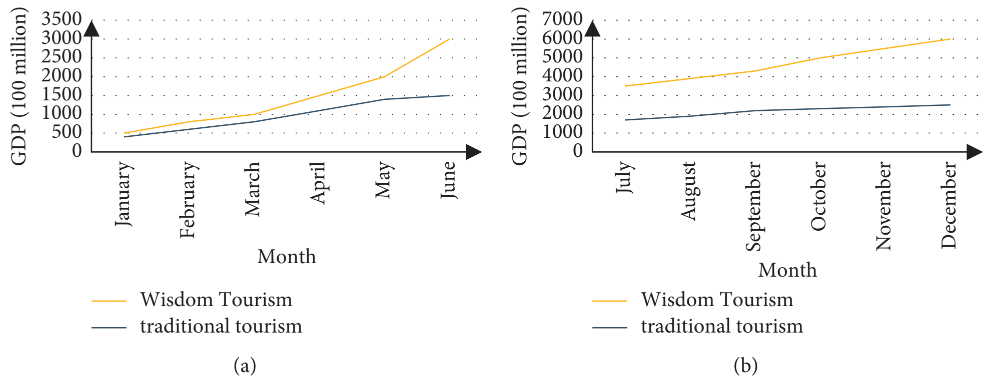

FIGURE 8: Economic changes around tourist areas. (a) Economic changes in the first half of the year. (b) Economic changes in the second half of the year.

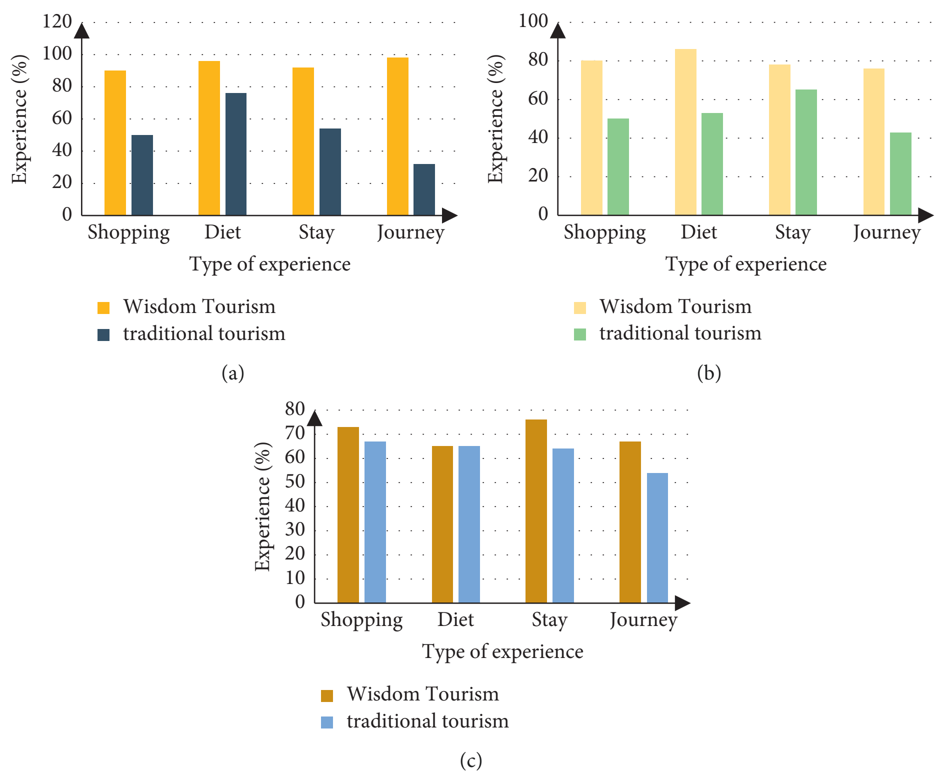

FIGURE 9: Sense of travel experience (a) Travel experience map of young people .(b) Travel experience map of middle-aged people. (c) Tourist experience map of the elderly.

dropped to about 70%, and the sense of traditional travel management experience remains unchanged.

4.2.4. Experimental Analysis. In order to compare the wisdom tourism management mode and the traditional tourism management mode, the experiment is carried out from the three dimensions of tourism resource development, the surrounding economy of the tourist area, and the sense of tourism experience. In terms of tourism resource development, the development degree of smart tourism management model accounts for 82.8% of the total tourism resources, while the traditional tourism management model accounts for 70.1% of the total tourism resources. In the surrounding economy of tourist areas, the average economic growth rate of the wisdom tourism management model is 50%, while the average growth rate of the traditional tourism management model is 10%. In terms of tourism experience, the average favorability of the wisdom tourism management model is 85%, while the favorability of the traditional tourism management model is 50%. And in terms of the convenience level of the use of the tourism management model, the average convenience rate of passengers in the wisdom tourism management model is 80%. The average

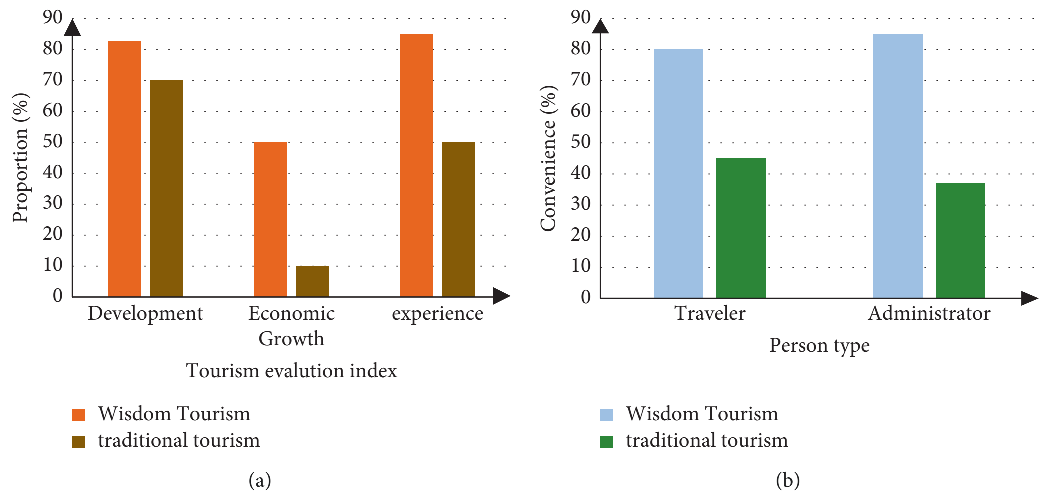

FIGURE 10: Average experimental results of two tourism management models. (a) Multi-dimensional comparison diagram of tourism modes. (b) Convenient diagram of tourism modes.

convenience rate for administrators is 85%. The average passenger convenience rate of the traditional tourism management model is 45%. The average convenience rate for administrators is 37%. The average experimental results of the two tourism management modes are shown in Figure 10.

5. Discussion

With the improvement of people's living standards, the tourism industry has gradually emerged in recent years, but the traditional tourism management model is very slow in purchasing and issuing tickets, and most of the guided tours are boring. Using the IoT, cloud computing, artificial intelligence, and other technologies to optimize the tourism management level can make the tourism management model intelligent, facilitate travelers to travel, and make good use of tourism resources as much as possible. The wisdom tourism management model has the advantages of being easy to use, diversified travel functions, and better travel experience. Through the Internet of Things and other technologies, it can maximize the help of people's wisdom tourism.

6. Conclusions

The following conclusions are drawn by comparing the wisdom tourism management model with the traditional tourism management model. (1) Compared with the traditional tourism management model, the wisdom tourism management model can develop more tourism resources. In the same tourist area, the wisdom tourism management mode develops 12.7% more tourism resources than the traditional tourism management mode. At the same time, in the same tourist area, the GDP of the wisdom tourism management model in one year is 1.4 times higher than that of the traditional tourism management model. (2) In terms of tourism experience, the general favorability of the wisdom tourism management model is better than that of the traditional tourism management model, and the younger the experimental population, the better the favorability of the wisdom tourism management model, up to 98%. And the wisdom tourism management mode is better than the traditional tourism management mode in terms of ease of use for passengers and administrators. However, the wisdom tourism management model still has shortcomings. The development of the Internet can easily lead to false information on the Internet. When tourists go to travel, it is easy to find the problem of inconsistent online and offline descriptions, resulting in a very poor travel experience. Therefore, while developing a wisdom tourism management model, it is necessary to ensure the authenticity of the information released by the tourism party as much as possible, which will be the direction of future research.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] V. Subramaniyaswamy, G. Manogaran, R. Logesh et al., "An ontology-driven personalized food recommendation in IoT-based healthcare system," *The Journal of Supercomputing*, vol. 75, no. 6, pp. 3184–3216, 2019.
[2] J. P. Kuilboer, "Big data and innovation in tourism, travel, and hospitality: managerial approaches, techniques, and applications," *Computing Reviews*, vol. 61, no. 5, pp. 175-176, 2020.
[3] I. Mountasser, B. Ouhbi, B. Frikh, and F. Hdioud, "Big data research in the tourism industry: requirements and challenges," *International Journal of Mobile Computing and Multimedia Communications*, vol. 11, no. 4, pp. 26–41, 2020.
[4] A. R. Alaei, S. Becken, and B. Stantic, "Sentiment analysis in tourism: capitalizing on big data," *Journal of Travel Research*, vol. 58, no. 2, pp. 175–191, 2019.

[5] D. Ayuni and B. Priyana, "Analysis of Mount rinjani national park's carrying capacity using sustainable tourism management model," *International Journal of Scientific & Technology Research*, vol. 8, no. 12, pp. 3951–3957, 2019.

[6] E. C. L. Muniz, G. A. Dandolini, A. A. Biz, and A. C. Ribeiro, "Customer knowledge management and smart tourism destinations: a framework for the smart management of the tourist experience – SMARTUR," *Journal of Knowledge Management*, vol. 25, no. 5, pp. 1336–1361, 2021.

[7] A. Wijayanti, J. Damanik, C. Fandeli, and S. Sudarmadji, "Analysis of educational tourism management at smart park, yogyakarta, Indonesia," *MIMBAR Jurnal Sosial dan Pembangunan*, vol. 34, no. 1, pp. 11–23, 2018.

[8] H. B. B. D. Freitas and L. Mendes Filho, "Smart tourism destinations initiatives in natal-RN city: a qualitative approach," *Revista Rosa dos Ventos - Turismo e Hospitalidade*, vol. 12, no. 4, pp. 997–1016, 2020.

[9] F. Bouchon and M. Rauscher, "Cities and tourism, a love and hate story; towards a conceptual framework for urban overtourism management," *International Journal of Tourism Cities*, vol. 5, no. 4, pp. 598–619, 2019.

[10] S. C. Wang, M. T. Torosoff, R. P. Smith, and A. D Coates, "Streptococcus pyogenes meningitis and endocarditis in a patient with prosthetic mitral valve," *Journal of cardiology cases*, vol. 16, no. 3, pp. 82–84, 2017.

[11] 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.

[12] Y. D. Beyene, R. Jantti, O. Tirkkonen et al., "NB-IoT technology overview and experience from cloud-RAN implementation," *IEEE Wireless Communications*, vol. 24, no. 3, pp. 26–32, 2017.

[13] C. Sisavath and L. Yu, "Design and implementation of security system for smart home based on IOT technology," *Procedia Computer Science*, vol. 183, no. 2, pp. 4–13, 2021.

[14] X. Zhang, Z. Mao, Y. Huang, Z. Zhang, and J Yao, *Channels*, vol. 14, no. 1, pp. 246–256, 2020.

[15] L. E. Alvarezdionisi, "Envisioning skills for adopting, managing, and implementing big data technology in the 21st century," *International Journal of Information Technology and Computer Science*, vol. 9, no. 1, pp. 18–25, 2017.

[16] Z. Li, H. Shen, W. Ligon, and J. Denton, "An exploration of designing a hybrid scale-up/out Hadoop architecture based on performance measurements," *IEEE Transactions on Parallel and Distributed Systems*, vol. 28, no. 2, pp. 386–400, 2017.

[17] A. L. Buczak and E. Guven, "A survey of data mining and machine learning methods for cyber security intrusion detection," *IEEE Communications Surveys & Tutorials*, vol. 18, no. 2, pp. 1153–1176, 2016.

[18] V. Chaurasia and S. Pal, "A novel approach for breast cancer detection using data mining techniques," *Social Science Electronic Publishing*, vol. 3297, no. 1, pp. 2320–9801, 2017.

[19] A. Y. Alanis and Y. Alma, "Electricity prices forecasting using artificial neural networks," *IEEE Latin America Transactions*, vol. 16, no. 1, pp. 105–111, 2018.

[20] S. Li, M. Fairbank, C. Johnson, D. C. Wunsch, E. Alonso, and J. L. Proao, "Artificial neural networks for control of a grid-connected rectifier/inverter under disturbance, dynamic and power converter switching conditions," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 25, no. 4, pp. 738–750, 2014.

[21] A. Javed, H. Larijani, A. Ahmadinia, and D. Gibson, "Smart random neural network controller for HVAC using cloud computing technology," *IEEE Transactions on Industrial Informatics*, vol. 13, no. 1, pp. 351–360, 2017.

[22] Z. Li, "Application of a resource-sharing platform based on cloud computing technology," *Agro Food Industry Hi-Tech*, vol. 28, no. 1, pp. 2205–2209, 2017.

[23] M. Panahiazar, N. Chen, D. Lituiev, and D. Hadley, "Empowering study of breast cancer data with application of artificial intelligence technology: promises, challenges, and use cases," *Clinical & Experimental Metastasis*, vol. 39, no. 1, pp. 249–254, 2021.

[24] H. Horii, "Advancement of vehicle occupant restraint system design by integration of artificial intelligence technologies," *International Journal of Transport Development and Integration*, vol. 5, no. 3, pp. 242–253, 2021.

[25] A. V. Raknys, D. Gudelis, and A. Guogis, "The analysis of opportunities of the application of big data and artificial intelligence technologies in public governance and social policy," *Socialinė Teorija Empirija Politika ir Praktika*, vol. 22, no. 6, pp. 88–100, 2021.