

Retraction

Retracted: Fuzzy Neural Network-Based Evaluation Algorithm for Ice and Snow Tourism Competitiveness

Complexity

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] Y. Zhao, Q. Zhu, and J. Bai, "Fuzzy Neural Network-Based Evaluation Algorithm for Ice and Snow Tourism Competitiveness," *Complexity*, vol. 2021, Article ID 9980528, 11 pages, 2021.

Research Article

Fuzzy Neural Network-Based Evaluation Algorithm for Ice and Snow Tourism Competitiveness

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This paper researches and analyzes the evaluation of the competitiveness of ice and snow tourism, uses the improved fuzzy neural network algorithm to process the system flow diagram of ice and snow tourism development through the function and characteristics of the power system of ice and snow tourism, and finally selects more than 40 indicators of the three subsystems of resources, economy, and culture. Based on the construction of cloud fuzzy neural network model, the above method is used for experimental comparison analysis, and experiments are conducted through University of California Irvine (UCI) dataset and engineering examples to compare with the traditional cloud model, fuzzy neural network, and BP neural network to analyze the operation efficiency, accuracy rate, and several rules of the algorithm. Through the experimental comparative analysis, the cloud fuzzy neural network can fully take into account the randomness and fuzziness of the data, optimize the generation of cloud rules, avoid multidimensional rule disasters, and ensure the operational efficiency of the algorithm; the accuracy rate of the algorithm is improved relative to that of the traditional technology, and it applies to a variety of datasets. And the software is used to test the ice and snow tourism industry system dynamics model to realize the correctness and robustness testing of the model. After the constructed model can reflect the real situation within the error range, the final policy simulation of the model is carried out.

1. Introduction

With the continuous improvement of the living standard of the residents, people are pursuing more spiritual life enrichment under the condition of material base satisfaction [1]. Ice and snow tourism as a new model of tourism development is gradually gaining popularity; in process of tourism, people can participate in ice and snow sports and deeper experience ice and snow culture and other rich connotations of ice and snow tourism activities to meet the diversified needs of tourists. Enhanced competitiveness can further improve the ice and snow tourism industry chain so that the regional economy accelerates development [2]. The development of ice and snow tourism and transportation

industry, manufacturing, accommodation, catering, and other industries are closely related, and ice and snow tourism can enhance the economic effect, while the development of related industries will also play a driving role.

For snow and ice, ice tourism and winter tourism have always been popular for scholars to study; however, most of the current research results are only limited to a certain topic in the development of ice and snow tourism and rarely involve the intrinsic connection between the elements affecting the development of ice and snow tourism, lacking the systematic information research that integrates the whole situation and takes into account the elements [3]. By analyzing the time distribution characteristics of ice and snow tourism cities, we can understand the peak and low seasons

of destination tourism network attention, make accurate predictions and corresponding reception measures for the real passenger flow, do a good job of peak season tourism warning, enrich off-season tourism products, implement refined management of ice and snow tourism destinations, and promote the sustainable development of ice and snow tourism destinations. It can also further verify the relationship between the information flow of network attention and the real tourism flow and provide a reference for passenger flow management [4].

The analysis of the ice and snow tourism market information by applying the system dynamics software has yielded relatively successful simulation data, so this method is generalizable and can be applied to ice and snow tourism market research, and the determination of some variables and parameters in the system can be adjusted appropriately according to the development status of different regions. The utility of ice and snow tourism market intelligence is that it is the foundation and basis for the investment decisions of the government and developers and is a precursor and prerequisite for decision-making. From the perspective of system science, we construct a system dynamics model for ice and snow tourism market information research and use the modeling software Genism PLE to realize simulation results based on existing market information, verify the validity of the model, and provide reliable predictions and feasibility recommendations through the analysis of multiscenario simulation results of system dynamics, so that the government and tourism developers can better grasp investment opportunities and directions. This will enable the government and tourism developers to better grasp the investment opportunities and directions, make decisions to avoid risks, improve the revenue, enhance the competitiveness of the tourism industry, and create higher value for the tourism economy. Our improved fuzzy neural network algorithm is the first research on the competitiveness of ice and snow tourism, which is in-depth analysis of ice and snow tourism, and it has strong accuracy.

2. Related Works

Wagner et al. analyzed more than 150 ski resorts in the European Alps consecutively, eventually defining 15 impact factors using Parandokan, Turkey, and Alps, Switzerland, as examples, and drawing statistical tables to analyze experimental innovation in the ski industry in economic development [5]. Bariscil used the Niseko region of Hokkaido, Japan; Allen and Daniel conducted interviews with regional government officials and residents who were already employed in the region, using the ski economy of Niseko, Hokkaido, Japan, as an example [6]. The rapid shift to a globalized tourism model in the region is examined, and the reasons for this shift, the positive and negative impacts on surrounding towns, and what other Japanese villages and cities can learn from the Niseko development experience are discussed [7]. Belonozhko et al. use system dynamics modeling to predict tourism demand for green ecology [8]. Bulatovic et al. argue that system dynamics is a method capable of capturing the dynamic behavior of complex

systems over time and that tourism is a complex system with a large number of interactions between its various sectors, providing tourism policymakers and regulation managers with the opportunity to conduct strategic analysis and develop policies at different strategic analysis and policy formulation at different levels [8]. Therefore, it is recommended that the system dynamics model of sustainable development be applied to tourism to promote a comprehensive understanding of the complexities of tourism and to assist in the development of more effective policies [9]. The research on tourism cities started earlier, the research is more detailed and in-depth, the research method mostly adopts qualitative description and empirical analysis, and the research content focuses on exploring the theories related to tourism cities and analyzing the characteristics and influencing factors of the competitiveness of tourism cities through empirical evidence.

Fuzzy neural networks are an intelligent combination of fuzzy theory and neural networks to achieve the processing and representation of the ambiguity present in the data through the affiliation function and fuzzy neurons [10]. Tsuji combines evolutionary computation with neural networks and proposes a multicomponent class algorithm that effectively adapts the affiliation functions of fuzzified and DE fuzzifiers to the dataset and is successfully tested using real economic data [11]; Zhao proposes a new RL neurofuzzy model design for inline sequential learning evolution and develops a dynamic evolutionary fuzzy neural network (DENFIS) function approximation REL system [12]; Liu applied fuzzy neural networks to environmental safety assessment and achieved good results by using the feature that fuzzy neural networks can handle fuzzy phenomena [13]. Also, there are many improved algorithms of fuzzy neural networks that improve the performance of the algorithms [14]. Xu argued that the factors involved in the capacity of the tourism environment are complex and numerous, and the factors in the general environment have mutual checks and balances, which are difficult to quantify in terms of the overall impact on the whole body [15]. This kind of environment should use the principle of system dynamics to conduct a comprehensive study of the complex system [16].

Although the combination of fuzzy theory and neural network improves the situation, there is still the defect that it cannot handle the randomness and fuzziness of the data at the same time, and the process of determining the affiliation function needs to be determined artificially based on rich experience, which is influenced by subjective factors. The cloud model has great advantages in dealing with uncertainty and can realize the two-way conversion of qualitative data and qualitative concepts, but its method of finding numerical features is often determined according to the boundary of the data and cannot consider the whole data.

3. Fuzzy Neural Network Ice and Snow Tourism Competitiveness Evaluation Analysis

3.1. Improved Fuzzy Neural Network Algorithm Design. The interconversion between data and concepts is crucial in the expression of results. The cloud model reflects the

distribution of data through the degree of certainty, and as the value of the degree of certainty approaches 1, the more likely the data belongs to this class or interval, and thus the uncertainty of the data can be expressed [17]. To use this property of cloud model in the fuzzy neural network, the fuzzy neural network algorithm based on cloud model is proposed to avoid the problems of overfitting and local optimal solutions by using numerical features to initialize the fuzzy neural network instead of the affiliation function with the degree of certainty [18]. At the same time, we propose a method to find the numerical features of the cloud model, introduce the concept of cloud rules to determine the boundary, and improve the traditional “soft and” algorithm, to establish a new network model structure, cloud fuzzy neural network.

The cloud model is introduced into the fuzzy neural network, and the cloud model is used to calculate the degree of certainty instead of the artificially determined affiliation function to reduce the interference of human factors. The accuracy of the cloud fuzzy neural network is ensured through Gaussian curve fitting and fuzzy clustering to obtain the numerical features of the cloud model, an improved “soft sum” algorithm is used for logical soft computation, and the conditional cloud generator is used to construct uncertainty inference, while the cloud rules are simplified by using the method of cloud rule determination to avoid the “rule disaster” due to a large amount of data. The paper constructs a cloud fuzzy neural network structure. The structure of the cloud fuzzy neural network is divided into six layers: the input layer, the clouded deterministic layer, the rule layer, the implicit layer, the inverse clouded layer, and the output layer. The topology of the network is shown in Figure 1.

The entry point of the cloud fuzzy neural network is responsible for passing the data to the clouding layer. The number of input nodes is determined by the number of conditional attributes that affect the output results.

$$\begin{aligned} f_i^1 &= x_i^2 + 2, \\ x_i^2 &= f_i^2, \quad (i = 1, 2, 3, \dots, n). \end{aligned} \quad (1)$$

The data are processed for uncertainty and the conceptual cloud model is reduced approximately. Each node is a conditional cloud generator that represents the linguistic variable values and calculates the certainty of the quantitative values.

$$\begin{aligned} x_{ij}^2 &= \exp\left(\frac{(x_i - Ex_{ij})^4}{4(En_{ji})^2}\right) (i, j = 1, 2, 3, \dots, n), \\ \mu_{ij} &= \exp\left(\frac{(x_i - 1)^4}{4(En_{ji})^2} - \frac{(x_j - 1)^4}{4(En_{ji})^2}\right). \end{aligned} \quad (2)$$

The executive function of each layer shows that CM-FNN is a network-type structure, and all nodes are uncertainty neurons, which is more suitable for dealing with data uncertainty than the traditional network-type fuzzy neural network.

The learning algorithm of CM-FNN adopts the more mature BP algorithm. In the process of network training that involves the initialization of weights and parameter adjustment, the traditional method initializes the weights by selecting random, as small as possible values, which easily leads to long network training time, too many iterations, and the existence of easy to fall into local optimal solutions [19]. In the current study, research scholars proposed optimizing the BP algorithm using genetic algorithm, particle swarm algorithm, annealing algorithm, and so on, but these algorithms are often too complicated in determining parameters and initialization. To address the above limitations, the BP algorithm is optimized using the cloud model in the network model to make the network converge quickly and obtain the global optimal solution.

Let the number of learning samples be R , the output of the network for the r th learning sample be t_r , the desired output be r_r , and the target learning function of the network be defined as

$$E = \frac{1}{2} \sum_{r=1}^R (t_r - r_r)^2 (t_r + r_r)^2. \quad (3)$$

The initialization of the weights and thresholds of the BP algorithm generally uses a normal distribution with a mean of 0 and a variance of 1. It follows that the normal cloud model can be initialized for the BP algorithm, with the expectation (Ex) as the initial weight and the entropy (En) as the initial threshold. The steps of the algorithm are as follows: set the weights Ex and threshold En of the network; input the learned samples to each layer in turn; calculate the output of each layer; find the backpropagation error of each layer; record the learned samples until all samples are learned; calculate the error between the actual result and the output result; execute the step if it does not meet the requirement; and output the result if it meets the requirement; in the cloud fuzzy neural network, the cloud model in the determinacy function is used as the activation function of CFNN, while the expectation (Ex) and entropy (En) of the cloud model are used as the initial weights and threshold; then, the adjustment of the weights is different from the traditional BP algorithm, and the adjustment formula is as follows:

$$\begin{aligned} Ex_{ij}(k+1) &= Ex_{ij}(k) - \beta \frac{\partial^2 E}{\partial^2 Ex_{ij}} (i, j = 1, 2, 3, \dots, n), \\ Ex_{ij}(k+1) &= Ex_{ij}(k) - \beta \partial^2 \frac{\partial^2 E}{\partial^2 Ex_{ij}} (i, j = 1, 2, 3, \dots, n). \end{aligned} \quad (4)$$

A fuzzy neural network based on a cloud model is the process of constructing a new network model by introducing the theory related to a cloud model in a fuzzy neural network. Firstly, to address the deficiencies in the current cloud model research, the use of Gaussian fitting and fuzzy clustering is proposed to calculate the numerical characteristics of the cloud model; secondly, to further reduce the

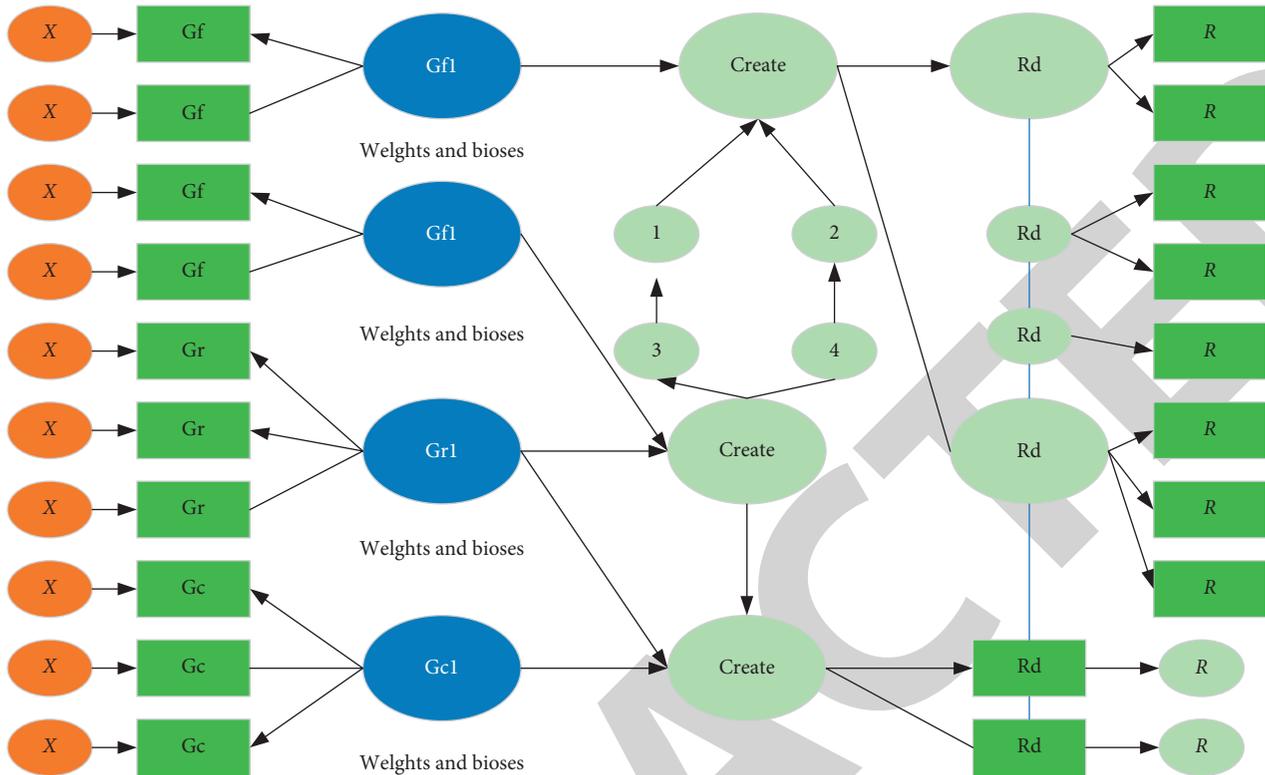


FIGURE 1: Topological model of cloud fuzzy neural network structure.

human influence in the cloud inference process, the method of projection mapping is used instead of the degree adjustment parameter; finally, to ensure the operational efficiency of the algorithm and reduce the number of rules, the rule simplification is performed using the cloud rule sure boundary. The initialization with cloud fuzzy neural network no longer uses random values, but the expectation and entropy of the cloud model; therefore, the dataset is pre-processed and normalized before performing the calculation of the cloud model numerical features. When error adjustment is performed, the adjustment of weights is converted to the adjustment of cloud model expectation and entropy, which reduces the number of error iterations to a certain extent and thus improves the operational efficiency of the algorithm.

The overall number of datasets and data dimensionality affect the running time of the algorithm. The introduction of rule simplification and the neural network has improved the efficiency of the algorithm. This section introduces how to build the cloud fuzzy neural network and gives the topology of the cloud fuzzy neural network, detailing the input and output of each layer and the role played by each layer; the learning algorithm of the fuzzy neural network is optimized by the cloud model, and the optimized weight adjustment formula is given; the algorithm idea and the operation process of the algorithm are introduced in detail, the flowchart of the algorithm operation is given, and the analysis of the cloud fuzzy neural network is given.

3.2. Ice and Snow Tourism Competitive Evaluation Analysis. With the rapid development of the Internet, the tourist city, as an important tourist destination, carries many tourists, which requires the transformation and upgradation of its tourism industry. The intelligent scenic spot through the destination information provided by the destination's network platform or a third-party platform, network platform, provides intelligent information to help tourists make decisions, help the destination to accurately measure the flow of tourists, and carry out accurate regulation within the destination. Through the interaction of intelligent information between tourists and destinations, tourist destinations can achieve joint growth of tourists and profitability, optimal use of scenic resources, and maximum ecological protection. Scenic areas can also give visitors an extraordinary information experience through on-site augmented reality (AR) virtual reality (VA) technology that gives the scenic area information content beyond reality [20].

Travel agents, as traditional providers of travel information and intermediary services, enable intelligent perception and easy use of travel information by human beings through technology updates that prompt service iterations. The new model facilitates time-saving for tourists, can provide clear travel guidance services, and facilitates the matching of tourists and suppliers. Not only can it provide a full range of services in multiple languages and currencies, but it also helps tourists solve the problem of information overload, and the whole design is entirely based on tourists'

needs as the primary consideration. A smart travel agency can multimodel to adapt to market demand according to different users and different markets. The use of intelligent information to improve management efficiency and form core competitiveness can provide a sustainable space for the development of the hotel industry. Smart hotels directly provide information services and personalized services for customers. Smart hotels are the application of intelligent technology in the hotel industry, which can expand customer sources and increase market share through personalized and diversified services, thus establishing an efficient and intelligent market image of hotels, enhancing core competitiveness, and continuously stimulating innovation in hotel management mode.

Ice and snow tourism development emphasize the protection of ice and snow tourism resources while maximizing economic benefits, while also developing and holding a variety of ice and snow tourism projects and activities, which will bring the development of ice and snow tourism to its fullest potential. Playing economic benefits at the same time, the full use of ice and snow tourism resources will inevitably reduce the abundance of ice and snow resources, the resource environment to produce huge pressure, resulting in a certain number of tourist trips down, which is a negative feedback mechanism [21]. On the other hand, the resource subsystem continuously absorbs the white waste generated during travel, leading to the destruction of the ecological environment, affecting the travel experience of tourists, and reducing the number of tourist arrivals, which is also a negative feedback mechanism. On the other hand, the increase in government fiscal expenditures and the increase in investment in tourism promotion and ecological protection have improved the number of tourists to a certain extent, stimulating the increase in the proportion of residents participating in the ice and snow tourism industry, thereby increasing the total GDP. The construction of ice and snow tourism service facilities has been strengthened one after another, and the satisfaction of residents and tourists has increased, which is a positive feedback mechanism. The condition of infrastructure directly affects the condition of ice and snow tourism resources, the visibility of local ice and snow tourism, and tourism experience, which in turn affects the number of ice and snow tourism. Therefore, the infrastructure of ice and snow tourism requires continuous investment from the government to increase the number of tourism enterprises (accommodation, catering, and travel agencies), increase the number of people working in ice and snow tourism, and increase the national economic income, which in turn leads to the increase of total GDP. The causality diagram of the resource subsystem is shown in Figure 2.

The economic subsystem is a causal feedback purpose mainly reflected in several indicators such as total DGP and disposable income of residents and tourism employment rate. Higher government fiscal spending, more investment in tourism promotion, environmental protection, and ice and snow tourism service facilities, attracts tourists to spend, increases local employment, and raises the disposable income of residents, which in turn raises the total GDP and

raises government fiscal spending, which is a positive feedback mechanism that is conducive to the development of the ice and snow tourism market. On the other hand, the residents are more satisfied, it will be better to receive and serve the visitors, the number of tourists further increased, the economic benefits created by related tourism enterprises such as catering, accommodation, travel agencies, and farmhouses will be improved, and the GDP contribution to local finances will achieve a quantitative breakthrough, so that the government has more sources of funding to serve the local infrastructure construction and so on, the conditions become better, and this is also a positive feedback mechanism. Of course, there is also a negative feedback mechanism; if the government does not make financial expenditure on snow and ice tourism, then the ecological damage to the environment will not be paid for; the residents and tourists will be less satisfied; the residents will reject the environmental pollution brought about by tourism; therefore, starting from the psychological resistance of lowering service standards, tourists will inevitably be reduced and the local economy will be depressed.

In the choice of variables of the economic subsystem, the main state variables of the system are selected as per capita ice and snow tourism consumption and ice and snow tourism income, which together reflect the state of the economic subsystem, the cumulative amount of ice and snow tourism income, and the fiscal revenue in time. Also, the auxiliary variables of the economic development subsystem include the number of relevant tourism employees, ice and snow tourism publicity investment, and ice and snow tourism service facilities investment. In the variable selection of the resource subsystem, the number of ice and snow tourism attractions and environmental protection expenditures are dominant, and the auxiliary variables include government infrastructure expenditures and capital investment in tourism. In the culture subsystem, the per capita disposable income of residents is selected as the main state variable reflecting this system, and the auxiliary variables include labor compensation of tourism services, business income of residents, related tourism employees, per capita labor compensation of related tourism enterprises, tourism-related industry employment ratio, and tourism investment rate. In this paper, the attributes of each variable are classified as shown in Table 1.

After the model is constructed, the simulation results of the model need to be compared with the actual results to check whether the model fits the historical values and future development trends and the actual, on this basis to ensure that the scenario analysis can simulate the future development trends. After the model is built, the simulation results and the actual results are analyzed to see how well the simulated values fit the historical values and whether the simulated scenarios match the actual development trend line.

4. Analysis of Results

4.1. Fuzzy Neural Network Algorithm Results in Evaluation Analysis. In this paper, we propose the use of Gaussian curve fitting and fuzzy clustering for the problem that the

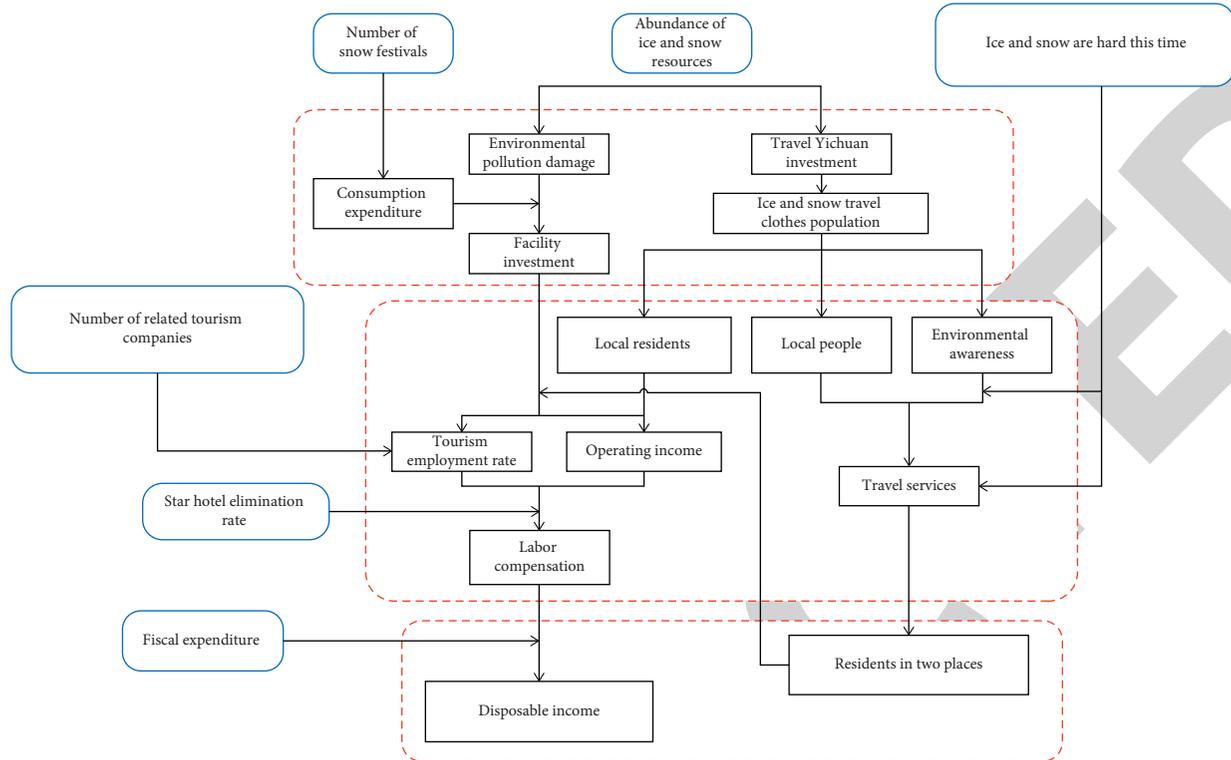


FIGURE 2: Ice and snow tourism market overall cause and effect diagram.

TABLE 1: Evaluation model main variables.

Variable type	Variable name	Number
State variables	Income from ice and snow tourism	6
Rate variable	Per capita consumption of ice and snow tourism	7
Constant	Operating income of residents	4
Auxiliary variable	Capital investment in tourism	6

method of determining the numerical characteristics of the cloud model is restricted by the type of data. Through the analogy of the degree of certainty and Gaussian function, the numerical characteristics of the cloud model are corresponding to the parameters of Gaussian function due to its similar formula structure and similar physical meaning, and the numerical characteristics of the cloud model are determined by finding the parameter values of Gaussian function. For small sample data, because the data are too small to reflect the distribution characteristics of the overall data, the clustering method is used to cluster the data into clusters, the center of each cluster is used as the expectation of the cloud model, and the entropy and superentropy of the cloud model are calculated by the matrix. To avoid the “rule disaster” in the cloud inference process, we propose the concept of cloud exact boundary rule and improve the “soft and” algorithm.

To verify whether CM-FNN has superiority, a comparative analysis with fuzzy neural network and BP neural network is conducted, the number of input nodes of all three neural networks is 5, the number of output nodes is 1, the maximum

number of iterations is set to 1000, and the error is set to 0.0001. Through several experiments, ten of them are selected to compare the accuracy of the algorithm. The accuracy comparison of the Winequality-red dataset is shown in Figure 3.

The experimental comparative analysis of cloud fuzzy neural network through the dataset is compared with the traditional BP neural network and fuzzy neural network, and it can be seen from Figure 3 that the cloud fuzzy neural network has the advantage of expressing uncertainty compared to BP neural network and fuzzy neural network, BP neural network has the lowest accuracy and cannot handle uncertainty, and the fuzzy neural network has accuracy compared to BP neural network but cannot take into account the randomness of the data. Cloud fuzzy neural network has improved accuracy compared to both algorithms. The dataset is randomly divided and several experimental sessions are conducted to verify whether the algorithm has stability. As seen in Figure 3, the cloud fuzzy neural network has the least degree of difficulties, indicating that the algorithm operates with small fluctuations in results but remains stable.

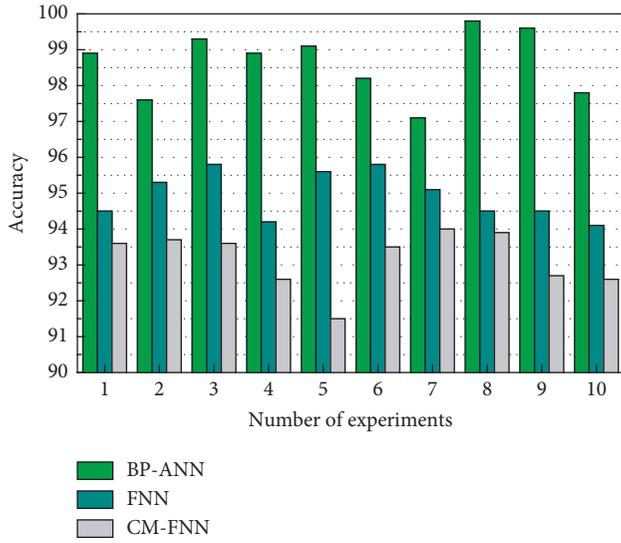


FIGURE 3: Accuracy comparison chart.

The running efficiency of the algorithm is also an important indicator of the algorithm's excellence. The time taken varies with the method technique used, and a comparison of the running times of the dataset under different algorithms is shown in Figure 4.

The running time can measure whether the algorithm is efficient or not. As can be seen from Figure 4, BP-ANN has the shortest running time among all network models and CM-FNN has the longest running time, which is because the process of generating cloud rules is more time consuming, which increases the overall algorithm's time complexity, but the time consumption is acceptable when comparing the advantages of uncertainty representation and the improvement of result accuracy. Therefore, combining cloud models with fuzzy neural networks can improve the processing of uncertainty data.

As shown in Figure 5, when the data in the dataset are relatively standard and there is no need to consider uncertainty, the accuracy of the cloud fuzzy neural network algorithm under the three methods is relatively similar; as the amount of data continues to increase, the golden mean method and the mean method gradually lose their advantages; especially when dealing with uncertain data, the accuracy decreases, while Gaussian fitting has a greater advantage in large datasets, which can count the distribution characteristics of all data. The accuracy of fuzzy clustering is also improved with the increase of sample size for small data samples. Thus, it can be proved that the cloud numerical features are crucial for the cloud model-related algorithm, which indirectly affects the accuracy of the overall algorithm.

During the computation of the cloud model, one data may trigger one or more cloud rules, and as the amount of data increases, the number of cloud rules increases dramatically, causing a great burden to the algorithm operation. To solve this problem, the cloud model is improved by using an algorithm to first reduce the number of rules generated by a bounded approach to build a cloud rule base and then improve the "soft-with" algorithm to reduce the human

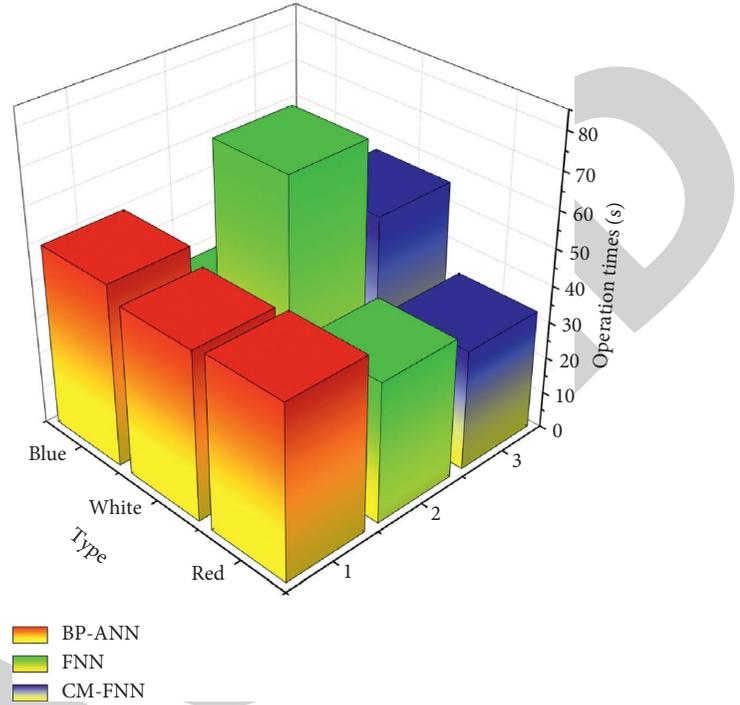


FIGURE 4: Comparison of algorithm running times for datasets.

influence. The runtime of the traditional cloud model and the improved cloud model is verified by the UCI dataset to prove the feasibility of the algorithm. The experimental results of the UCI dataset show that the improved cloud model and the related algorithms play a positive role in the accuracy of the CM-FNN, and the dataset is processed by numerical feature fitting and clustering, attribute simplification, and rule determination. The accuracy of the three methods is similar for small data samples with accurate data and no uncertainty expression. By comparing with the traditional "soft and" algorithm, it can be found that the cloud rules can reduce the running time of the algorithm, and the accuracy of the algorithm is relatively high with the increase of uncertainty and the number of data samples; by comparing with the traditional BP neural network and fuzzy neural network, it can be seen that the accuracy of CM-FNN in dealing with uncertain data is relatively high. It can be seen that CM-FNN can guarantee the accuracy of the algorithm when dealing with deterministic data, and the accuracy of BP neural network is lower when dealing with uncertain data, and CM-FNN has the highest accuracy and can maintain relative stability, and it shows the goodness of the algorithm more with the increase of data samples.

4.2. Analysis of the Results of the Evaluation of the Competitiveness of Ice and Snow Tourism. The tourism flow represented by the network attention is the precursor effect of the real tourism flow, so the analysis of the precursor effect has important guiding significance for the forecast of passenger flow, network marketing, and tourism product creation in ice and snow tourism cities. According to the change of the network attention degree with before and after the holiday, it

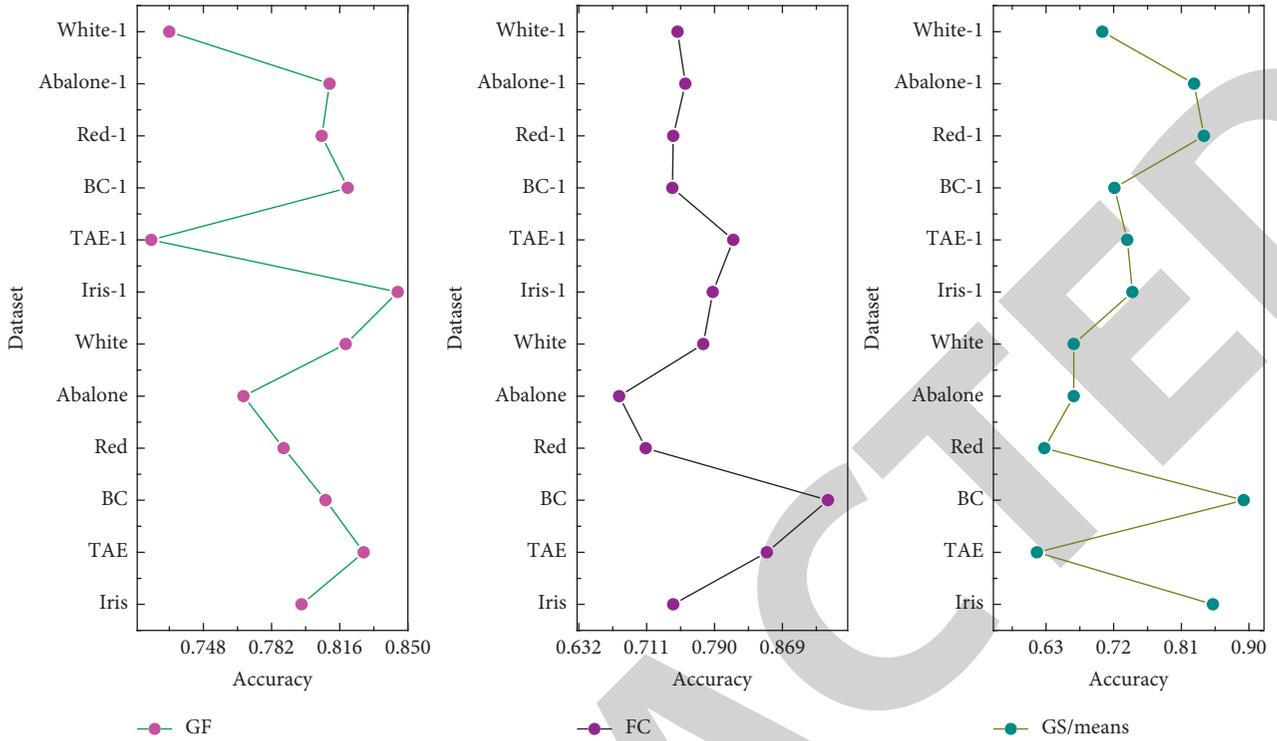


FIGURE 5: Effect of cloud digital feature determination method on accuracy.

can be learned that the network attention degree before the holiday is larger than that after the holiday, there will be a rapid rise before the holiday, a rapid decline during the holiday, and a slow rise after the holiday, but the peaks and troughs will not be higher than before the holiday, as shown in Figure 6. Specifically, the network attention starts to rise slowly from t_1 , reaches a peak at t_2 on the eve of the holiday, declines rapidly during t_2 - t_3 , and gradually rises again during t_3 - t_4 . The changing trend of network attention is highly consistent with people's information demand before and after traveling, that is, people will search for information related to travel destinations before traveling, when the demand for travel information is high and the attention is high; people have gone out to travel during holidays, and the network attention drops rapidly; after the completion of travel activities, the demand for information is low, and the attention rises slowly, but the peak is lower than that before the holidays. This also indicates to a certain extent that the peak of real tourists is usually after the network attention.

In terms of time distribution characteristics, it has obvious seasonal characteristics and has different characteristics before and after different holidays, so climate comfort and holiday system are selected as the influencing factors of time distribution of network attention; in terms of spatial distribution characteristics, according to the above study, network attention is influenced by the level of economic development of the source place, the degree of network development, and the distance between two places, considering other possible related factors. In terms of spatial distribution characteristics, according to the above study, network attention is influenced by the level of economic

development, the degree of network development, and the distance between two places, and other possible related factors such as population size and education level on network attention are also considered.

The portal layer of the ice and snow tourism platform needs to establish a unified data interface and realize rapid integration of various demands gathered from various channels through core algorithms; second, the ice and snow tourism platform resource gathering mechanism ensures that the ice and snow tourism platform can gather the required key core resources, take into account the reputation of the resource service provider, the cost of using resources, consumer preferences, and other factors, integrate different resources to form service modules, and sort them according to certain rules; third, consumers enter the entrance of the ice and snow tourism platform and find various resources that meet consumer requirements through different ways such as exact matching, fuzzy matching, and random matching. It should be noted that if there are no services on the ice and snow tourism platform that match the needs of tourists, that is, the core needs of tourists also cannot be met confirmed as matching failure, at this time, through the platform's early warning mechanism, early warning information is presented to the platform operator, resource service providers, and platform management subjects. According to the degree of urgency and importance of resources, the corresponding resource pooling scheme is formulated, the composite system synergy degree calculation is carried out sequentially according to the designed synergy degree calculation steps, and the entropy value and difference coefficient of each index are shown in Figure 7.

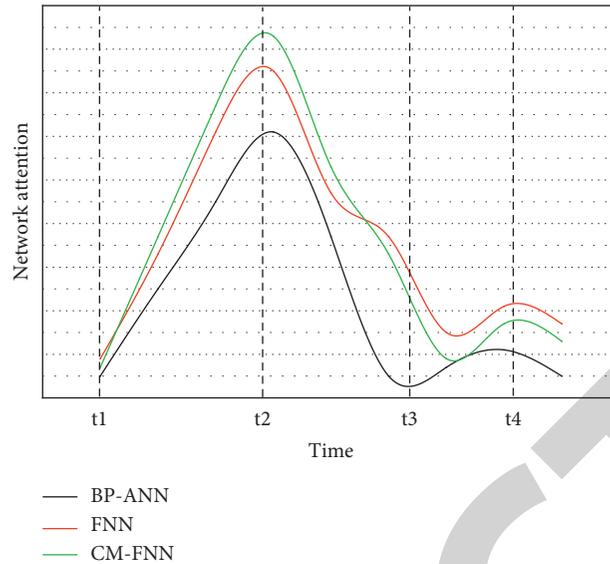


FIGURE 6: Ice and snow tourism network attention foreshadowing effect curve.

The orderliness between the three constituent dimensions of travelers, tourism elements, and supply and demand matchmakers is shown in Figure 8, which shows that the orderliness of traveler participation and synergy is the largest, indicating that the effect of traveler participation in ice and snow smart tourism is high, but the orderliness of the supply and demand matchmaker dimension is low.

Finally, the synergy degree of the composite system of the network platform is 0.868, which is in a moderate synergy state, especially in the supply-demand interface, which needs to be further strengthened, including the degree of platform interface and the provision of elemental synergy services by tourism intermediaries. For example, the management and cooperation of tourism service intermediaries should be strengthened, and the direct business cooperation of various travel agencies, service providers, and ground receiving organizations needs to be further improved. It should be noted that, affected by the network technology, the degree of element synergy and the degree of ice and snow tourism resources, the current ice and snow value joint service model has not yet been implemented, and the information interaction and element collaborative service model will be affected. This is the main service mode of the current ice and snow smart tourism. In the future, with the development of various information technologies such as artificial intelligence, the Internet of Things, and virtual reality, the network platform will carry out resource collection and element integration. The role of service innovation is further highlighted, and the value of various types of tourism participants will achieve common creation.

Strengthen leadership and planning, through the institutional reform of tourism and cultural administration, adhere to unified leadership and coordination, and complete smart tourism development planning based on all-area tourism planning. As an important reliance of the all-area tourism as the wisdom tourism, the related coordination work involves many levels of society and many interest

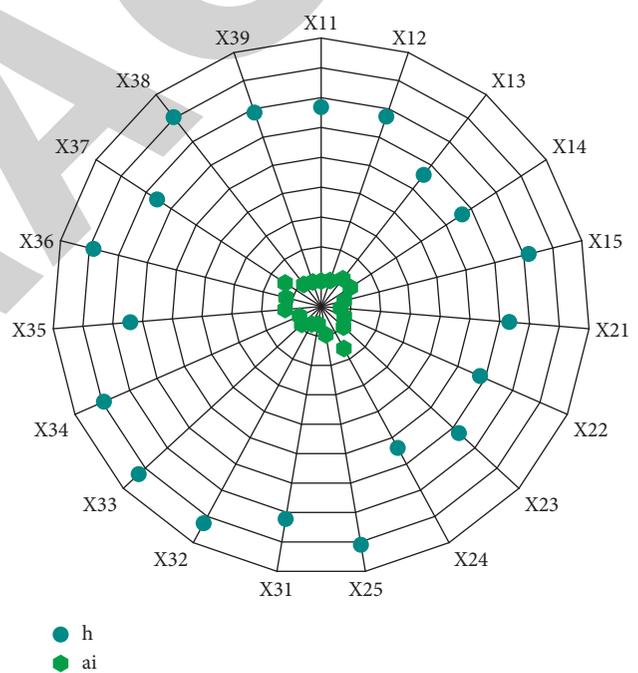


FIGURE 7: Entropy value and coefficient of variation of each index.

subjects, so it must be fully coordinated through the high-level organizations at the provincial or municipal level. It is recommended that wisdom tourism be included in the assessment of party and government officials at all levels of culture and tourism management, so that the entire tourism macro- and microadministrative agencies and public services can pay strategic attention to wisdom tourism and collaborate with multiple departments of development and reform, finance, transportation, urban and rural construction, market supervision, natural environment, emergency management, education, and human resources to solve real problems and potential conflicts in the development of

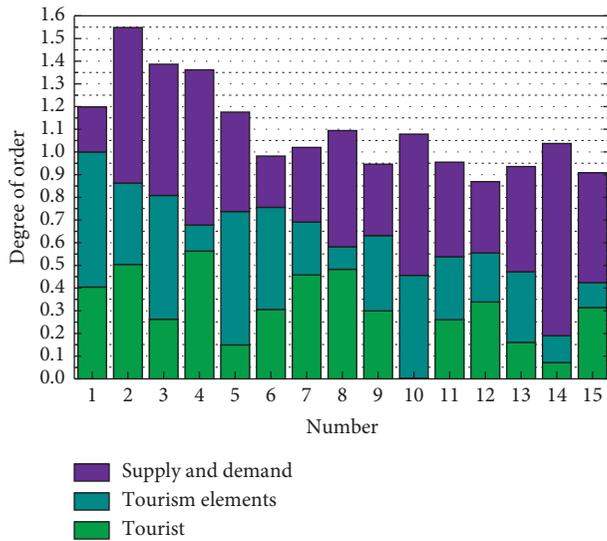


FIGURE 8: Orderliness score of each dimension.

wisdom tourism, with each department close collaboration, clear responsibilities, unified planning, and level-by-level implementation.

5. Conclusion

In this paper, we propose the use of Gaussian curve fitting and fuzzy clustering for the problem that the method of determining the numerical characteristics of the cloud model is restricted by the type of data. For small sample data, because the data are too small to reflect the distribution characteristics of the overall data, the clustering method is used to cluster the data into clusters, the center of each cluster is used as the expectation of the cloud model, and the entropy and superentropy of the cloud model are calculated by the matrix. Although the development history, development characteristics, and competitive advantages of the four characteristic towns are different, their methods of improving comprehensive competitiveness still have the same experience to follow, ice and snow tourism competitiveness improvement needs to rely on their environment, location, resources, and other advantages. The government needs to further regulate the development direction of the policy market industry, develop advantageous industries, rationally allocate resources, give play to the leading role of characteristic industries, and comprehensively improve the comprehensive competitiveness of the ice and snow tourism industry. This method is mainly used for predictive analysis in specific scenarios, and most other scenarios cannot be realized at present. In the future, we will further expand the applicability of this algorithm.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.

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