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Construction of Natural Environmental Protection Quality Assessment System Fusing Ant Colony Algorithm and Neural Network Algorithm

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Abstract: with the development of urbanization and industrialization in China, china's natural environment protection and sustainable development issues are increasingly prominent. In the aspect of environmental protection, the establishment of environmental quality assessment system can grasp the status of ecological and environmental protection from the macro-level, and provide scientific basis for formulating corresponding protection measures. In this paper, based on the previous research results, combining the ant colony algorithm and neural network algorithm in the dynamic planning design ideas, combined with the natural history background, a framework of natural environmental protection quality assessment system is proposed, which integrates information input, data processing and output. The final experimental results show that: through the assessment model of a scenic natural reserve environment assessment score of 3.34, the grade is good, the model can determine and reflect the environmental quality more scientifically in the process of environmental protection assessment, and make the natural ecosystem have a better understanding of the harmonious relationship between man and nature.

1. Introduction

At present, China is in a critical period of economic development, facing great challenges between social and economic development and the natural environment. The natural environment includes natural landscape and ecological environment. The natural landscape includes land, sea, lake, grassland, desert, wetland, etc; Human landscapes include human history, folk customs, religious beliefs, culture and arts, ethnic customs, etc; The ecological environment includes biodiversity, ecosystem stability and ecological security. In the field of natural resources, taking

forests and grasslands as an example, forests are the space for wild animals to grow, reproduce and recuperate, and are the most important part of maintaining biodiversity; Grassland is the material base for livestock production and reproduction.

Unplanned tourism development has a negative impact on the environment and dependent communities, which is often attributed to weak governance and weak regulatory enforcement. Stecker T suggested that the Environmental Protection Agency should take steps to strengthen the disclosure requirements for natural gas processing facilities and issue a proposal to require companies to report their chemical data to the public [1]. Singh S confirmed that it lacks the capacity and resources to implement environmental policies, planning and management. It is therefore necessary to strengthen governance and community capacity to address the issue of effective implementation of legislation and to ensure the conservation, management and sustainable use of marine and coastal resources [2]. The complete forest landscape (IFL) is an important base for them to provide environmental services, especially their role in climate protection. Fa J E studied the importance of these areas to the preservation of the world's existing intact forests. It is determined that at least 36% of international forest aborigines are located on land, which makes these areas critical to the mitigation actions required to avoid catastrophic climate change [3].

The research scheme proposed in this paper can achieve good results and provide a reference for the evaluation and monitoring of natural environment protection, which is of certain significance. The model proposed in this paper has been widely used in the construction of environmental quality assessment system in China. The model can provide new ideas for building a scientific and effective air environment protection evaluation system and realizing the analysis and evaluation of the relationship between environmental quality and natural environment.

2. Natural Environment Protection Quality Assessment System Integrating Ant Colony Algorithm and Neural Network Algorithm

2.1. Natural Environment Protection Quality Evaluation Index System

Nature reserves refer to natural areas with special functions and important influence on human living environment. It refers to the places, facilities and other relevant spaces that are set up according to law, uniformly managed and used by the government or national institutions to protect the ecological environment and provide important production and living resources and ecological environment services for human beings [4, 5]. The natural landscape resources related to nature reserves constitute a treasure house of natural resources assets. To carry out the work of natural environment protection, it is necessary to comprehensively and objectively assess the natural resource conservation areas and environmental quality, so it is necessary to comprehensively consider all aspects of the indicators of environmental protection quality and relevant analysis and evaluation models. On this basis, the comprehensive evaluation index system of natural environment protection quality was determined [6, 7].

2.2. Evaluation Method of Nature Reserves Quality Based on Ant Colony Algorithm and Neural Network Algorithm

Ant colony algorithm is a method that uses the behavior of ant colony as a predator to predict the probability of the problem, so as to determine the best strategy and optimization method. The evaluation index system of natural environment protection quality based on ant colony algorithm and neural network modeling method has good stability and adaptability, and its theoretical research can be applied to the evaluation of natural environment protection quality. The environmental quality assessment adopts two basic assessment methods: the least square method (Likert

Benchmark Decision) and the discriminant weighted method (Gamma Time). Among them, the least squares method is based on the weighted problem solving decision matrix, which is the optimal solution formed by taking various factors into account in the formulation of the evaluation index system; The discriminant weighted solution problem is obtained by introducing local optimal solution to fit the evaluation model [8, 9]. The least square method is applied in the evaluation of nature reserves to evaluate the environmental quality and the degree of realization of ecological protection objectives. This paper takes nature reserves as an example to study the quality evaluation methods and theoretical research methods of nature reserves for comprehensive evaluation of nature reserves, and applies them to the environmental quality simulation after the establishment of the natural reserve level evaluation index system in the climate quality evaluation system of the Dianchi Lake basin in Kunming City [10].

3. Design of Natural Environment Protection Quality Assessment System Integrating Ant Colony Algorithm and Neural Network Algorithm

According to the importance evaluation of each indicator by the audience of environmental interpretation in a scenic area nature reserve, the data in the tourist questionnaire are counted, and the indicator weight is calculated by taking the score value of its importance [11, 12]. According to the hierarchical structure of the evaluation model, the evaluation weight is divided into the weight of the criteria layer and the weight of each index. The calculation formula is as follows:

Determination equation of each evaluation index weight:

$$\varphi_j = \frac{\sum_{j=1}^{n} s_j}{\sum\sum_{j=1}^{m} s_j} \tag{1}$$

In the formula, φ_j is the weight of the jth single indicator, s_j is the important value score of the jth indicator, n is the sample size of this survey, m is the number of indicators, and this model is 25 [13, 14].

The weight determination equation of the criterion layer:

$$X_i = \frac{\bar{S}_i}{\sum(\bar{S}_1 + \bar{S}_2 + \bar{S}_3 + \bar{S}_4 + \bar{S}_5 + \bar{S}_6)} \tag{2}$$

X_i is the weight of the ith criterion layer, $\bar{S}_i$ is the average of the important values of the ith criterion layer, $\sum(\bar{S}_1 + \bar{S}_2 + \bar{S}_3 + \bar{S}_4 + \bar{S}_5 + \bar{S}_6)$ is the sum of the average values of the importance of each criterion layer, and i is taken as 1, 2, 3, 4, 5, 6 in this model [15].

According to the above assessment model, the scores of the environmental assessment system of a scenic nature reserve can be calculated. In this model, the assessment grade of the environmental assessment system is divided into four grades: excellent, good, pass and fail. The five point system is adopted. Each grade corresponds to a score interval. 4~5 points are excellent, 3~4 points are good, 2~3 points are pass, and 1~2 points are fail (Table 1). In this way, according to the grade corresponding to the score, we can put forward operational stage goals and improvement strategies for the construction of the environmental assessment system of a scenic spot [16].

As shown in Table 2, the number of male tourists is 156, accounting for 57.1% of the total number of visitors, and the number of female tourists is 117, accounting for 42.9% of the total number of visitors. The difference between male and female tourists is 14.2%. Based on the analysis of the current situation that the proportion of men and women in China is basically the

same, and men are slightly more than women, the reason for the significant difference in the proportion of men and women in this survey may be that a natural reserve in a scenic spot is a mountain type natural reserve, and the process of sightseeing requires hiking, which consumes a high degree of physical strength, so it is less attractive to some female tourists, while male tourists are more enthusiastic [17, 18].

Table 1. Grading standards for environmental assessment system

Grade	Score	Improvement Strategies
Excellent	4-5	Maintain
Good	3-4	Perfection
Passing	2-3	Upgrade
Failure	1-2	Reconstruction

According to the age distribution of tourists, the number of tourists between 18 and 30 years old is the largest, up to 52.1%, followed by the number between 31 and 45 years old, accounting for 30.4% of the total number of visitors. There are 26 tourists between 46 and 65 years old, accounting for 9.5% of the tourists, and only 4 tourists over 65 years old. Most of the young people are students. They have plenty of time, and their willingness to travel is easy to meet. The elderly have poor physical fitness. The mountain form and environment of a scenic spot increase the difficulty of their travel, so the proportion is very small.

Table 2. Demographic characteristics

Personal Characteristics	Category	N	Percentage(%)
Gender	Male	156	57.1
	Female	117	42.9
Age	Under 18	18	6.6
	18-30	142	52
	31-45	83	30.4
	46-65	26	9.5
	65 or more	4	1.5

The average value of each environmental assessment system assessment indicator in 273 questionnaires is calculated to reflect the difference of tourists' scores on the importance and satisfaction of each assessment indicator in each standard layer of the environment of a scenic natural reserve. The difference between the importance and satisfaction of each assessment indicator is also based on this. The average value of tourists' satisfaction with each assessment indicator is used to subtract the average value of the importance of each assessment indicator, Get the difference value of importance satisfaction. The standard deviation is used to describe the dispersion of the value. The smaller the standard deviation is, the smaller the fluctuation is. The better the stability of the evaluation indicators in the questionnaire is.

4. Analysis of Natural Environment Protection Quality Assessment System Integrating Ant Colony Algorithm and Neural Network Algorithm

4.1. The Importance of the Guide of the Interpreter

As shown in Figure 1, the importance score of the announcer's criterion level is 3.81, of which good attitude and enthusiastic service (A3) are the most important, with an average of 4.03; Clear speech speed, clear expression (A4), and low scores in the importance of the two indicators of transmitting the concept of environmental protection (A5) are 3.61 and 3.59 respectively. In terms of tourist satisfaction, vivid language and easy to understand (A2) are the most satisfactory. The satisfaction of having rich professional knowledge (A1), good attitude and enthusiastic service (A3) are 3.27 and 3.32 respectively. The satisfaction of speaking clearly and expressing clearly (A4) is relatively low.

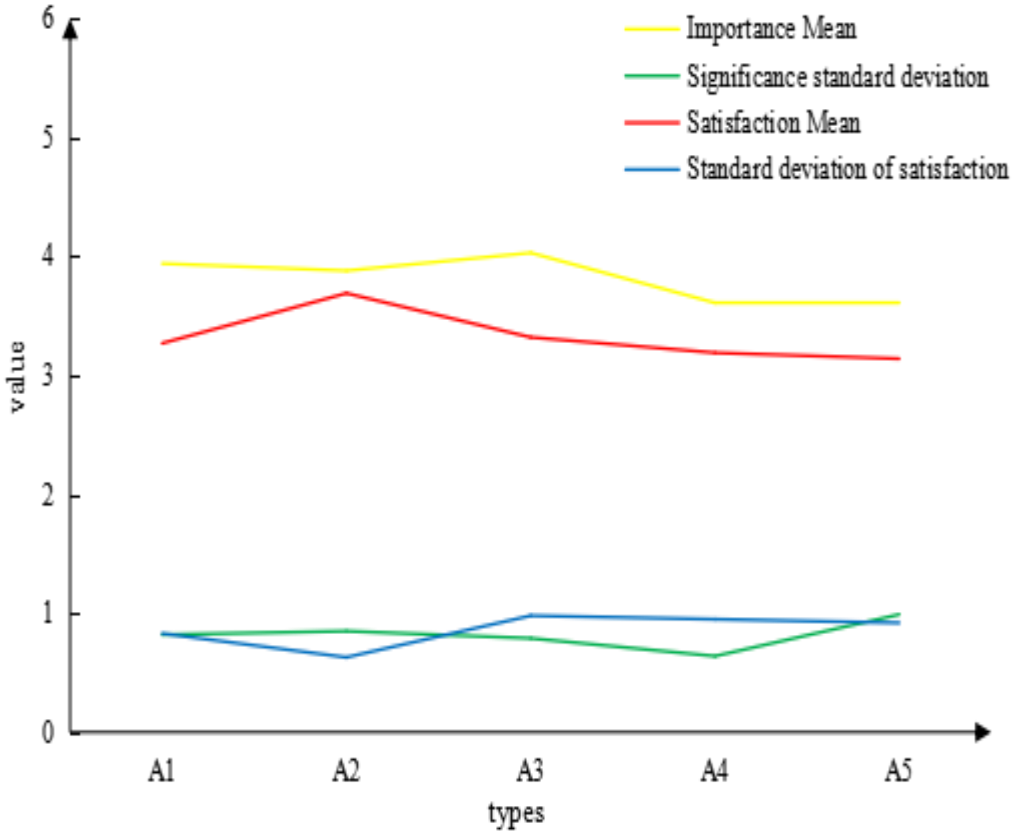

Figure 1. Difference analysis of importance satisfaction of interpreters

4.2. Importance of Explanation Board

As shown in Figure 2, the average value of the criterion level for the importance of the explanation board is 4.14, indicating that tourists generally believe that the explanation board plays an important role in the environmental assessment system. Among them, concise text, accurate information (B3) and clear indication of the visit route (B2) are the most important, with scores of 4.26 and 4.24 respectively. The location is suitable, and the score of coordination with the environment (B4) is relatively low, 3.97. Tourists scored 3.42 points for satisfaction with the standard level of the billboards. Among them, the satisfaction of six evaluation indicators was quite different, with concise text, accurate information (B3) and clear indication of the visit route (B2) reaching more than 4 points. The satisfaction of the billboards with rich content, sufficient quantity (B5), timely repair, and proper maintenance (B6) was very low, only 2.92 and 2.36.

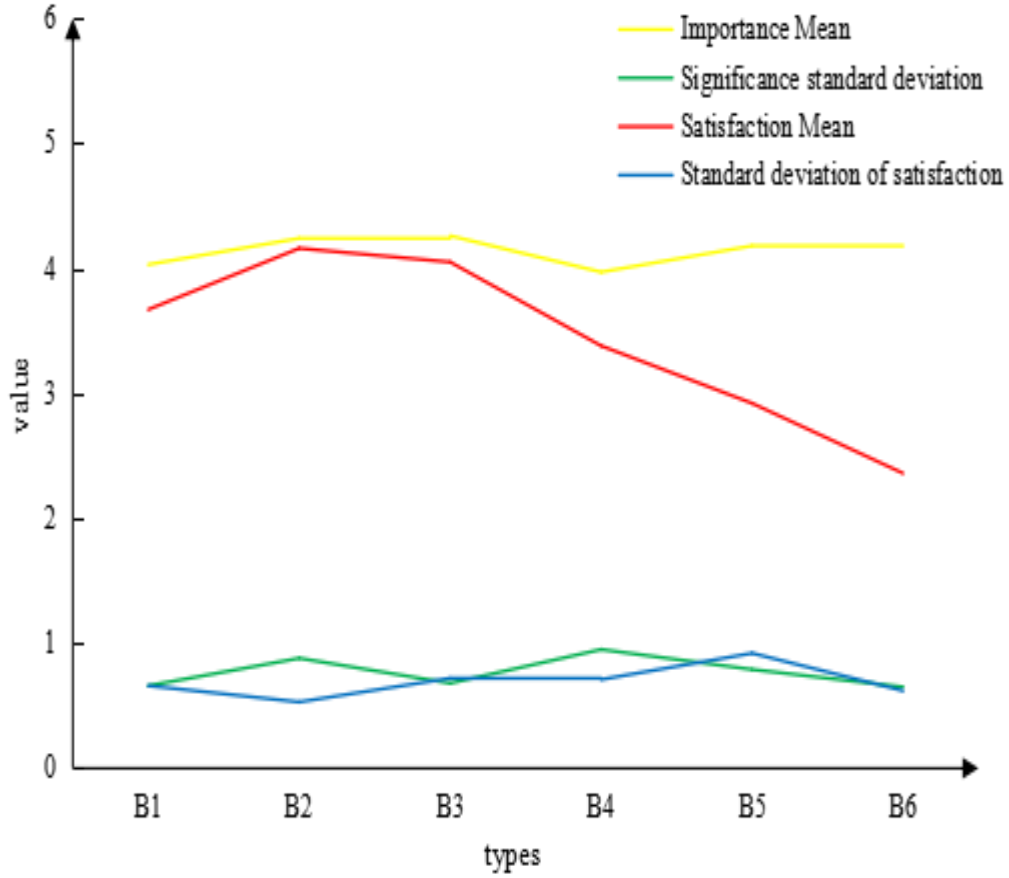

Figure 2. Difference analysis of importance satisfaction of explanation boards

4.3. Tourist Center

It can be seen from Figure 3 that the importance of the criteria layer of the tourist center is 3.51, of which the professionalism and enthusiasm of the staff (C3) are the most important, and the Convenience and Accessibility (C1) is the lowest. In terms of tourist satisfaction, the staff's professional and enthusiastic (C3) score is the highest, 3.59; The second is complete internal service facilities (C2), with an average of 3.31; The average value of EasyReach (C1) in the location is the lowest, 3.14.

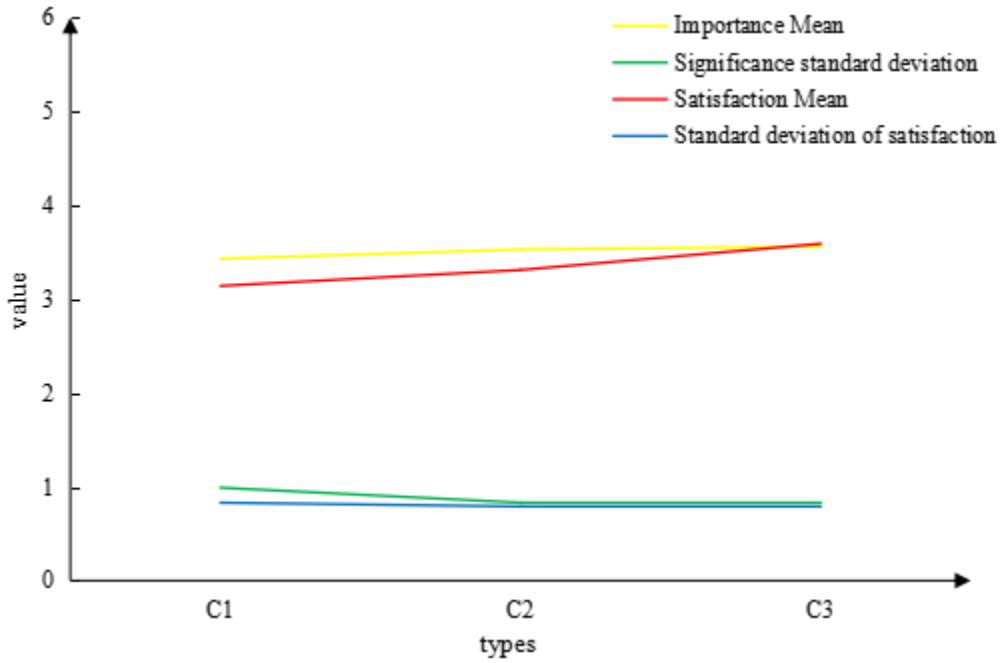

Figure 3. Difference analysis of importance satisfaction of tourist centers

4.4. Assessment Results of Natural Environment Protection Quality and Application Evaluation of Models

In the actual environmental protection quality assessment, there are large differences among nature reserves, forest parks, eco-tourism scenic spots and other nature reserves, which leads to certain deviations in the assessment results. However, using ant colony algorithm and neural network algorithm to build the quality assessment model of nature reserves can effectively solve the above problems. In the quality assessment of nature reserves, the forest coverage, land use type and watershed water quality are included in the indicator system to analyze their impact on the natural ecosystem of nature reserves. Taking nature reserves, forest parks and ecotourism scenic spots as examples, combined with the evaluation results, there are differences in the ecological environmental protection benefits among different nature reserves, among which ecotourism scenic spots are the most prominent. The main reason is that the vegetation coverage in these scenic spots is relatively high and dense, which has a certain role in promoting the natural ecosystem and landscape of ecotourism scenic spots. In view of the problems and shortcomings in the environmental protection quality assessment of Jinping County, on the one hand, through various measures to improve the forest coverage and land use types of natural reserves, the natural environment of ecotourism scenic spots can be effectively protected and restored; On the other hand, in environmental protection and construction, it is necessary to minimize the destruction of wetland water sources to maintain biodiversity.

5. Conclusion

In the process of establishing the quality assessment system of natural environment protection, the ant colony algorithm and neural network algorithm are used to assess the quality of environmental protection of natural reserves in different regions. The use of ant colony algorithm can effectively overcome the impact of time and space correlation on the evaluation accuracy; The neural network can better adapt to the complexity and variability of the evaluation object, and can

reflect the actual situation from multiple dimensions. According to the assessment results of the natural environment protection quality of a scenic spot, some suggestions are put forward: first, the establishment and application of the environmental protection quality assessment system should be carried out in combination with the situation of the natural protection area of a scenic spot; Second, improve the quality evaluation system of natural environment protection in a scenic spot to guide the protection, development and utilization of local natural resources; Third, enhance the local natural resource protection capacity and further strengthen the construction of ecological civilization.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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