

# ON Intelligent Interactive Model of Tourism Planning Multi Neuron Algorithm

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**Abstract:** The research on establishing intelligent interactive system of tourism planning based on multi neuron neural network model has practical significance. Firstly, this paper introduces the meaning, function and characteristics of intelligent interaction in tourism planning, and then studies the application of multi neuron algorithm. Based on this algorithm, an intelligent interaction model in tourism planning is designed, and its function is experimentally analyzed. Finally, the experimental results show that the basic tourism cost is controlled within 30000. According to the rationalization assumption of the mathematical model, through a reasonable combination of the days spent in each region, in order to visit the areas of interest to tourists in fewer days. The mathematical model of tourism route planning established in this paper can help travelers make reasonable travel plans, and can also judge whether the determined travel plans are reasonable and the approximate budget.

**Key words:** Multi Neuron Algorithm, Tourism Planning, Intelligent Interaction, Interaction Model

## 1. Introduction

Tourism planning is a complex multi-dimensional nonlinear system, which involves many fields, such as tourism resource development, transportation mode selection and route arrangement. Many factors need to be considered in tourism itinerary design. For example, problems such as travel time, travel length and destination environment will affect tourists' satisfaction with the information.

Scholars at home and abroad have made in-depth exploration and Analysis on the research in the field of tourism planning from multiple levels and dimensions. Intelligent interaction has been done more mature abroad. Foreign scholars in the field of tourism planning have studied the nonlinear problem under the influence of node interaction in neural network. Domestic research on the development of tourism started late. Some scholars proposed the design of intelligent interactive perception system based on multi neuron algorithm. They believe that intelligent decision-making and decision-making can be realized by establishing a "multi-level" network model. Other scholars have studied some uncertainties in how to select the best path, optimization scheme and optimal strategy combination when traveling in traffic congestion and location. The above research has laid a research foundation for this paper.

In the problem of tourism planning, intelligent interaction model is an important topic. It can help people make better decisions and improve the efficiency of decision-making. At present, there are many researches on intelligent transportation system and VRP in China. However, due to the late development of intelligence and multi-level in China. Therefore, based on the relevant theories of multi neural networks at home and abroad, this paper will build an intelligent interactive model system of tourism planning based on the feedback of tourists' behavior characteristics, and the problem to be solved is how to formulate corresponding travel routes in the target population.

## 2. Discussion on Intelligent Interactive Model of Tourism Planning Based on Multi Neuron Algorithm

### 2.1 Tourism Planning

#### 2.1.1 Meaning

Tourism planning refers to the reasonable, effective and systematic planning and organization of tourism in a region, and guiding people to obtain the maximum profit in a limited time through scientific means. In essence, it is the development and construction of existing tourist attractions and surrounding scenic spots. There are many problems in real life. Firstly, because people are far away from different scenic spots, it causes traffic congestion. Secondly, because tourism planning is lack of scientificity, tourists can't know their destination in time, which affects the development speed and efficiency of tourism. In practice, people's choice of tourist attractions is often limited to a certain extent. For example, a scenic spot may be a popular scenic spot or a place with profound cultural connotation, but in some specific areas, due to the influence of factors such as transportation, play facilities and services, it is not attracted by buying such tourism products when its passenger flow is small or crowded, which is called "nowhere to choose". Therefore, for tourists, they will be satisfied with the travel experience of tourist attractions. There are two purposes of tourism planning. One is to consider from a long-term perspective. That is, from the perspective of tourists and tourism industry as a whole. Second, we should take into account the current, potential consumers and existing resources to comprehensively analyze their advantages and disadvantages and formulate corresponding measures to ensure that tourism can achieve the goal of sustainable development.

#### 2.1.2 Function

The role of tourism planning the role of tourism planning is to provide tourists with a comfortable, convenient, safe and reliable travel itinerary. It is mainly reflected in the following aspects: (1) provide convenience for tourists and promote local economic development. In the period of rapid growth of tourism, tourist attractions are an important factor. There are different degrees of demand for different regions, different periods and different regions. Therefore, tourism planning is needed to attract more people to this place for sightseeing and leisure

vacation. In addition, we should also consider that the travel time and transportation mode of tourists have a great impact on their travel efficiency and promote the development of tourism. Tourism is one of the main purposes of people's leisure, entertainment, shopping and other activities. It can also become a form of social and economic behavior. (2) It is possible to provide a good environment for the scenic spot, make the scenic spot more perfect and develop tourism. (3) Promote local economic development and improve people's living standards. Through the statistical analysis of a large number of data, it is found that tourism is one of the important industries of the national economy. Tourism can not only meet people's material and spiritual needs, but also meet many cultural needs. Such as entertainment, leisure, fitness and so on, but also has a certain degree of social and environmental benefits. For example, the forces of increasing employment and income and alleviating traffic congestion.

### 2.1.3 Features

The main characteristics of tourism planning are: (1) timeliness. For a long tourist route, many factors need to be considered, such as passenger flow, traffic conditions, etc. In this process, we should analyze and deal with these influencing factors. (2) High flexibility and accuracy requirements. With the improvement of people's living standards and the rapid development of tourism, as well as the changing needs of tourists, there are differences between different regions. (3) Strong comprehensiveness: tourism planning involves many aspects and needs to comprehensively consider a variety of elements, so it has strong characteristics such as complexity and systematicness.

## 2.2 Multi Neuron Algorithm

### 2.2.1 Basic principles

Multi neuron algorithm is a stochastic system model based on natural neural network. It is composed of multiple unit nodes. Each unit contains one or more kinds of nodes. An artificial neural network is established on each kind of points. The model consists of several independent units. Each individual has an adaptive learning ability and parallel memory computing function. When processing data, it extracts the points related to or close to the observed values from the samples as the training set. In this process, it can constantly adjust the relationship between its required knowledge and experience and correct its own problems or defects. In the whole process, all neurons are interrelated and interact to form a network structure, and each part is connected into a complete system at multiple levels. In this method, each part is connected and interacts with each other to form a new knowledge network (i.e. recursive relationship). Each sub layer is connected by nodes to form the whole network system. At the same time, a multi-level nonlinear problem model can be established by using the mapping relationship between each sub layer and other parts, and applied to the actual situation and planning objectives. This method can effectively solve the problems of low efficiency of traditional manual calculation and easy to fall into local optimal solution

### 2.2.2 Key technologies

In the search and optimization problems in daily life, we often encounter multi-objective optimization problems, not just single objective optimization problems. The optimization objectives in multi-objective optimization problems are usually contradictory and restrictive, so the "absolute optimal solution" satisfying each objective function does not exist under normal circumstances. We can only weigh each objective to obtain the relative "optimal solution set", that is, Pareto optimal solution set, and finally the decision-maker decides to select the optimal solution according to the actual situation. The following is a simple example to introduce the multi-objective optimization problem. For example, I want to buy a room. You can take the price as the first goal, the geographical location of the house as the second goal, and the structure of the house as the third goal. Usually they want to spend the least, have superior geographical location and good house structure. Then it is impossible to meet these three conflicting goals at the same time. Therefore, the optimization process is to find Pareto solutions that meet these three objectives as much as possible. Generally, the multi-objective optimization problem is composed of a set of objective functions and many constraints. Its mathematical model is described as follows:

$$\min f(x)=(f_1(x),f_2(x),\dots,f_m(x)) \tag{1}$$

$$\text{s.t.} \begin{cases} G_i(x) \leq 0, i=1,2,\dots,p \\ X \in R^n \end{cases} \tag{2}$$

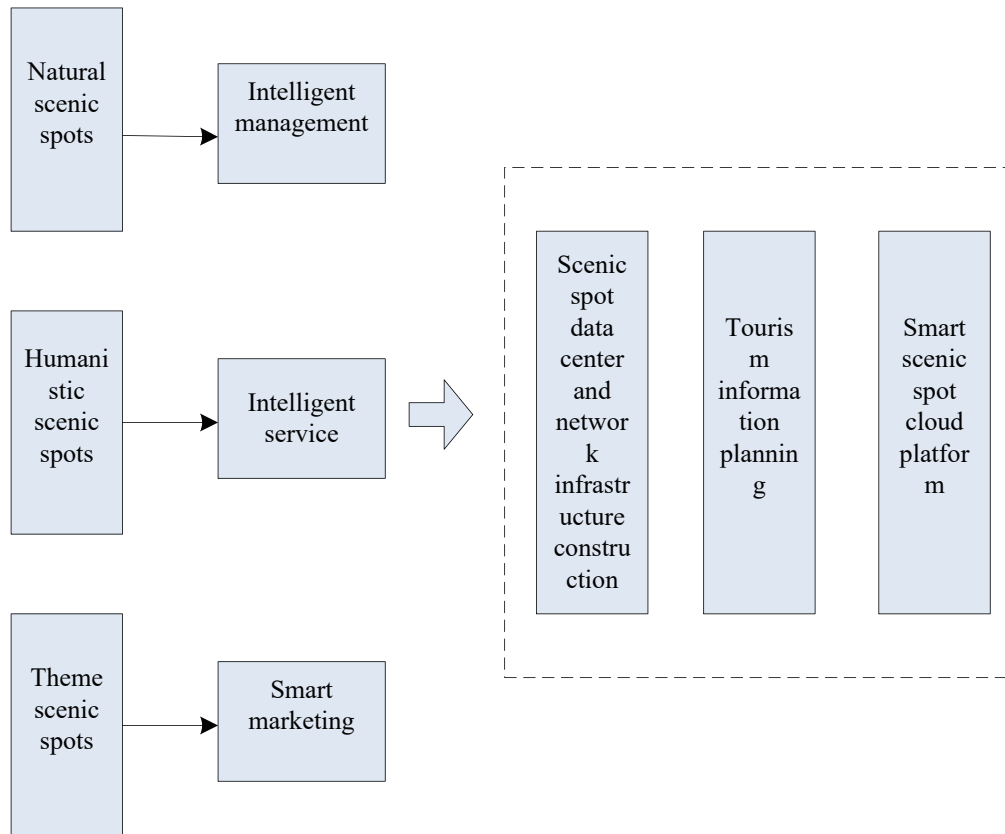
Where  $f(x) = (F_1(x), F_M(x))$  is an objective function and a single objective function contains only one function. Here, multi-objective optimization is studied. Therefore,  $M > 2$  indicates that multiple functions are included,  $F_k(x)$  represents the  $k$ -th function,  $x = (x_1, x_2, \dots, x_n) \in R^n$  is the  $n$ -dimensional vector of  $R^n$  space, and  $G_i(x)$  represents the  $i$ -th constraint. Formula (1) calculates the minimum value of the objective function, but if the problem to be studied needs to find the maximum value, that is,  $MAXF(x)$ , it is generally converted to the minimum value problem  $\min f(-x)$ . Therefore, there is no essential difference between maximization and minimization, which can be described by the same mathematical model.

### 2.3 Intelligent Interaction of Tourism Planning

The intelligent interactive model of tourism planning is based on the traditional manual data collection and prediction, through the analysis and sorting of various information, to establish a multi-level decision-making system that can be used in the process of tourism development. The system can provide tourists with more convenient, fast and efficient access to relevant demand information. When making tourism information decision, we can integrate different types and needs through multi-level network structure, so as to realize the comprehensive analysis of data and other resources. So as to provide users with a comprehensive, personalized and operable tourism planning tool. This not only improves the travel efficiency and comfort experience of tourists, but also effectively reduces traffic congestion and energy consumption.

### 3. Intelligent Interactive Model Experiment of Tourism Planning Based on Multi Neuron Algorithm

#### 3.1 Tourism Planning Intelligent Interactive Process Model Structure



**Figure 1. Intelligent interactive process framework of tourism planning**

The structure of the intelligent interactive model of tourism planning is shown in Figure 1, which includes three levels. The first level is the information exchange and sharing between the client and the server, the second level carries out data query, processing and other operations through the client, and the third level is responsible for the application of the intelligent interactive model of tourism planning established by the first two and three levels in real life. The main contents involved are: data collection, system status monitoring, data analysis and processing, including the classification of tourist information. Different types of tourists are treated at different levels, and the potential value or expectation of these tourists are collected. According to the specific situation, take corresponding strategies to improve the impact of factors such as user satisfaction and loyalty on the intelligent interaction model of tourism planning, so as to reduce the overall operation cost of the system, improve service quality and efficiency and promote the sustainable development level of tourism.

#### 3.2 Performance Test of Multi Neuron Algorithm

##### 3.2.1 Test purpose

In order to verify the practical application effect of multi neuron algorithm in tourism planning intelligent interaction model, it is necessary to test whether it can achieve the expected goal in different scenarios (such as scenic spots, playing time, etc.). The test content mainly includes the following three aspects: (1) data acquisition. By analyzing the information obtained in the process of tourists' tour, we can get tourists' travel mode choice preference and behavior characteristics. (2) User access control design, parameter setting and input / output analysis. By comparing the relationship between various factors, the influence degree and direction of these variables on decision-making needs in different scenarios are obtained. Determine the vertex displacement values at different positions between nodes of each layer. The same method should be used to calculate the weight change at different points in each adjacent area. After comparing all the algorithms to get the final required data set and initial condition results, do a comparative analysis again. If all the optimization can achieve the expected results, you can continue to work in the next step.

##### 3.2.2 Test steps

The test steps of multi neuron algorithm are as follows: (1) establish the input data set, including two indicators, one is eigenvalue, the other is association rules. If the eigenvalues can be obtained by observation, analysis and calculation, it means that the method has good performance. If not, proceed directly to the next stage, that is, process all input data sets. Otherwise, repeat the above process until the output signal reaches the set target. (2) Design the parameters and indexes required by the multi neuron algorithm, including the setting of system initial conditions and the requirements of system operating environment, such as load capacity.

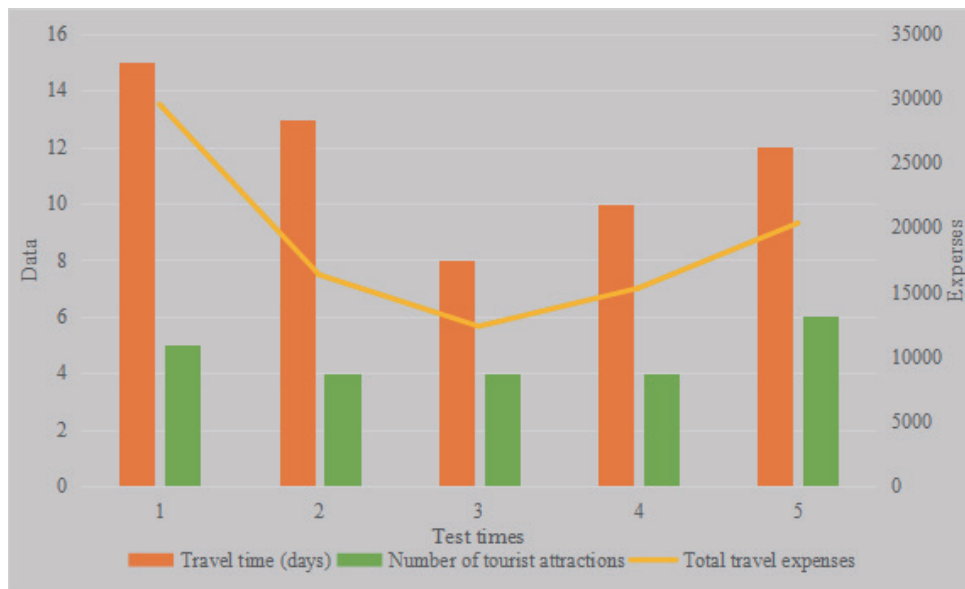
## 4. Experimental Analysis of Intelligent Interactive Model of Tourism Planning Based on Multi Neuron Algorithm

Function Test of Intelligent Interactive Model of Tourism Planning Based on Multi Neuron Algorithm

Table 1 shows the function test data of the model.

**Table1.Interactive model performance test data**

Test times	Travel time (days)	Total travel expenses	Number of tourist attractions
1	15	29563	5
2	13	16358	4
3	8	12365	4
4	10	15326	4
5	12	20369	6



**Figure2.Functional test of the intelligent interaction model of tourism planning**

The test is mainly through multi-level simulation planning problem and multi-dimensional data processing, so as to obtain more accurate and reliable evaluation results. In order to verify the effectiveness of the model proposed in this paper and apply it to the actual situation in the process of tourism planning. This paper tests the time spent in the process of tourism, tourist attractions and the time spent in tourism. As can be seen from Figure 2, the basic tourism expenditure is controlled within 30000. According to the rationalization assumption of the mathematical model, through a reasonable combination of the number of days spent in each region, in order to visit the areas of interest to tourists in fewer days. The mathematical model of tourism route planning established in this paper can help travelers make reasonable travel plans, and can also judge whether the determined travel plans are reasonable and the approximate budget.

## 5.Conclusion

With the development of economy and the improvement of people's living standards, tourism has become an indispensable part of people's daily life. With the vigorous development of tourism, more and more tourists put forward higher requirements for the tourism industry. Intelligent interaction model is one of the most important methods to solve this problem. This paper mainly studies the construction of tourism planning system based on multi neuron algorithm, and studies and discusses the processing of complex data, obtaining a large amount of information and analyzing relevant laws. The function and performance index of the system are optimized by establishing a user-oriented scenic spot node cooperation platform.

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