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Monitoring and Evaluating on Ecological Environment Quality of Tourism Areas Using Stochastic Optimization Method

Shanshan Zhou[1] and Lu Zhou[2]

[1]Department of Tourism Management, Xinyang Vocational and Technical College, Xinyang, Henan 464000, China, zhoushanshan@xyvtc.edu.cn
[2]Department of Tourism Management, Xinyang Vocational and Technical College, Xinyang, Henan 464000, China, zhoulu@xyvtc.edu.cn

Corresponding author: Shanshan Zhou, zhoushanshan@xyvtc.edu.cn

Abstract. The effect map of tourism planning drawn by computer technology can help designers better express the concept of planning and design, and help improve the tourism design scheme. Computer-aided rendering has the advantages of high definition, simulation and precision, and has a multi-angle model, realistic effect and real environment. It is very intuitive to understand the tourism planning and design scheme. At present, in computer-aided design, as the main application software of design, it plays a prominent role in the rendering design of tourism planning and design renderings. This paper proposes a study of ecotourism areas based on stochastic optimization method, focusing on the monitoring and analysis of atmospheric environmental quality characteristics, to achieve the atmospheric environment of regional ecotourism areas. Quality analysis, and finally relevant simulation test analysis. The analysis of the characteristics of the atmospheric environment quality in ecotourism areas. Carrying out ecological reconstruction and accelerating urbanization and industrialization in the process of ecotourism regional construction and atmospheric environment quality optimization planning has important practical guiding significance for guiding the improvement of atmospheric environment quality in tourism areas and promoting green urbanization.

Keywords: random optimization method; ecotourism; regional atmospheric environmental quality characteristics
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1 INTRODUCTION

In the design of tourism ecological environment planning, computer-aided design software can more realistically depict the texture of various landscape elements. It can create an extremely real environment, and can also make fine modifications. It can also carry out various complex post-processing through computer calculation, and produce economic and feasible special effects. In the future, tourism planners will be closely connected with it whether they go out for investigation or

carry out engineering design in the laboratory. Whether it is photo restoration, voice input, road planning, tourism route planning, it has formed a combination relationship with computer-aided design. How to use computer aided design technology to combine with tourism planning well needs further exploration in future work. In tourism planning, the commonly used CAD software includes Auto CAD3 DSMAX and Photoshop. Although computer aided design has many advantages over manual drawing, it can't get twice the result with half the effort without paying attention to methods and techniques in production. Before application, the overall analysis of tourism planning and design should be carried out to analyze the main body and details of tourism planning in scenic spots. Determine the main body and overall effect to be represented in the effect map of tourism planning, so as to determine how many complex details need to be represented and how detailed they need to be portrayed. With the continuous development of computer science and technology and the continuous improvement of information technology theory, machine learning methods have entered people's vision, providing a better method to solve the above problems. Wang [1] analyzed the spatial distribution of different land ecosystems under different ecosystem types and made an evaluation to comprehensively improve the ecological quality of land. Bello et al. [2] investigated the impact of computer-assisted multimedia instruction (CAMI) and school location on high school students' academic performance and ecological conservation in some states of northwest Nigeria. Through the randomized search method, the optimal waste treatment scheme can be found to maximize the utilization of waste and reduce the pollution of waste to the environment. At the same time, it can also be used for environmental monitoring, and the random optimization algorithm can be used for environmental monitoring. Such as optimizing the layout of environmental monitoring stations, optimizing the selection of monitoring parameters, etc. Through the randomized search method, the optimal monitoring scheme can be found and the accuracy and efficiency of environmental monitoring can be improved.

In this paper, a reconstruction model of atmospheric environmental quality in ecotourism areas is established, and the ecological landscape information fusion perception and block area template matching in the process of visual reconstruction of landscape ecological construction and air quality optimization design increase the instantaneous excess rate of required pollutant concentrations. Must be less than a certain standard limit. Its innovations are:

Controlling air pollution by limiting the annual average concentration and the probability of occurrence of high pollutant concentration can better reflect the protection objective of atmospheric environmental quality.

The model calculates the results of regional total amount, which is convenient for the management and operation of total amount control. The model solves the allowable total amount of air pollutants in the region by setting up control points, and if necessary, it can be redistributed to specific pollution sources, so that the total amount control can be implemented.

Landscape ecological construction refers to the transformation of urban space into ecological space through scientific planning, rational design and effective management in the process of urbanization, and the realization of urban ecological construction. The organization of this paper is as follows:

The first section summarizes the atmospheric environment protection under the ecological environment, and expounds the landscape construction background of the dataset. Section 2 analyzes and expounds the current research on ecological construction. Section 3 analyzes the performance of the model and summarizes the construction process of scientific protection framework for ecological construction layout. Section 3 describes the research methods and analyzes the algorithm content of spatial layout. Section 4 summarizes the research results, analyzes and reviews the summary content of the research theory. Section 5 summarizes the full text. Spatial pattern optimization refers to the purpose of improving the quality of urban environment, improving the quality of residents' life and promoting the sustainable development of the city by optimizing the layout and structure of urban interior and surrounding space.

2 RELATED WORK

At present, atmospheric environmental quality refers to a quantitative expression of the suitability of the overall atmospheric environment or certain atmospheric pollutants to the health, survival and reproduction of people, and social and economic development. It emerged as one of the cleanest and most dynamic biofuels on the market. This work involves modeling and evaluating biomass gasification topologies, using process simulation and environmental and inherent safety analysis by Meramo et al. [3], and uses Aspen Plus process simulation software to model the process. Computer Aided Synthesis Program (CASP) is a promising research field, which may have a great impact on drug discovery, industrial chemistry and material science. Wang et al. [4] critically studied the status of resources and methods required by CASP, including big data, algorithms and their characteristics, advantages, limitations and programming obstacles. 2D materials have great prospects in a wide range of applications, but the proliferation of equipment and the satisfaction of real-life needs are still far from being realized. Kolesnichenko et al [5] extended the statistical correlation analysis of exciton spectra of single-layer WS2 obtained through hyperspectral absorption and photoluminescence imaging to multi-dimensional cases. The multidimensional correlation is checked by unsupervised machine learning algorithm. Montero et al. [6] obtained the spatial and temporal distribution characteristics of air pollutants in Paris through 7 months of monitoring data. Saltz et al. [7] found that the PM10 concentration change trends of the eight monitoring stations were different according to the PM10 seasonal mean concentration data of the eight monitoring stations near Athens. In view of the common problem of alkane/naphthenic separation in petrochemical industry. Song et al [8] carried out a study on computer-aided ionic liquid design (CAI LD). Detailed experimental data were collected to expand the UNIFAC-IL model of the system, in which the proximity effect in alkanes and cycloalkanes was specifically considered by defining different groups. Liu et al. [9] proposed a landscape based spatial pattern optimization. It is emphasized that through rational spatial layout and structure, the quality of urban environment, the quality of residents' life and the sustainable development of the city can be improved. This can provide support for landscape ecological construction. By optimizing the spatial pattern inside and around the city, improve the quality of the city's ecological environment, and provide better spatial conditions and infrastructure for landscape ecological construction. Rehman et al. [10] Promote spatial pattern optimization, which can support landscape ecological construction. Together, they constitute an important part of urban ecological construction and contribute to the sustainable development of cities and the harmonious coexistence of human and nature.

In the total quantity model based on random optimization, several meteorological factors are treated as random variables, their occurrence probability is obtained through statistical meteorological data, and the function under the action of random variables is described by mathematical model, which makes the analysis of atmospheric environment quality more reasonable. The quality of atmospheric environment in eco-tourism areas mainly depends on natural conditions. The meteorological conditions that are most difficult to divide are treated as random variables, and their long-term statistical characteristics are characterized by expectation and probability function, which are solved by probability statistics method and stochastic simulation technology, so that the analysis results are more accurate.

3 COMPUTER AIDED STOCHASTIC OPTIMIZATION METHOD FOR ANALYSIS OF ATMOSPHERIC ENVIRONMENTAL QUALITY CHARACTERISTICS

3.1 The Solution Method and Process of the Model

Through the mathematical expectation model, the meteorological parameters are taken as the design conditions of a model, and the optimal value is obtained by genetic algorithm and function

operation. In actual work, the discrete control point $k=1,\cdots,n,$ is used to represent the corresponding objective function and constraints of functional partition $S_1,S_2,\cdots,S_n,$ as follows:

$$Max\sum_{i=1}^{m}Q_i \tag{3.1}$$

Restrictions:

$$E\left[\sum_{i=1}^{m}C_{ij}(x,y,\xi)\right]\le c_0(j),\ j=1,\cdots,n \tag{3.2}$$

$$\Pr\left\{\sum_{i=1}^{m}C_{ij}(x,y,\xi)\le c_0^{'}(j)\right\}\ge 1-\alpha,\ j=1,\cdots,m \tag{3.3}$$

$$Q_i\ge 0\quad i=1,2,\cdots,m \tag{3.4}$$

3.1.1 Probability distribution generation of model parameters

The four meteorological parameters are related to the diffusion of air pollutants. They are surface wind speed, the solar radiation intensity is related to the solar altitude angle and cloud cover, while angle is related to the local longitude and the observed day ordinal number. Therefore, the components of the random vector of the model are determined as four, namely, wind speed level, wind direction, total cloud cover / low cloud cover category and the observed day ordinal number, namely: wind speed level, wind direction, total cloud cover/low cloud cover category and observation day ordinal, denoted as ξ_{1i}, ξ_{2i}, ξ_{3i} and ξ_{4i} respectively. Suppose their distribution functions are $\phi(\xi_1)$, $\phi(\xi_2)$, $\phi(\xi_3)$, $\phi(\xi_4)$. The two constraints of the total model are nonlinear functions with random variables. The genetic algorithm is more stable and can converge to the global optimal point in most cases. The genetic algorithm is essentially a kind of simulation based on A random search method for biological processes. The probability can be estimated by the following formula:

$$\theta=\frac{N'}{N} \tag{3.5}$$

3.1.2 Calculation process of genetic algorithm

(1) Initialize the atmospheric environmental quality parameters and set the parameters reasonably; (2) The neural network is trained to judge the excellent value of each individual and calculate its adaptive value; (3) The excellent individual values are transformed and their fitness values are calculated.

The main idea of the total amount model of the stochastic optimization method in this paper is to use the genetic algorithm to solve the stability, and in most cases, the global optimum can be achieved. The genetic algorithm is essentially a random search based on the simulated biological process. A non-linear function with random variables is used to solve the calculation.

3.2 Analysis on Changes of Atmospheric Environmental Quality in Ecotourism Areas

3.2.1 Regional characteristics of atmospheric environmental quality

In view of the current development of ecological atmospheric environment, it can effectively promote the environmental protection work with the support of computer information technology. At the same time, scientific use of computer technology in environmental protection can effectively improve the efficiency of environmental protection. As far as North China is concerned, the atmospheric acidic substances deposited on the soil surface of the region can come from the

northwest region, and the regional emissions can also be deposited on the surface of other provinces. The workflow of the stochastic optimization method is illustrated in Figure 1.

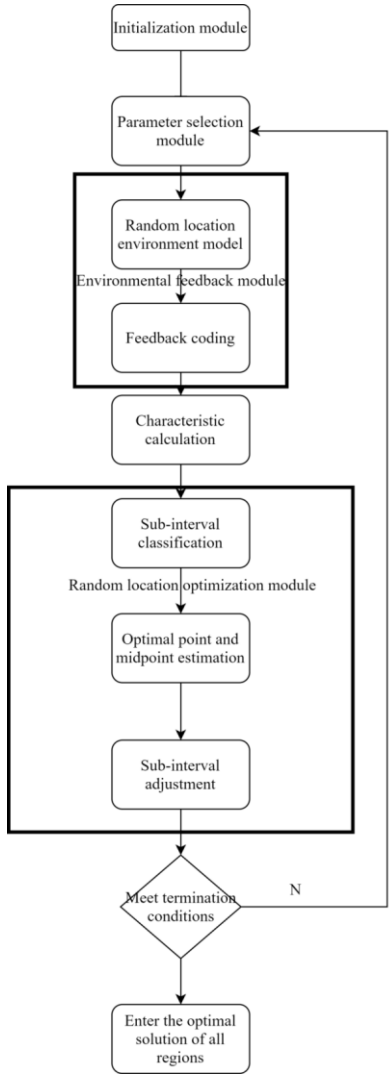

Figure 1: Workflow of the stochastic optimization method.

Another example is the short-term air pollution trend in North China, where the synchronicity is quite consistent. According to the national environmental monitoring data, regional atmospheric environmental quality often shows a process. The road network weighted density model is used to calculate the road network density, and the calculation formula is:

$$D_r = \sum_{j=1}^{m} p_j L_{ij} / A_i, i = 1,2,3,\cdots,n \tag{3.6}$$

The appearance of good atmospheric quality can last for days or even weeks. During this process, the pollution source does not change, but the environmental process of continuous pollution occurs. It is a problem that needs to be explored for the atmospheric environment. That is, the

middle and lower layers of the atmospheric boundary layer. Special discussion. According to the monitoring and analysis of national atmospheric environmental quality, the primary air pollutant in China has changed from SO2 pollution to particulate matter, mainly PM10 pollution. The strong point sources of emission of important pollutants, and due to China's implementation of the plan to develop small and medium-sized towns, township enterprises all over the country have flourished. Range is also affected by atmospheric transport networks and terrain. River network density: its calculation formula is as follows:

$$D_w = L_i / A_i, i = 1,2,3,\cdots,n \tag{3.7}$$

3.2.2 Change analysis of air pollutant concentration

Air pollutants refer to some substances that enter the atmospheric environment near the ground in the form of gases and cause pollution. Such as sulfur oxides, carbon oxides, nitrogen oxides, suspended particulate matter in the air, etc., as well as various volatile organic compounds such as formaldehyde, these harmful gases enter the atmospheric circulation, which will affect the life and health of the human body and the entire ecological environment. The system produces considerable threats. Many liquid and solid substances have extremely small particle diameters, and these substances are called particulate matter. Particulate matter comes in many forms, it can be smoke or dust, and its sources are more complex, often from natural sources and man-made sources. Volcanic eruptions, sand dust, fires, etc. in nature can cause particulate matter; human activities such as industrial production, building construction, straw burning, and vehicle exhaust emissions can also generate particulate matter. It can be combined with genetic algorithm to reduce the speed of calculating individual fitness function, so as to reduce the consumption of resources in this process. Figure 2 Analysis of total atmospheric environment model.

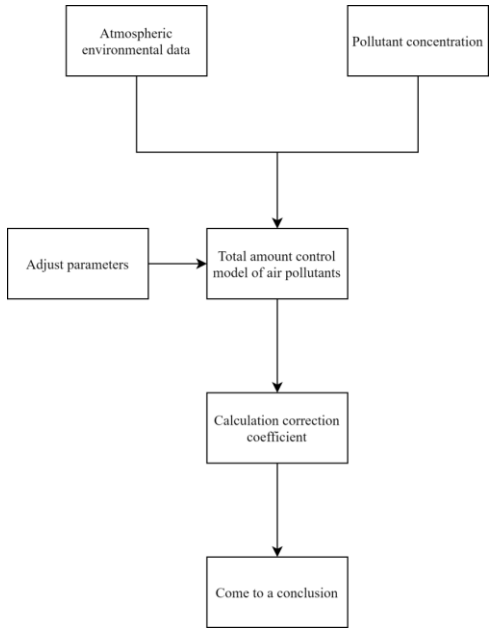

Figure 2: Analysis of atmospheric environment total quantity model.

$$NDVI = (NIR - R)/(NIR + R) \tag{3.8}$$

To analyze the development trend of environmental protection, we should strengthen the construction of monitoring and management mode of ecological air pollution sources through computer technology. In addition, the automatic monitoring of pollutant discharge at the sewage

outlet is closely connected with the online monitoring of the operating conditions of the air pollution treatment plant facilities, which is jointly committed to the smooth progress of pollution reduction. Figure 3 shows the workflow of the total air pollution control model.

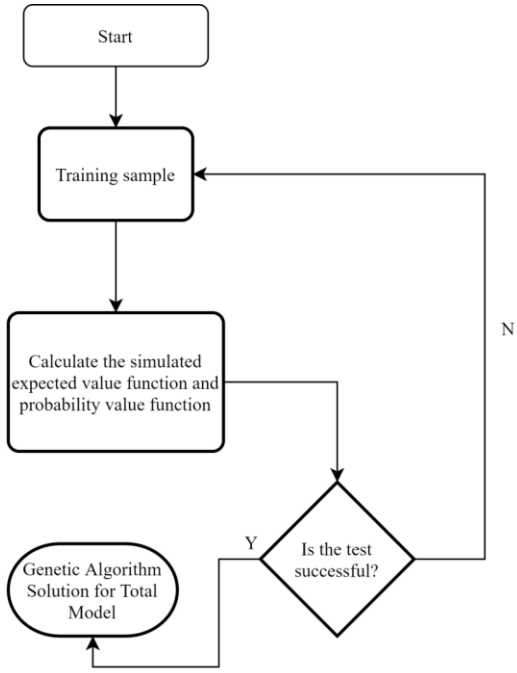

Figure 3: Workflow of the total air pollution control model.

The concentration of pollutants does not conform to normal distribution, so the Spearman rank correlation coefficient in nonparametric analysis can be used for quantitative analysis of these six pollutants. The particle size of PM2.5 is smaller, and it is easier to invade the human body. Therefore, at similar pollution levels, PM2.5 is more harmful to human health and has a very adverse impact on human health. Therefore, it is more necessary to control it effectively. The days and proportions of primary pollutants in the data of control monitoring stations in the Ma research area from 2016 to 2021 are sorted into Table 1. The number of days with an excellent air quality evaluation will not be counted for primary pollutants.

Site name	*Days of pollution*	*Days*	*$PM_{2.5}$ ratio*	*Days*	*NO_2 ratio*
Hudong rd No.4 primary school	1756	456	26%	90	51%
Development zone	1789	500	29%	198	50%
Cihu	1766	618	34%	146	43%
Magang	1763	623	35%	132	41%

Table 1: Number of days and proportion of primary pollutants in the study area from 2016 to 2021.

It can be seen from the chart that the pollutants in the study area are mainly NO2, accounting for more than 40%. In addition, the daily change curve of fine particulate matter (PM2.5) shows a bimodal distribution, and the first peak appears at 8:00 a.m., which may be caused by the sudden increase of vehicle exhaust emissions in the morning peak and the road dust caused by travel. As the atmospheric boundary layer becomes unstable after noon, the vertical exchange capacity of air turbulence becomes stronger, The concentration of PM2.5 decreased again and again until it

reached the lowest at 16:00 p.m., then the sun set, the radiation gradually weakened, the height of the atmospheric mixing layer slowly decreased, and the concentration of PM2.5 began to increase gradually.

4 CONCLUSION ANALYSIS AND DISCUSSION

In this paper, the improved random optimization method is used to evaluate the quality of monitoring samples, and a horizontal comparison is made. The evaluation results show that the air quality of urban ecotourism areas is obviously unbalanced, especially in the areas where the ecological areas overlap with the main urban areas and are close to some industrial and infrastructure pollution sources, the atmospheric environment level is low, and the impact of human activities such as transportation and commerce is obvious; The barrier function of the coastal green space is not obvious and still needs further construction. Figure 4 shows the monthly mean concentration of fine particles at the monitoring points in the study area and the city in 2021.

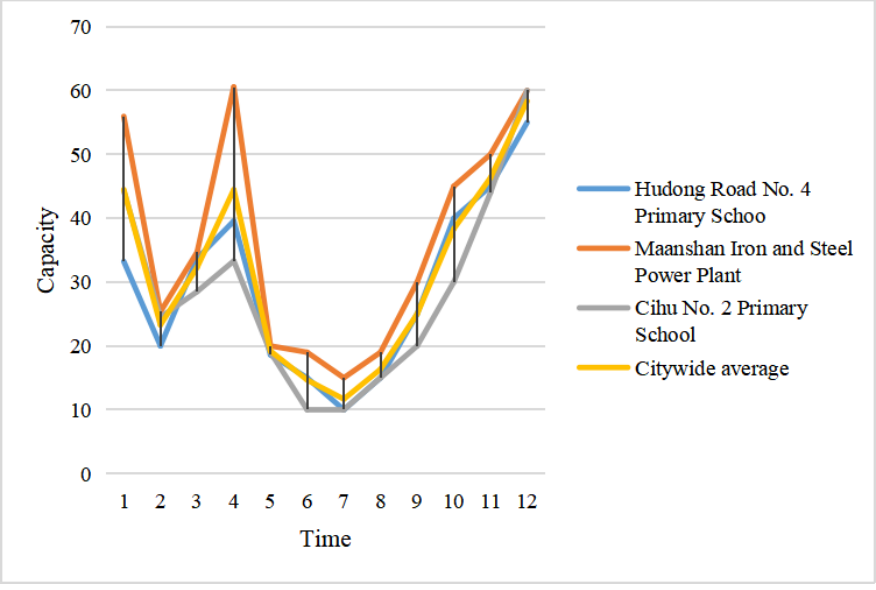

Figure 4: Monthly mean concentration of fine particles at the monitoring points in the study area and the city in 2021.

When the dust weather occurs, the accompanying strong wind and other meteorological conditions are conducive to the diffusion of SO2, while the strong dust weather causes the daily average concentration of PM10 to increase rapidly, and the concentration of PM2.5 will also increase in the case of floating dust, resulting in the decline of atmospheric environmental quality. The number of days affected by dust in 2017-2020 is 12. Because of the topography and geomorphology of China, the type of dust weather process is basically the type of imported floating dust. The sand dust weather process in 2018 and 2019 has a great contribution to the air quality PM10 and PM2.5 concentrations. Figure 5 shows the monthly average concentration of SO2 in the study area and the city's average monthly SO2 concentration in 2022.

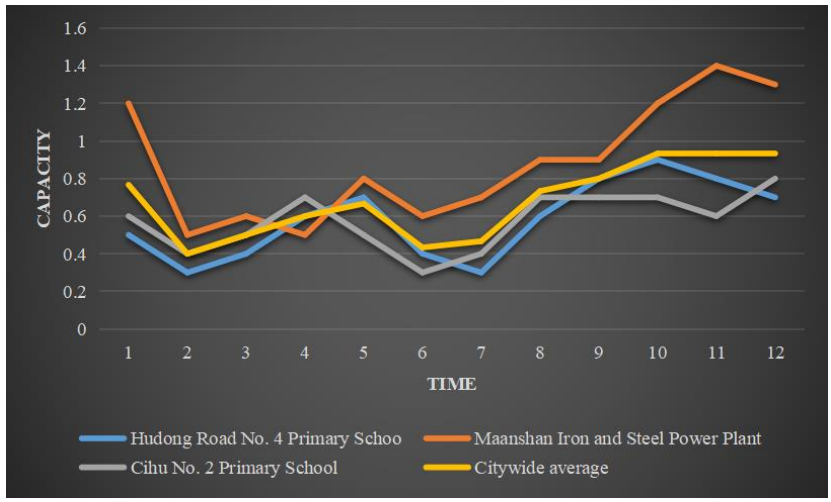

Figure 5: Monthly average concentration of SO2 at the monitoring points in the study area and the city in 2021.

There are moderate correlations, high correlations, and high correlations of PM10, and most of PM2.5 are highly correlated. From this, it can be preliminarily analyzed that the correlation between PM10, PM2.5 and the air quality rate is relatively high. The daily concentration change of O3 in the study area is shown in Figure 6.

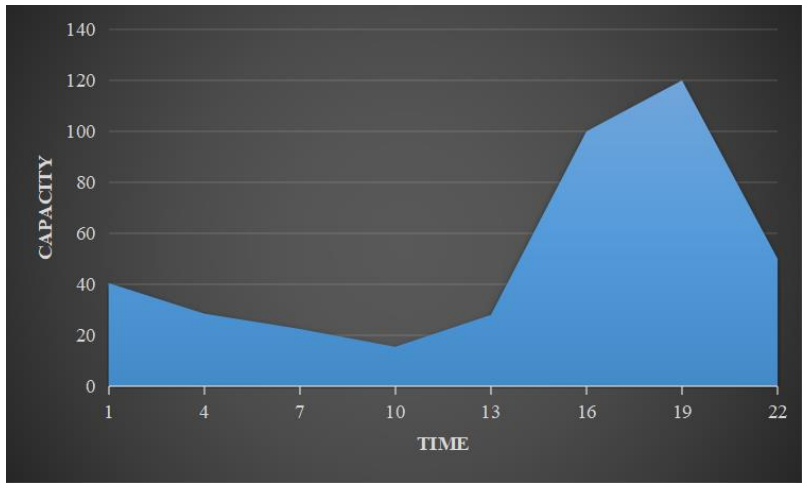

Figure 6: Daily concentration change of O3 in the study area.

In addition, the comparative research among various machine learning methods in ecotourism suitability evaluation research has not yet been involved, and the suitability evaluation research based on machine learning algorithm needs to be further studied. For the future analysis of atmospheric environmental quality in eco-tourism areas, it can be considered that on the basis of traditional research methods, combining the advantages of machine learning algorithms, and combining many classification algorithms for comparative analysis. See Figure 7 for the monthly average change of air quality level pollution days from 2016 to 2022.

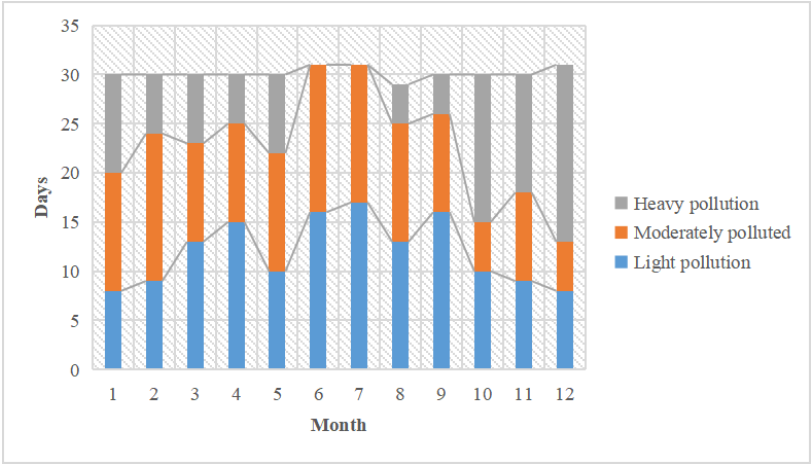

Figure 7: Monthly average change of air quality level pollution days from 2016 to 2022.

Due to climatic factors, regional pollution and local emissions, the study area has the most polluted days in winter, accounting for about 30% of all polluted days; from May to July, affected by ozone pollution, there is a peak for a period of time, accounting for 30% of all polluted days. 25% or so. It can be seen that the air pollution situation in the study area is still relatively severe in winter, and the pressure on air pollution control is relatively high.

5 CONCLUSIONS

In this paper, a stochastic optimization method is proposed to analyze the characteristics of atmospheric environment quality in ecotourism areas. It can be used for regional ecotourism to achieve the analysis of the atmospheric environment quality in the ecotourism area, and finally the simulation test and analysis were carried out. The optimized system does not need complex pretreatment process, and only needs to store the collected samples in the quantitative loop to realize direct injection and sampling. It can repeat the detection in a short time, avoid the system error caused by external state changes, and the detection results are more reliable and accurate. This optimization method is used to monitor the ambient air. In view of the shortcomings of the current gas chromatographic column automation, this study optimized its automation system, which does not require manual sampling and injection, and has a time adjustment window on the human-computer control interface to reduce human error. This study analyzed and optimized the atmospheric environment quality of ecotourism areas. Through the combination of various methods, the concentration of air pollutants can be accurately detected, real-time data output can be realized, and historical curves and data can be read and applied to practical applications. Monitoring and analysis of atmospheric environment quality in ecotourism areas.

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Shanshan Zhou, https://orcid.org/0009-0002-5777-0359
Lu Zhou, https://orcid.org/0009-0002-9509-868X

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