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Intelligent Analysis Framework of Big Data and Comprehensive Evaluation in Comprehensive Evaluation of Water Environment Quality

Guo Tao
Xuecheng District Environmental Monitoring Station
Zaozhuang, China

Dong Yunqin
Zaozhuang College
Zaozhuang Shandong
277100, Shandong, China

Abstract:Based on big data, this paper analyzes the intelligent analysis framework applied in the comprehensive evaluation of water environment quality. It is believed that the water environment quality evaluation standard is actually an interval concept rather than a point concept. Therefore, the traditional intelligent analysis framework treats the evaluation standard as an ideal point. There are certain flaws. In order to overcome this shortcoming, a multi-objective decision-ideal interval method (MODMIIM) is proposed. Compared with the PP model and neural network method, MODMIIM is simple and effective; compared with the intelligent analysis framework, it has greater applicability and increased by 7.6%. MODMIIM can be widely used in comprehensive evaluation of various environmental quality.

Keywords: Intelligent Analysis, Big Data, Water Environment Quality, Comprehensive Evaluation

1. INTRODUCTION

The comprehensive evaluation of water environment quality is actually based on the classification standards of water quality evaluation to determine the comprehensive quality of water environment in a certain area within a certain period of time which is the closest to the standard, and then the comprehensive quality of the water environment in the area is considered to belong to this level. At present, there are many methods for comprehensive evaluation of water environment quality, such as fuzzy comprehensive evaluation method, unascertained measurement model, grey relational analysis method, neural network method, PP model method and multi-objective decision-ideal point method. Each method has its own characteristics. The multi-objective decision-making-ideal point method is not only simple to operate and easy to understand, but also can reflect the complex relationship between the quality of the water environment and various pollutants or nutrients. However, multi-objective decision-making-ideal the point method has certain flaws in processing the evaluation criteria into points [1-6].

In order to overcome this shortcoming, this paper proposes a Multiple Objective Decision Making Ideal Interval Method (MODMIIM), and applies it to the comprehensive evaluation of water environment quality. Based on the Internet of Things technology, the application of high-speed and reliable network interaction technology has built a data transmission network integrating wireless networks, sensor networks, wired networks and other forms of networks, and successfully realized the data transmission and perception of the water environment. Networked management of processing; smooth communication between various monitoring points is realized, and the mobile deployment of testing instruments is effectively carried out. Among them, the perception layer corresponds to on-site detection instruments for monitoring factors of water environment pollution, while the network interaction layer corresponds to various networks (wired and wireless networks). The operation of the basic support layer mainly relies on the background computer system to complete various monitoring the intelligent processing of data and the intelligent application layer realize various specific services of the water environment automatic monitoring system. Big data provides new opportunities for solving various ecological and environmental problems. At present, in addition to disciplines closely related to big data such as geography and climate change, the field of ecology and environmental sciences has gradually realized the advantages of big data and carried out related research (Liu Lixiang et al., 2017). In 2015, the State Council issued the "Outline of Action for Promoting the Development of Big Data" to make arrangements for the construction of big data in my country, and upgrade the construction of big data to a national strategy. In 2016, the Ministry of Environmental Protection organized the compilation of the “Overall Plan for the Construction of Ecological Environment Big Data”, which clearly pointed out that through the construction and application of big data, it is necessary to achieve scientific comprehensive decision-making on the ecological environment, precise ecological environment supervision, and public ecological environment in the next five years [7-14].

At present, big data is widely used in the field of ecological environment, such as air pollution control, climate change prediction, and ecological network monitoring. At present, there are many comprehensive evaluation methods for water environment quality, such as multi-level fuzzy pattern recognition model method, fuzzy neural network method, projection pursuit model method (PP method), multi-objective decision-making ideal point method, multi-objective decision-making ideal interval method, grey theory method Each method has its own characteristics. This article is based on the traditional approach to the ideal solution technology (TOPSIS) based on the degree of eutrophication of the water environment quality and the unideal (negative ideal) and ideal (poor and good) of the water environment quality inspection point (evaluation plan) to be evaluated.) These typical fuzzy concepts put forward the approximate ideal solution method based on fuzzy set (Technique for Order Preference by Similarity to Ideal Solution based on Fuzzy Set,TOPSISFS), and apply it to the comprehensive assessment of water environment quality. To prevent and control environmental pollution and improve environmental quality, environmental monitoring is the key. Environmental monitoring must fully rely on technological progress, use technology. In recent years, the rapid development of my country's Internet of Things technology has provided new technologies, new methods and new ideas for environmental protection [15-24].

2. THE PROPOSED METHODOLOGY

2.1 The Big Data Model

The definition of big data has not yet been unified, but the core connotation is largely the same. The "Outline of Action to Promote the Development of Big Data" points out: Big data is a data collection with large capacity, multiple types, fast access speed, and high application value. It is rapidly developing into a large number of data with scattered sources and diverse formats Perform collection, storage, and correlation analysis to discover new knowledge, create new value, and enhance new capabilities of a new generation of information technology and service formats.

From the 3V characteristics of big data: the data's scale (Volume), structure diversity (Variety) and high speed (Velocity) gradually expanded to 6V characteristics, increasing the authenticity (veracity), variability (Variability) and value (value) (Gandomietal, 2015); As a collection center of environmental information resources, the cloud data center can provide storage and management services for various environmental protection service systems and various basic data collected by equipment in the intelligent service platform of the Internet of Things, and Through unified organization, sharing and use among multiple applications, expanding the utilization rate and scope of development and utilization of Internet of Things information resources. At the same time, as an information resource application service center, the cloud data center processes and comprehensively processes the aggregated information resources, constructs various application services, and provides reliable and efficient common technical support for the construction of application services. Meet the business needs of personnel at different levels and scope of responsibility. The ground monitoring data mainly comes from online monitoring systems for the ecological environment in various places. Due to the different development periods of the systems, the different technical means, and the diverse data formats, it is difficult to form information sharing between the systems.

Satellite remote sensing monitoring data mainly comes from satellite remote sensing data and aerial remote sensing data, including terrain, vegetation coverage and other data, which are huge data involving different regions and different time series. The sources of geographic information data mainly include field collection, map digitization, aerospace remote sensing collection, and photogrammetry.

2.2 The Comprehensive Evaluation of Water Environment Quality

The company's emissions indicators are charged to the company's IC card and carried out on a monthly basis, and the company's emissions are measured and controlled. Once the enterprise's emissions indicators are used up, the system will automatically close the discharge valve, thus the control effect is reflected. The structure diagram of the sewage system is shown in Figure 1. The traditional TOPSIS is a decision-making method based on ideal points. The basic idea is to define the optimal vector and the worst vector of the decision-making problem. The relative closeness between the best vector and the worst vector, sort and make decisions based on this size. The opposing concept of unideal (negative ideal) and ideal (inferior and superior) of a certain plan to be evaluated does not have an absolutely clear boundary in the process of dividing it. It has an intermediary transitional nature. It is an objectively existing fuzzy concept. Use a Express. On the other hand, "decision-making is carried out in the universe X, that is, comparison between n schemes in the universe, which has nothing to do with outside the universe. This is the relativity of decision-making. Therefore, the relative negative ideal solution and the relative ideal solution in the universe of X can be established, and then the relative closeness of the plan to be evaluated to A can be calculated as the criterion for the comparison of plan decisions.

The degree of eutrophication of water environment quality is a fuzzy concept. Regarding different water quality levels as plans to be evaluated, the relative closeness of each level can be calculated. Compare the relative proximity of n water environment detection points with the relative proximity of different levels to evaluate the water quality level of the water environment detection points. The opposing concept of unideal (negative ideal) and ideal (inferior and superior) of a certain plan to be evaluated does not have an absolutely clear boundary in the process of dividing it. It has an intermediary transitional nature. It is an objectively existing fuzzy concept. Use A Express. On the other hand, "decision-making is carried out in the universe X, that is, comparison between n schemes in the universe, which has nothing to do with outside the universe. This is the relativity of decision-making. Therefore, the relative negative ideal solution and the relative ideal solution in the universe of X can be established, and then the relative closeness of the plan to be evaluated to a can be calculated as the criterion for the comparison of plan decisions.

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3. CONCLUSIONS

In view of the shortcomings of the intelligent analysis framework in the concept of treating the quality standards as points in the water environment impact assessment, in order to more symbolize the actual water environment quality standards, this article improves the intelligent analysis framework and treats the quality standards as a concept of interval. A multi-objective decision-ideal interval method is used to apply the multi-objective decision-ideal interval method to the comprehensive assessment of the water environmental quality of the Lakes. The results obtained are scientific, reasonable and comparable.

4. REFERENCES

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