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Retraction

Retracted: Application of Big Data Technology in Environmental Pollution Control in Energy Ecological Economic Zone

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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) Peer-review manipulation

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.

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[1] X. Jin and X. Jin, "Application of Big Data Technology in Environmental Pollution Control in Energy Ecological Economic Zone," *International Transactions on Electrical Energy Systems*, vol. 2022, Article ID 1569905, 7 pages, 2022.

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Research Article

Application of Big Data Technology in Environmental Pollution Control in Energy Ecological Economic Zone

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In order to solve the problem of environmental pollution control in the energy ecological economic zone, this paper proposes a technology to realize environmental pollution control by using big data. The main content of this technology is based on the characteristics and application of big data technology; through the collection of online monitoring data of ecological environment pollution, the construction of the online monitoring data quality model of ecological environment pollution, and finally through the experiments in the simulation environment, the feasibility of big data technology is obtained. The experimental results show that the average quality factor data of the quality control model in the environmental scientific data supervision is 2.16, the average quality factor data of the Internet of things in the marine pollution monitoring is 5.88, and the average quality factor data of the model in the ecological environment pollution online monitoring based on the big data technology is 8.64. Big data technology has good applicability. It is proven that the research of big data technology can meet the needs of environmental pollution control in the energy ecological economic zone.

1. Introduction

With the acceleration of economic development and urbanization, the problems of resource shortage and environmental degradation are becoming more and more serious. People gradually realize the importance of coordinated development of the economy and environment. While developing the economy, paying attention to environmental protection has become a topic of common concern to the whole society [1]. Economic development and resources and the ecological environment restrict and promote each other. In the past 30 years, human living standards and material conditions have been greatly improved with the continuous development of social productivity. However, with the continuous development of productivity and science and technology, the environmental pollution problem of globalization has become increasingly prominent and has become the most serious problem facing mankind (Figure 1). Its main manifestations are air pollution, marine pollution, urban environment, and other problems directly caused by land desertification and forest vegetation destruction. Various pollution phenomena have caused serious damage to the global ecosystem and affected the normal life of human beings. Natural or man-made addition of certain substances to the environment, which exceeds the self-purification capacity of the natural environment, is generally called environmental pollution. The scope of environmental pollution generally includes air pollution, water resource pollution, soil geological pollution, noise pollution, and various radioactive element pollution. Environmental pollution control mainly refers to the specific means and measures to control the discharge of various pollutants. At present, it mainly includes two main aspects: pollutant emission control technology and pollutant emission control policy. It should be noted that the formulation of specific policies for pollution control is the basic function of the government. The process of policy formulation is determined according to the environmental quality and economic development of the country or region [2].

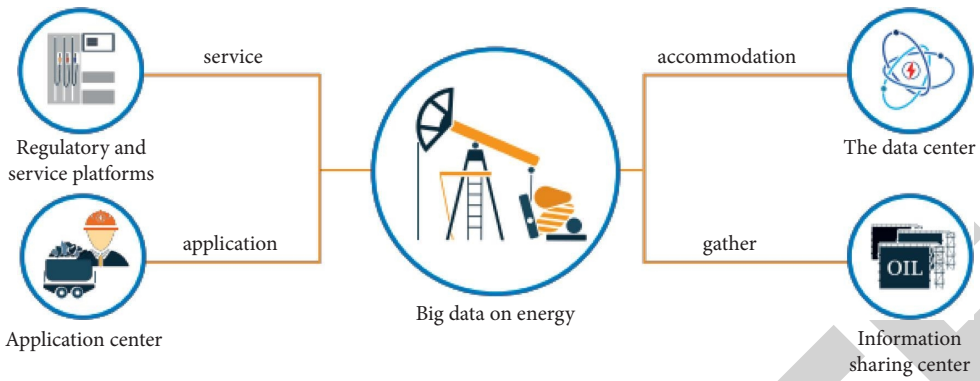

Figure 1: Application of big data technology in environmental pollution control in the energy ecological economic zone.

For a long time, the extensive development mode continued by China's rapid economic prosperity has resulted in the waste and depletion of resources and the destruction and deterioration of the ecological environment. People are not only gradually feeling the increasingly rich material and cultural life but also personally feel the increasingly severe environmental protection situation. As the global climate change problem continues to heat up, it is facing increasing pressure from the international community to reduce emissions. Developed countries continue to put pressure on China to commit to emission reduction obligations [3]. In view of this, the effective implementation of environmental pollution control policies is not only effectively promoting the sustainable development of the economy and society but also, as a responsible big country, China is showing its image as a responsible big country to the international community.

2. Literature Review

With the vigorous development of the country's current economy, under the current background, the acceleration of urbanization and industrialization has exacerbated environmental problems and posed a great threat to people's production, life, and health. Under the traditional extensive development strategy, the problems of environmental pollution and ecological damage cannot be recovered in a short time, and the impact on the natural ecological balance cannot be estimated. Traditional environmental monitoring and diagnosis rely more on manual methods. The work under the manual operation mode is intensive, stressful, and time-consuming. With the increasingly serious environmental problems and the arrival of the information age, we should pay attention to the application of big data monitoring and diagnosis technology to promote the reform of environmental protection work. With the increasing attention to environmental protection around the world, more and more human, material and technology have been invested in environmental protection, and the scope and content of environmental protection monitoring have become more and more extensive. This trend has exacerbated the difficulty of environmental protection, monitoring, and diagnosis. For example, taking environmental monitoring as an example, it is necessary to conduct real-time and dynamic monitoring of air, water, soil, noise, and other pollution. Once it is found that harmful substances or gases exceed the normal standard through corresponding monitoring, the local environmental protection department should immediately formulate corresponding treatment countermeasures according to the degree and type of pollution. Therefore, big data technology provides technical support for environmental monitoring, enabling the orderly progress of environmental monitoring. In the process of promoting environmental protection, the state has successively issued corresponding environmental protection policies. The introduction and implementation of various environmental protection policies have made environmental pollution under certain control, which is in line with the overall strategic goal of sustainable development. The application of big data technology in environmental monitoring and intelligent diagnosis is an inevitable requirement in the information age. In the corresponding environmental work, the application of big data technology can effectively provide corresponding data support for the formulation of environmental protection policies [4].

In view of the above problems, this paper proposes the application of big data technology in environmental pollution control in the energy ecological economic zone [5]. The main content of this technology is based on the characteristics and application of big data technology; through the collection of online monitoring data of ecological environment pollution, the construction of online monitoring data quality model of ecological environment pollution, and finally through the experiments in the simulation environment, the feasibility of big data technology is obtained. Big data technology is used to collect online monitoring data of ecological environment pollution. By setting the online monitoring frequency of ecological environment pollution, the online monitoring data quality model of ecological environment pollution is constructed.

3. Research Methods

3.1. Research on Big Data

3.1.1. Big Data. The global research institute first gave such a definition to big data. Big data is a kind of data aggregation, and its scale far exceeds the storage, management, analysis,

and application capabilities of traditional data technologies [6]. There is a large amount of data involved in big data. Using some conventional software tools, it has been unable to mine its most valuable information in a very limited time, and there are certain difficulties in management and in-depth processing. Therefore, it is necessary to develop more advanced big data technology to provide services for solving practical problems. This definition emphasizes the role and value of big data from another level. It points out the main characteristics of big data and emphasizes its importance to the five in one construction of economic, political, cultural, social, and ecological civilization. Although there is no unified definition of big data, it has become a global focus and an important force to promote the development of modern society.

With the development of informatization, big data has accumulated certain resources in many industries and fields. The Internet industry is the first field that has achieved fruitful research results. The application of big data in finance, government affairs, retail, industry, medical and health care, and other fields has also shown a step-by-step growth [7]. In the research released by the Big Data Industrial Innovation Research Institute, 100 enterprises with high market popularity and obvious differentiated competitive advantages were collected. Through the reclassification and summary of the industry fields corresponding to these cases, the statistical results are shown in Figure 2.

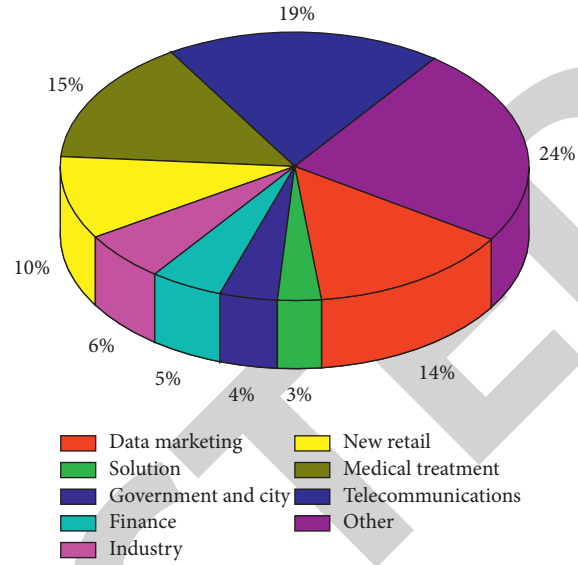

Figure 2: Classification of big data application fields.

3.1.2. Build a Smart Environmental Protection Platform Based on Environmental Protection Big Data. As far as environmental protection is concerned, it involves many work contents and a wide range. As far as environmental monitoring is concerned, it involves the monitoring contents of air quality, water quality, soil, meteorology, and so on. In the process of promoting the routine environmental protection work, there are relatively many departments involved in the environmental protection work. The work of different departments is relatively independent and scattered, and they are responsible for different types of data. It is difficult to achieve unified processing for various types of data collection, analysis, and processing. With the arrival of the information age, in the process of promoting environmental protection, people gradually realize the advantages of information technology and intelligent technology and actively apply big data technology in environmental monitoring and intelligent diagnosis [8].

The construction idea of the environmental protection big data sharing platform is shown in Figure 3. The relevant environmental work departments need to build not only a professional data processing platform but also an information database consistent with the platform. Through the effective cooperation between the data platform and the database, the integration and utilization of environmental information data are fully guaranteed [9]. Taking a city as an example, its investment in big data monitoring and intelligent diagnosis of environmental protection has increased. Through special research on environmental protection, the platform has many functions, such as monitoring, monitoring, early warning, video monitoring, intelligent analysis, environmental supervision, and decision support; after the platform was put into use, the environmental work has ushered in major changes. Once the corresponding environmental indicators exceed the normal standards, the intelligent early warning module in the platform will immediately start the corresponding early warning to remind the relevant departments.

3.2. Design of the Data Quality Model for Online Monitoring of Ecological Environment Pollution

3.2.1. Collect Online Monitoring Data of Ecological Environment Pollution. Taking advantage of big data technology, the collection method of online monitoring data of ecological environment pollution is optimized. Considering the impact of industrial wastewater discharge and industrial waste gas, the ecological environment pollution sensor data collection is carried out by using chips with low cost and power consumption. Through the collected online monitoring data of ecological environment pollution, the types of ecological environment pollution are counted [10]. The CC2430 chip is used to calculate the computing unit. The MCU 8051 single chip is used as the controller, the ADC channel is used to connect with the data acquisition unit, and the standard comparison method in big data technology is introduced to judge whether there is pollution in the node field. The standard comparison method is to establish a pollution-free ecological environment curve function, which is expressed as

$$Z = \lim_{0 \longrightarrow \infty} Q_n \bigcap_{i=1}^{n} X_i f!. \quad (1)$$

Based on the ecological environment curve function, the online monitoring data of ecological environment pollution are obtained by relying on the sensor data acquisition unit, and the online monitoring curve function is established [11], specifically expressed as

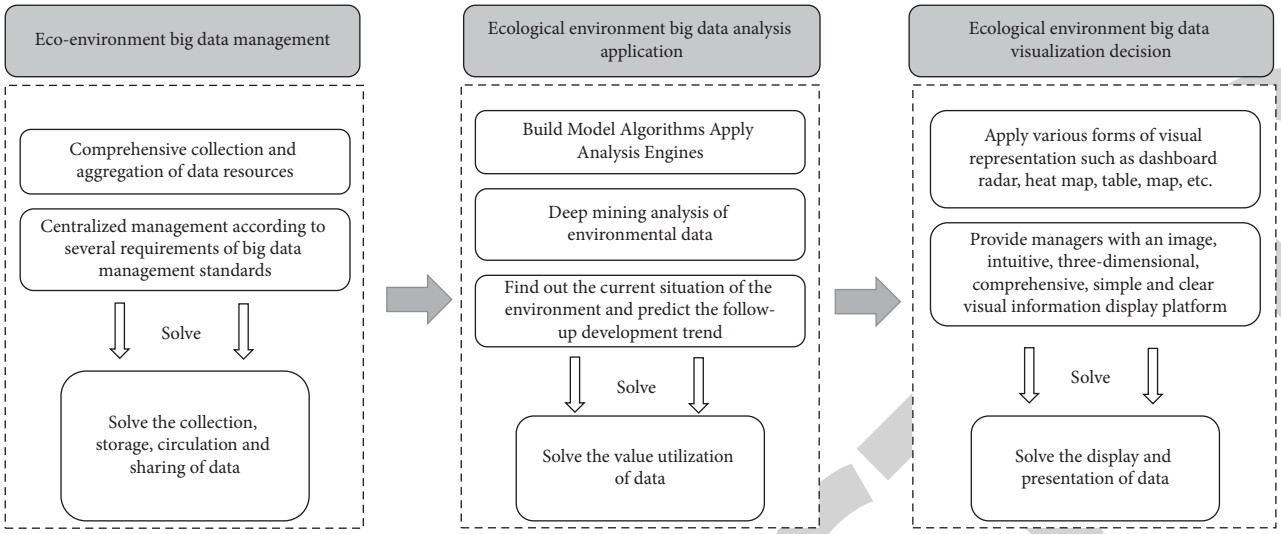

Figure 3: Construction idea of environmental protection big data sharing platform.

$$C = Z\gamma_i + W_0 \frac{\partial^2 q_k \mathrm{d}x}{S}. \tag{2}$$

In formula (2), Z represents the ecological environment curve function without pollution, γ_i represents the eco-environmental adaptation coefficient, W_0 represents the online monitoring time, q_k represents the online monitoring data of eco-environmental pollution, and S represents the online monitoring distance. Perform the difference operation between formula (2) and formula (1), and the difference operation formula is

$$f(x) = \Delta C - \Delta Z. \tag{3}$$

If the difference of formula (3) is zero, it indicates that ecological environment pollution has occurred. If the difference of formula (3) is larger, it indicates that the degree of ecological environment pollution is more serious [12].

The period flux in big data technology is used to set the online monitoring frequency of ecological environment pollution. Period flux refers to the pollution degree of the ecological environment within the specified time. According to the ecological environment pollution, the calculation formula of period flux is divided into tidal period flux and nontidal period flux. The calculation formula of tidal period flux is

$$W_t = \int_0 {}'Q_i \frac{C_i}{\mathrm{d}t}. \tag{4}$$

Based on the calculation of ecological environment pollution, determine the online monitoring frequency of ecological environment pollution according to the ecological environment pollution and provide judgment basis for the online monitoring data quality model of ecological environment pollution [13].

3.2.2. Construction of the Data Quality Model for Online Monitoring of Eco-Environmental Pollution. According to the setting results of online monitoring frequency of ecological environment pollution, online monitoring data of ecological environment pollution can be obtained. Based on the quality of online monitoring data of ecological environment pollution, the quality information of online monitoring data of ecological environment pollution can be fused. The main purpose of online monitoring data quality information detection and fusion of ecological environment pollution based on big data technology is to fuse online monitoring data quality information by using multisensors in big data technology [14].

As the online monitoring system for ecological environment pollution is composed of multiple sensors, distributed data fusion mainly includes two structural modes, as shown in Figure 4 and Figure 5.

According to the above process, each node in the cluster is configured with its corresponding decision-making task to fuse the quality observations of the online monitoring data of ecological environment pollution of each information fusion node and transmit them to the cluster head node. The cluster head node will make the final decision and judgment on the quality information of the online monitoring data of ecological environment pollution according to the local decisions on the quality of the online monitoring data it receives [15]. Formula of fusion processing is

$$P_d = \sum_{j=k}^{N} \sum_{n/w} \prod_{t}^{n_l} \left(1 - P_d^i\right)^{1-i}. \tag{5}$$

In equation (5), k represents the online monitoring data quality information fusion processing threshold, N represents the number of observations of the online monitoring data quality information, P represents the likelihood function, d represents the detection rate of the online monitoring data quality information of the sensor, i represents the false detection probability of the online monitoring data quality information, o represents the false alarm probability, and j represents the fusion criteria of the online monitoring data quality.

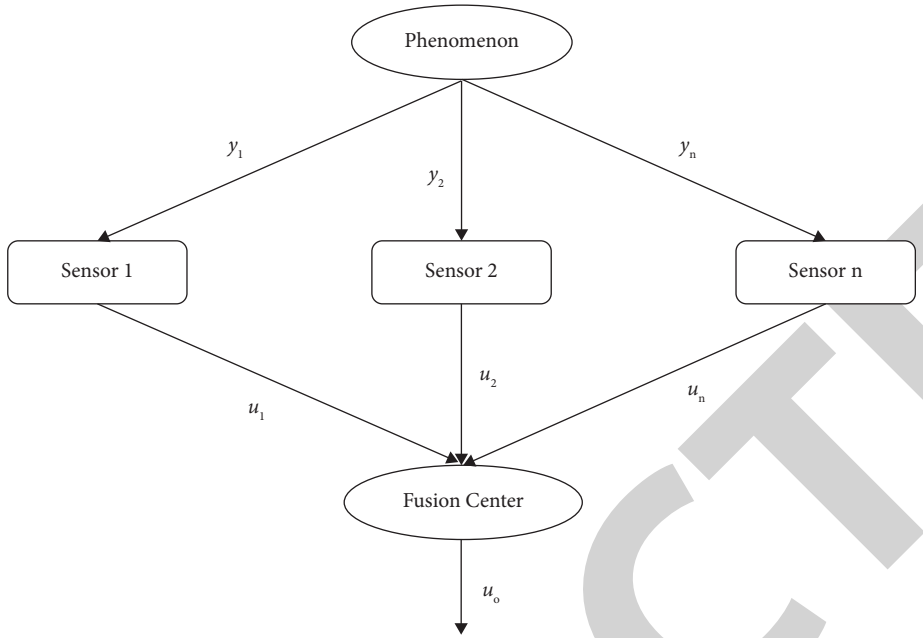

Figure 4: Distributed data fusion mode, fusion model A.

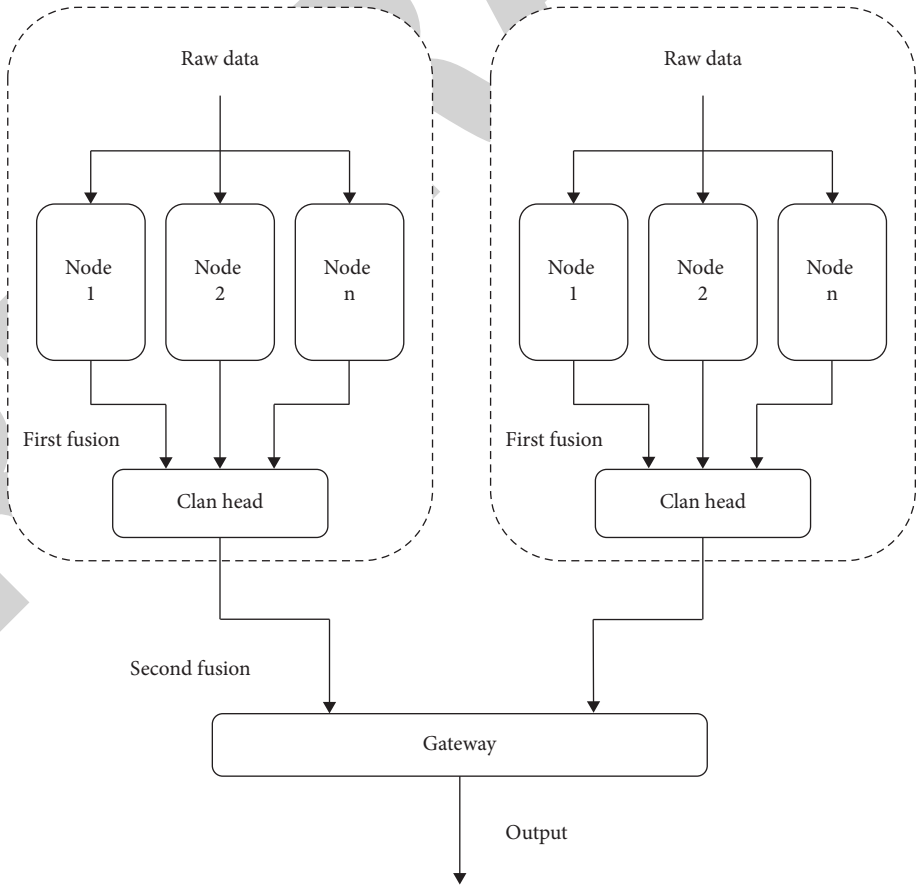

Figure 5: Distributed data fusion mode, fusion model B.

Table 1: Quality test results of online monitoring data of ecological environment pollution.

Quality control model in scientific data supervision under environment		The model of internet of things technology in marine pollution monitoring		Online monitoring model of ecological environment pollution based on big data technology	
Iterations/time	Quality factor	Iterations/time	Quality factor	Iterations/time	Quality factor
1	2.2	1	6.0	1	9.0
2	3.3	2	6.6	2	8.3
3	1.0	3	5.3	3	9.2
4	2.7	4	6.2	4	8.5
5	1.6	5	5.3	5	8.2
Mean value	2.16	Mean value	5.88	Mean value	8.64

In the distributed data fusion mode, formula of centralized information fusion is

$$\widehat{X} = \sum_{i=1}^{N} \alpha_i Y_t. \tag{6}$$

In equation (6), X represents the weighted estimation value of centralized information fusion, α represents the weighting factor of the data quality information node of the online monitoring of ecological environment pollution, and Y represents the output value of the clustering node t.

According to the setting results of the online monitoring frequency of ecological environment pollution, the online monitoring data of ecological environment pollution are obtained. By using the distributed information fusion mode, the final decision and judgment are made on the online monitoring data quality information of ecological environment pollution, and the online monitoring data quality model of ecological environment pollution is established [16].

4. Result Analysis

In order to verify the performance of the data quality model for online monitoring of ecological environment pollution based on big data technology, a simulation environment is constructed [17]. The quality control model in environmental scientific data supervision and the model of Internet of things in marine pollution monitoring are used for comparison. The test results are as follows [18]. Table 1 shows the test results of online monitoring data quality of ecological environment pollution of the three online monitoring data quality models of ecological environment pollution. The average quality factor data of the quality control model in the environmental scientific data supervision is 2.16, the average quality factor data of the Internet of things in the marine pollution monitoring is 5.88, and the average quality factor data of the ecological environment pollution online monitoring model based on the big data technology is 8.64. Big data technology has good applicability [19].

5. Conclusion

In order to solve the problem of environmental pollution control in the energy ecological economic zone, a technology using big data was proposed. The main content of this technology is based on the characteristics and application of big data technology; through the collection of online monitoring data of ecological environment pollution, the construction of online monitoring data quality model of ecological environment pollution, and finally through the experiments in the simulation environment, the feasibility of big data technology is obtained. Big data technology is used to collect online monitoring data on ecological environment pollution. By setting the online monitoring frequency of ecological environment pollution, the online monitoring data quality model of ecological environment pollution is constructed. The simulation results show that the data quality factor of this model is much higher than that of the other two methods in many iterations, which shows that the method designed in this paper can ensure the data quality of online monitoring of ecological environment pollution.

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 conflicts of interest.

Acknowledgments

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