

## ***Urban and Rural Natural Environment Protection Policies Based on Big Data Evaluation***

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**Abstract:** With the application of Big Data (BD), human production activities have been greatly affected, especially in the protection of environmental pollution in some regions. Therefore, the problems existing between the ecological environment and social and economic development should be paid attention to and solved in combination with the rapid development of science and technology. At present, the form is in the period of accelerated urbanization, industrialization and industrial structure adjustment. Due to the continuous improvement of urbanization construction speed, the coordination and unification of urban and rural planning has become one of the current research hotspots. There is a large amount of industrial wastewater and living garbage accumulation in rural areas, which seriously limits the application of BD technology. How to use scientific and reasonable methods to deal with it is extremely urgent. The traditional urban and rural natural environment protection model is too dependent on the professional opinions and subjective judgments of experts and scholars in the process of governance, and can not find the potential pollution in the natural environment in time. The means to deal with the environmental pollution problems are relatively simple. The cost of environmental protection is too high, and the implementation of natural environmental protection measures is not in place. To solve these problems, this paper proposed a model of urban and rural natural environment protection based on BD technology and combined with decision algorithm and computer technology. Through experimental comparative analysis, the innovative urban and rural natural environmental protection model was compared with the traditional urban and rural natural environmental protection model, and the average performance improvement was 13.8% in four aspects.

## 1. Preface

The arrival of the era of BD has brought new opportunities and also provided people with more available information resources. With the continuous improvement of social informatization level and technological innovation ability, BD plays an increasingly important role in life. With the development of human civilization, it is difficult to solve various urban and rural natural environmental protection problems with traditional methods. People should study the relationship with the natural environment in a scientific and reasonable way. They should explore its impact on the ecological environment and prepare countermeasures to protect the environment, so as to make urban and rural planning in the era of BD more harmonious and orderly.

Some experts and scholars summarized the pollution problems caused by the local urban and rural construction process to the natural environment by studying the local urban and rural natural environment protection policies, and put forward valuable suggestions for the protection and development of urban and rural natural environment. By studying the behavioral significance of local social subjects to the natural environment and combining with the ideological evaluation rules, Molinario Erica got the internal relationship between the local protection of the natural environment and the ideology of social subjects, and determined the practical significance for the proposal of the local natural environment protection plan [1]. Olimovich Allanazarov Quldosh studied the local natural environment pollution. Combining the role of different plants in different environmental problems, he analyzed the importance of plants in protecting the natural environment and improving the local urban and rural construction, and enriched the local urban and rural natural environment protection methods [2]. Stelmasiak Jerzy explored various pollution problems of the local natural environment in the process of urbanization, and combined with the local natural environment protection strategy. He analyzed the decision-making efficiency of the local natural environment protection strategy on the pollution problems in the natural environment, and determined that the formulation of effective natural environment protection policy was conducive to the improvement of the effect of natural environment protection [3].

By studying the local economic expenditures in the natural environment protection policy, and combining the expenditure cost and effectiveness evaluation, Bulajic Stanko obtained the cost-effectiveness ratio in air protection, wastewater management, soil remediation and other aspects through comparative analysis, and put forward valuable suggestions for cost control in the natural environment protection plan [4]. Hou Na explored the factors affecting the implementation of the local natural environment protection policy, and combined with the local impact on various fields during the implementation of the natural environment protection policy. He analyzed and obtained the promotion and impediment factors of the natural environment protection plan, and proposed a new dynamic development direction for the local natural environment protection plan [5]. Shahzad Tahir explored the internal relationship between the income of local people and the awareness of natural environmental protection, and compared the degree of payment of local people in different income ranges for environmental issues. He analyzed that people were generally willing to pay the price for better natural protection policies, and emphasized the close relationship between people and nature and the urgent attitude towards natural environmental protection [6].

Danovaro Roberto studied the quality change of the local natural water environment, and combined with the basic ecological variable framework. He carried out data analysis on the species diversity, ecosystem function, climate change and risk assessment of the natural water environment, and obtained the impact of the local natural environment protection policy on the natural water environment, so as to carry out optimization and exploration on this basis [7]. Ponitka Jens studied the local climate change and evolution, and combined with the air governance strategy in the local natural environment protection. He proposed the theoretical framework of efficient protection

policy for the natural environment, and opened up a new direction for the local natural protection development [8]. Bekezhanov Dauren explored the importance and necessity of sustainable development of natural environment protection and prevention of environmental disasters, and tentatively put forward a digital scheme of natural environment protection in combination with digital technology, thus expanding the development field of local natural environment protection strategies [9]. These studies laid a theoretical foundation for the proposal of the natural environment protection plan.

In addition, some experts and scholars have carried out exploratory research on the efficiency of natural environment protection strategies, thus hoping to make prospects for the development of natural environment protection policies in a broader technical field. By studying the implementation effect of natural environmental protection measures in the process of local urbanization construction, and combining with the survey technology to evaluate and analyze, Halaburda Malgorzata compared the data to get the low efficiency of natural environmental protection, thus emphasizing the importance of information technology in the evaluation of the implementation effect of natural environmental protection programs [10]. Zhang Kun-min explored the sustainable development of local natural environment, combined with the transformation of local economic development, and analyzed that the process of rapid economic development would bring great challenges to the protection of natural environment [11]. Hironaka Ann summarized the effectiveness of local natural environment impact assessment. He combined with the assessment data of local natural environment protection degree, and proposed that digital natural environment protection scheme was the future of environmental protection development [12]. However, none of the above studies put forward a relatively complete natural environment protection plan, which needed further study.

In the process of traditional urban and rural natural environmental protection, there are many difficult problems: People are too dependent on the professional opinions and subjective judgment of experts and scholars, and can not timely discover the hidden dangers of pollution in the natural environment. The implementation of natural environmental protection measures are not in place. The traditional urban and rural natural environmental protection program is summarized, and its advantages and disadvantages are displayed. Combined with BD technology, a new urban and rural natural environmental protection program is proposed, which can timely monitor the state of urban and rural natural environment.

## 2. Technical Evaluation of BD Network

With the advent of the era of BD, BD has provided great convenience for the collection and transmission of various information systems, and has been widely concerned by various subjects in society. BD is closely related to Internet technology and cloud computing, especially the rapid development of Internet technology, which provides an exponential impetus for the coverage of BD. In the current form of natural environment that has been seriously damaged due to the advancement of urbanization, the use of BD technology can more accurately and efficiently analyze the pollution problem, and take timely and effective measures to suppress or even solve it. While strengthening the protection of natural environment, it also promotes the process of urban and rural construction, and promotes the achievement of the strategic goal of green ecological sustainable development. The analysis of urban and rural environmental policies in the context of BD mainly refers to the use of scientific methods for planning and research, and the selection of its content, form and application technology.

It can be seen from the research that the focus of urban and rural environmental protection work under the background of BD is how to deal with the relationship between good people and nature. First of all, it is necessary to formulate punishment rules from the macro level to standardize the

layout and construction of urban space; secondly, it is necessary to put forward corresponding measures to improve the impact of people’s life behavior on environmental quality in the era of BD; finally, it is necessary to make a comprehensive and accurate analysis of the current situation and future trend of human society, and effectively prevent and control the natural environment pollution from the micro level. This paper used BD technology to obtain valuable content in a large, fast and diverse amount of environmental data through the analysis of environmental information. Through data analysis, pollution problems can be better predicted, identified and solved. BD technology uses the Internet as the basic platform to realize resource sharing and social interaction, and now it is time to integrate information technology into it to complete the goals and tasks of intelligent and information-based urban and rural beautiful environment construction. The structure flow of BD network is shown in Figure 1.

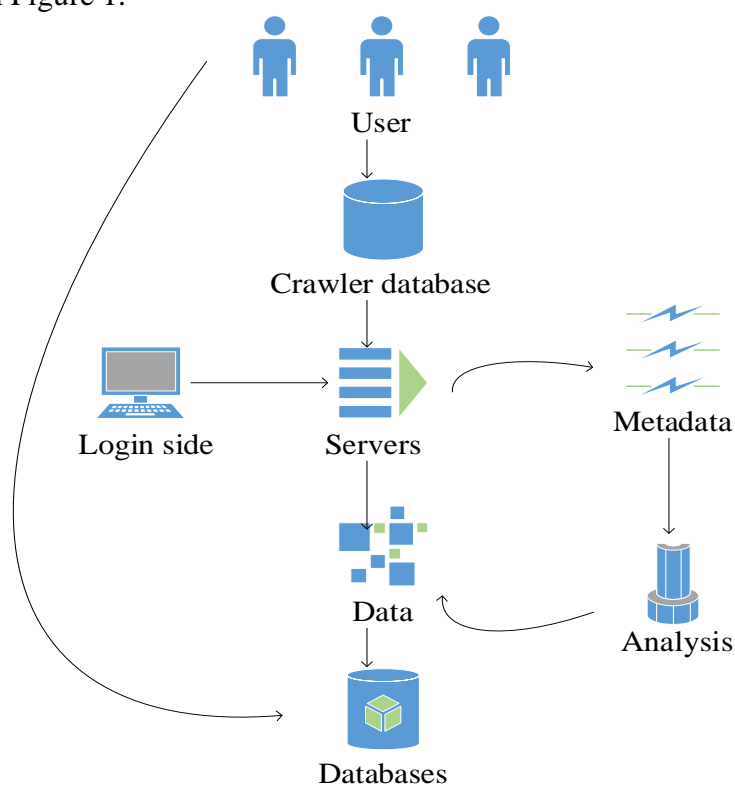


Figure 1. Structural processes for BD networks

### 3. Evaluation on the Development of Urban and Rural Natural Environment Protection Schemes

The protection policy of urban and rural natural environment has been formulated and implemented since the reform and opening of housing. The traditional urban and rural natural environment protection plan is mainly implemented by the local government through legislation, and establishes punitive rules to punish environmental pollution, such as the supervision of the discharge of complex industrial wastewater and solid waste by the environmental protection department, and the prevention and control of the occurrence of serious pollution problems. The traditional urban and rural natural environment protection plan is based on environmental protection. Through the development and utilization of natural environmental resources, the economy is vigorously developed. The relationship between economy and nature is coordinated, and the natural resources, energy and ecological environment are reasonably allocated. The traditional urban and rural natural environment protection plan mainly takes human resources as the main driving force

for the implementation of the plan and supplemented by the implementation of policies and the implementation of environmental protection concepts, and finally achieves the goal of accelerating the pace of green development and promoting the harmonious coexistence of human and nature.

Due to the rapid development of BD technology, new requirements are put forward for pollution control of urban and rural natural environment [13]. First, the construction of ecological civilization should be put in a prominent position. Before carrying out the ecological environment renovation, all the sewage generated in people’s daily life and the waste water generated in production activities must be discharged into the designated pre-purification environment; second, it is necessary to strengthen the control of garbage, waste and noise emission of rural residents, and do a good job in publicizing the education of natural environmental protection to improve the awareness of natural environmental protection of residents. Third, it is necessary to increase the investment of environmental protection funds and technical support and the implementation of policies to promote the improvement of the governance level of urban and rural natural environmental pollution [14]. The classification of sudden pollution problems of urban and rural natural environment is shown in Figure 2.

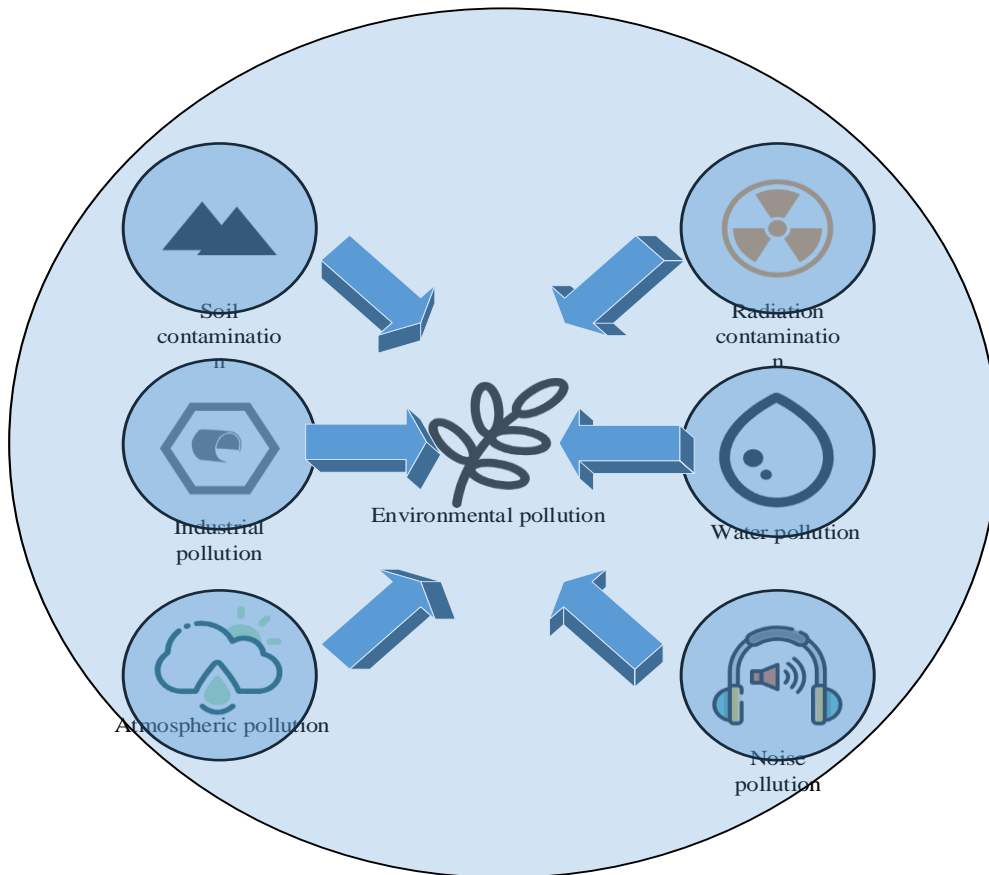


Figure 2. Classification of sudden pollution problems in the natural environment

#### 4. Evaluation of Decision Algorithm

In order to improve the information analysis capability based on BD technology, a fast parallel algorithm of decision tree is adopted [15]. Firstly, the collected environmental data set is divided into two sub-data sets  $W_1$  and  $W_2$ , and the continuous attributes  $X$  and boundary points  $C$  are obtained by ascending order. The information entropy  $Q(X,C;W)$  obtained by dividing the boundary points is calculated by Formula (1).

$$Q(X, C; W) = \frac{|W_1|}{M} Q(W_1) + \frac{|W_2|}{M} Q(W_2) \quad (1)$$

Among them,  $M$  represents the actual number of training data sets, and  $Q(W_1)$  and  $Q(W_2)$  represent the information entropy of data sets on both sides of the boundary point. When a boundary point  $C_x$  in attribute  $X$  makes  $Q(X, C_x; W)$  obtain the minimum value,  $C_x$  is the best partition point of the current attribute. When a partition point in an interval  $m_b$  of continuous attribute  $Y$  is  $C_y$ ,  $m_b \geq 2$ .  $C_{y1}$  and  $C_{y2}$  are the two boundary points of the interval, and  $Z$  instances have values less than  $C_{y1}$  in attribute  $Y$ . The value of  $L$  instances in attribute  $Y$  is greater than  $C_{y2}$ , and the value of  $m_t$  instances in attribute  $Y$  is between  $C_{y1}$  and  $C_{y2}$ . When Formula (2) or Formula (3) is satisfied, the average class information entropy is the minimum.

$$m_t = 0 \quad (2)$$

$$m_t = m_b \quad (3)$$

The collected environment data is injected into the collection  $E$ , which has  $I$  instances and  $J$  attributes. According to the partition rules, it is divided into  $U(U > 0)$  partitions and cached on different data nodes. In the training process of environment data, the calculation of information entropy only needs the participation of target attributes and current attributes, so it is necessary to aggregate and analyze some instance environment data cached on each partition. The structure flow of the algorithm is shown in Figure 3. These are some of the algorithms used in this paper. Through the use of this algorithm, the BD network model built in this paper runs more smoothly and efficiently.

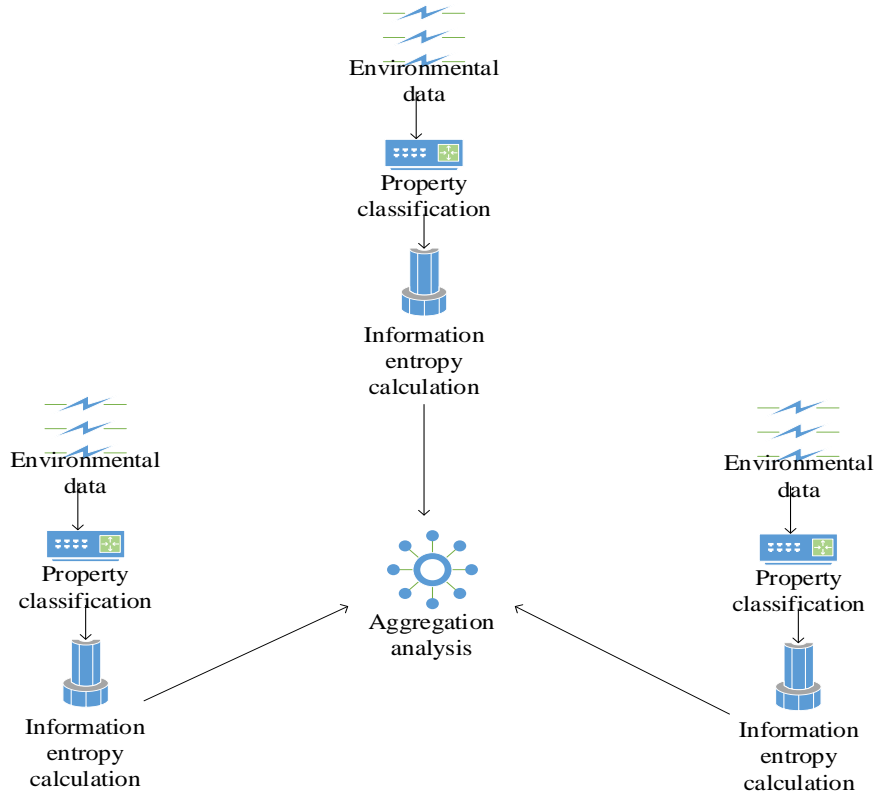


Figure 3. Decision tree algorithm structure flow



## 5. Experimental Evaluation of Urban and Rural Natural Environment Protection Model Based on BD

The protection of natural environment under BD is the analysis of urban and rural environment, which takes into account various natural factors involved in each region. In this process, it is necessary to make full use of computer networks to collect environmental data from all regions, and then use decision algorithms to divide the data into attributes and calculate information. Finally, the obtained data would be aggregated and analyzed to form a training model to predict the state of various places in the urban and rural natural environment, and remove potential pollution hazards, so as to apply for the formulation and improvement of relevant laws and regulations by the decision-maker according to the actual situation. In order to study the application effect of the urban and rural natural environment protection model, it is necessary to establish the evaluation criteria for the model effect. Table 1 shows the classification of some evaluation criteria for machine behavior rules.

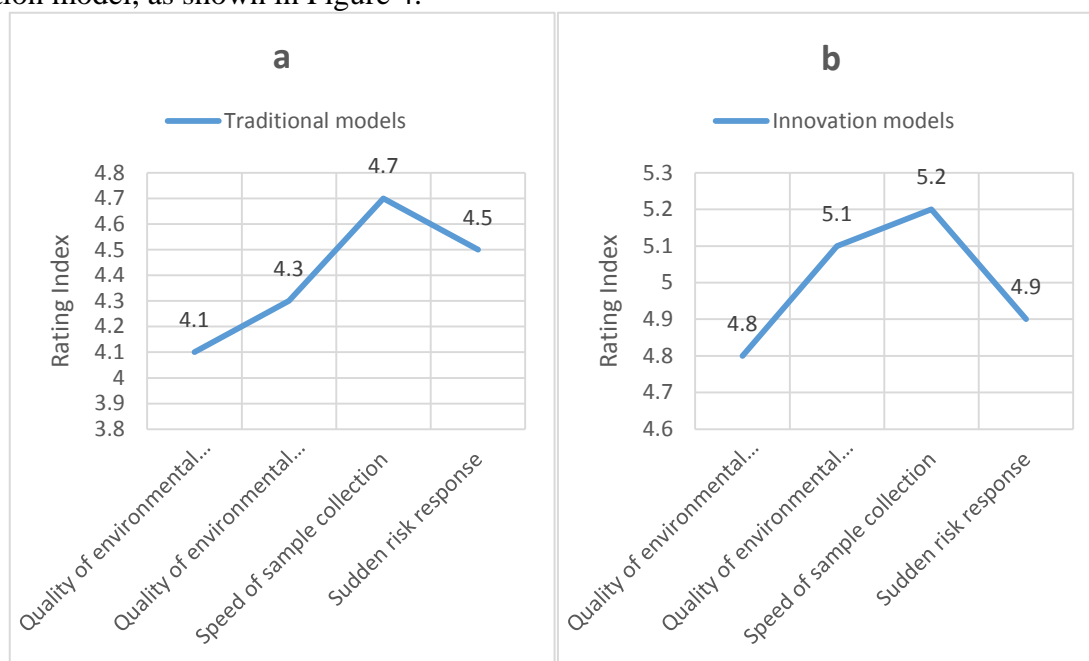
*Table 1. Evaluation criteria and their evaluation rules*

Evaluation indicators	Rules of Conduct
Quality of environmental testing	Atmospheric pollution levels Water pollution levels Noise pollution levels
Speed of sample collection	Atmospheric sample collection Water body sample collection Noise sample collection

In order to optimize the traditional urban and rural natural environment protection model, so as to ensure the smooth progress of urban and rural construction and the harmonious coexistence of human and nature, first of all, the local natural environment is divided into sample intervals to collect various environmental simulation variable data, such as water quality data, noise decibel data, soil quality data and atmospheric quality data. After analog-digital conversion by computer, the digital variables that can be calculated are obtained. The attribute classification and information entropy calculation are carried out by the decision algorithm. The information data obtained are aggregated and analyzed, and the training model is obtained. The training model is used to predict and evaluate the environmental status of the sample interval, and the natural environmental pollution problem is found in time. The traditional urban and rural natural environment protection model relies too much on the professional opinions and subjective judgments of experts and scholars in the process of governance, and can not find the potential pollution in the natural environment in time. The means to deal with the environmental pollution problems are relatively simple, and the cost of environmental protection is too high. The implementation of natural environmental protection measures is not in place. Such urban and rural natural environment protection model can fundamentally solve these problems, but it still needs some experiments to verify the effectiveness of the model.

First of all, the region in the local natural environment is divided into sections, and then the environmental analog quantity of each sample section is collected by computer technology. The analog quantity of the collected air quality data, soil quality data, water quality data and noise decibel data are converted into data volume by computer module, and then the attribute division and information entropy calculation are performed by decision algorithm. The obtained information and data are aggregated and classified to form a training and learning model to predict and evaluate the environmental status of the sample interval. It can also monitor the sample interval in real time, which can not only detect potential environmental pollution in time, but also respond to sudden

environmental pollution problems in time. After a period of experiments, the satisfaction of relevant staff and managers was evaluated according to the experimental results. The evaluation rules compared and analyzed the performance of the urban and rural natural environment protection model based on BD proposed in this paper with the traditional urban and rural natural environment protection model, as shown in Figure 4.



a. Performance analysis of traditional models

b. Performance analysis of innovative models

Figure 4. Comparative analysis of the performance of traditional and innovative models for urban and rural environmental protection

As shown in Figure 4, Figure a showed the performance analysis of traditional urban and rural natural environment protection models. The four performance indicators were environmental monitoring quality, environmental prediction quality, sample collection speed, and emergency risk response. The performance indexes of the four performance indicators were 4.1, 4.3, 4.7, and 4.5 respectively. Figure b showed the performance analysis of the innovative urban and rural natural environment protection model. The four performance indicators were environmental monitoring quality, environmental prediction quality, sample collection speed, and emergency risk response. The performance indexes of the four performance indicators were 4.8, 5.1, 5.2, and 4.9 respectively. Data analysis was carried out from the indices of the four performance indicators proposed in the paper. The innovative urban and rural natural environment protection model was better than the traditional urban and rural natural environment protection model. Compared with the traditional urban and rural natural environment protection model, the innovative urban and rural natural environment protection model proposed in this paper had an average performance improvement of 13.8% in four aspects.

## 6. Conclusion

In the context of the information age, the rapid development of BD technology poses new



direction to the protection requirements of traditional urban and rural natural environment. In the process of urban and rural construction, the quality of life of urban and rural residents has gradually improved, but what is invisible is that the potential pollution of the natural environment has become increasingly serious. The traditional urban and rural natural environment protection model is too dependent on the professional opinions and subjective judgments of experts and scholars in the process of governance, and can not find the potential pollution in the natural environment in time. The means to deal with the environmental pollution problems are relatively simple, and the cost of environmental protection is too high. The implementation of natural environmental protection measures is not in place. To solve these problems, this paper proposed a model of urban and rural natural environment protection based on BD and combined with decision algorithm and computer technology. Finally, the reliability of the model was verified by experiments. Compared with the traditional urban and rural natural environment protection model, it had more efficient processing capacity in the face of sudden environmental pollution.

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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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