Application Management Platform of Hydrological Water Resources Monitoring Data Based on Data Mining

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Abstract: Hydrological water resources monitoring data is one of the water conservancy information resources. Scientific research can accelerate the informatization of hydrological and hydraulic conservancy, so as to better monitor hydrological water resources. Ordinary methods cannot solve the problem of low accuracy of monitoring data of hydrological water resources. Therefore, this paper proposes a data mining technique for monitoring data analysis. First of all, the computer is used to analyze the monitoring data, and the indicators are divided according to the requirements of the monitoring data to reduce the monitoring data in the interfering factor. Then, the computer analyzes the monitoring data of the hydrological and water resources monitoring data application management platform to form a monitoring data scheme and correct Comprehensive analysis of monitoring data results. MATLAB simulation shows that under certain evaluation criteria, the accuracy of monitoring data of the hydrological and water resources monitoring data application management platform by data mining technology is The reliability of the monitoring data is better than that of ordinary methods.

1 INTRODUCTION

With the increasing scarcity of water resources and the continuous deterioration of the water environment, the monitoring and management of hydrological resources has become the focus of attention. Traditional hydrological resources monitoring and management methods are constrained by scattered data sources (Abd Elrahman and S. I. M, et al. 2023), low data quality and low data processing efficiency, which are difficult to meet the needs of modern water resources management (Ashu, and Lee, 2023). The data mining method can propose effective solutions to the above problems, optimize and improve the hydrological resources monitoring and management platform, and the optimized platform can obtain (Belleflamme, and Goergen, et al. 2023), process and analyze the data of hydrological resources more accurately, and provide more scientific, reasonable and effective decision-making support for water resources management (Cai, and Wang, et al. 2023). In this paper, we will introduce the optimization method and application examples of data mining methods for hydrological resources monitoring and management platform (Campbell, and Hyslop, 2023).

Data mining is the process of extracting potential, useful, unknown, and previously undiscovered patterns and patterns from massive amounts of data (Chaparro, and O'Farrell, et al. 2023), which transforms large amounts of data into useful information and knowledge through a series of data processing and analysis steps (Chen, and Tseng, et al. 2023). The main steps of a data mining method include the following:

Data preprocessing is a key step of data mining, including data cleaning, missing value processing, outlier handling, etc., to make data more standardized, complete and accurate (Chitra-Tarak, and Warren, 2023).

Data integration is the consolidation of data from multiple data sources under the same platform for easy data processing and analysis (de Bruijn, and Smilovic, et al. 2023).

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Data conversion is the conversion of raw data into a form that can be processed by computers, such as converting data into numeric, text, and other formats (Dunea, and Serban, et al. 2023).

Pattern discovery is the core of data mining, which discovers patterns and regularities in data through various algorithms and models, such as clustering, classification, regression, association rule mining, etc (Gaillot, and Delbart, et al. 2023).

Pattern evaluation is to evaluate the validity and accuracy of the excavated patterns to improve the reliability and effectiveness of decision-making (Gao, and Xu, et al. 2023).

Through the analysis and modeling of historical data, future changes and trends of water resources can be predicted and simulated, such as predicting water level, flow, water quality and other indicators, so as to provide scientific and accurate decision-making support for water resources management (Gao, and Wang, et al. 2023).

The mining of monitoring data can analyze the quality of monitoring data, such as the accuracy, consistency and completeness of monitoring data, to ensure the validity and reliability of monitoring data (Greco, and Marino, et al. 2023).

Through the analysis and modeling of monitoring data, reasonable water resources management strategies can be determined, such as quantitative analysis of water supply and demand balance, and formulation of water resource utilization plans, so as to provide scientific and effective guidance for water resources management (Guo, and Jin, et al. 2023).

Through data cleaning, outlier value processing, missing value processing and other methods, the quality and accuracy of monitoring data are improved, so as to ensure the effectiveness and reliability of data mining.

Through clustering, classification, association rule mining and other methods, the rules, trends and patterns in the data are discovered, so as to provide scientific and accurate information support for water resources management.

Monitoring data is useful for studying hydrological water resources. However, in the process of monitoring data, there is a problem of poor accuracy in the monitoring data scheme, which brings resistance to water conservancy research. Some scholars believe that the application of data mining technology to the analysis of hydrological and water resources monitoring data application management platform can effectively analyze the monitoring data scheme and provide corresponding support for the monitoring data. On this basis, this paper proposes a data mining technique to optimize the monitoring data scheme and verify the effectiveness of the model.

2 RELATED CONCEPTS

2.1 Mathematical Description of Data Mining Techniques

Data mining technology is to use the computer to optimize the monitoring data scheme, and according to the indicators in the monitoring data is q_i , find the unqualified values in the hydrological and water resources monitoring data application management platform is c_i , and monitor the data the scheme is integrated is $tol(q_i \cdot n_{ij})$, and the feasibility of the hydrological water resources monitoring data application management platform is finally judged, and the calculation is shown in Equation (1).

$$tol(q_i \cdot n_{ij} + \square 3 \square) = q_{ij} \geq \max(n_{ij} \div \sqrt{2}) \quad (1)$$

Among them, the judgment of outliers is shown in Equation (2).

$$\max(n_{ij}) = (n_{ij}^{\ 2} \cdot 5) \succ mean(\sum_{i=1}^{n}(n_{ij} + T)^2 \cdot \frac{1}{3} + \sum n_{ij}) \quad (2)$$

Data mining technology combines the advantages of computers and uses the application management platform of hydrological and water resources monitoring data for quantification, which can improve the accuracy of monitoring data.

Hypothesis I. The monitoring data requirements is n_i , the monitoring data scheme is set_i , the satisfaction of the monitoring data scheme is q_i , and the monitoring data scheme judgment function is $T(n_i \approx 0)$ as shown in Equation (3).

$$T(j_i) = \sum n_i - 3 \cdot \bigcap \xi \iint T \cdot 2 \to \sum_{i=1}^{q} j_i \square \quad (3)$$

2.2 Choice of Monitoring Data Scheme

Hypothesis II. The function of the hydrological water resources monitoring data application management

platform is $a(n_i)$, and the weight coefficient is b_i, then, the monitoring data requires the unqualified hydrological water resources monitoring data application management platform as shown in Equation (4).

$$a(n_i)=\bigcap_{i=1}^{n} b_i \cdot 3 - c_i \cdot \prod \div \frac{1}{2} + T(j_i) - 3b_i \tag{4}$$

Based on hypotheses I and II, a comprehensive function of the monitoring data can be obtained, and the result is shown in Equation (5).

$$a(n_i) + T(j_i) \le \max(n_{ij}) \tag{5}$$

In order to improve the effectiveness of quality assessment, all data needs to be standardized and the results are shown in Equation (6).

$$\overline{a(n_i)} + T(j_i) \leftrightarrow mean(\sum_{i=1}^{n} (n_{ij} + T)^2 \cdot \frac{1}{3} + \sum n_{ij}) \tag{6}$$

2.3 Analysis of Monitoring Data Programmes

Before carrying out data mining technology, it is necessary to analyze the monitoring data scheme in multiple aspects, and map the monitoring data requirements to the hydrological and water resources monitoring data application management platform library, and eliminate the unqualified Monitoring data programmes is $No(n_i)$,According to Equation (6), the anomaly evaluation scheme can be proposed, and the results are shown in Equation (7).

$$No(x_i) = \frac{\overline{a(n_i)} + T(j_i)}{mean(\sum_{i=1}^{n} (n_{ij} + T)^2 \cdot \frac{1}{3} + \sum n_{ij})} \tag{7}$$

Among them, $\frac{\overline{a(n_i)} + T(j_i)}{mean(\sum_{i=1}^{n} (n_{ij} + T)^2 \cdot \frac{1}{3} + \sum n_{ij})} \le 1$

it is stated that the scheme needs to be proposed, otherwise the scheme integration required is $Zh(n_i)$, and the result is shown in Equation (8).

$$Zh(n_i) = \min[\sum \overline{a(n_i)} + T(j_i)] \tag{8}$$

The hydrological and water resources monitoring data application management platform conducts comprehensive analysis, and sets the threshold and index weight of the monitoring data scheme to ensure the accuracy of data mining technology. The application management platform of hydrological and water resources monitoring data is a systematic test monitoring data scheme, which needs to be correctly analyzed. If the hydrological and water resources monitoring data application management platform is in a non-normal distribution is $unno(n_i)$, its monitoring data scheme will be affected, reducing the accuracy of the overall monitoring data is $accur(n_i)$, and the calculation result is shown in Equation (9). 。

$$accur(n_i) = \frac{\min[\sum \overline{a(n_i)} + T(j_i)]}{\sum \overline{a(n_i)} + T(j_i)} \times 100\% \tag{9}$$

The survey and monitoring data scheme shows that the monitoring data scheme presents a multidimensional distribution, which is in line with objective facts. The application management platform of hydrological and water resources monitoring data is not directional, indicating that the monitoring

data scheme has strong randomness, so it is regarded as a high analysis study. If the random function of the hydrological water resources monitoring data application management platform is $randon(n_i)$, then the calculation of Equation (9) can be expressed as Equation (10).

$$accur(n_i) = \frac{\min[\sum \overline{a(n_i)} + T(j_i)]}{\sum \overline{a(n_i)} + T(j_i)} \times 100\% + randon(n_i) \tag{10}$$

Among them, the hydrological water resources monitoring data application management platform meets the normal requirements, mainly the computer adjusts the hydrological and water resources monitoring data application management platform, removes duplicate and irrelevant schemes, and supplements the default scheme, so that the dynamic correlation of the entire monitoring data scheme is strong.

3 OPTIMIZATION STRATEGY OF HYDROLOGICAL WATER RESOURCES MONITORING DATA APPLICATION MANAGEMENT PLATFORM

Data mining technology adopts random optimization strategy for the hydrological and water resources monitoring data application management platform, and adjusts the monitoring data parameters to realize the scheme optimization of the hydrological water resources monitoring data application management platform. Data mining technology divides the hydrological and water resources monitoring data application management platform into different monitoring data levels, and randomly selects different schemes. In the iterative process, the monitoring data schemes of different monitoring data levels are optimized and analyzed. After the optimization analysis is completed, the monitoring data level of different schemes is compared, and the best hydrological and water resources monitoring data application management platform is recorded.

4 PRACTICAL CASE OF HYDROLOGICAL WATER RESOURCES MONITORING DATA APPLICATION MANAGEMENT PLATFORM

4.1 Presentation of Monitoring Data

In order to facilitate the monitoring data, the application management platform of hydrological water resources monitoring data in complex situations is taken as the research object, with 12 paths and a test time of 12h, and the specific hydrological water resources monitoring data application management platform is taken The monitoring data scheme is shown in Table 1.

Table 1: Monitoring data requirements

Scope of application	grade	Accuracy	Monitor data
water level	normal	85.34	84.82
	Higher	82.58	88.74
flow rate	normal	82.97	83.39
	Higher	84.63	85.94
evaporate	normal	85.16	86.20
	Higher	85.16	80.34

The process of monitoring data in Table 1. is shown in Figure 1.

Compared with ordinary methods, the monitoring data scheme of data mining technology is closer to the actual monitoring data requirements. In terms of the rationality and accuracy of the hydrological and water resources monitoring data application management platform, data mining technology is superior to ordinary methods. Through the change of monitoring data scheme in Figure 2, it can be seen that the stability of data mining technology is better and the judgment speed is faster. Therefore, the data mining technology has better monitoring data scheme speed, monitoring data scheme positive accuracy, and summation stability.

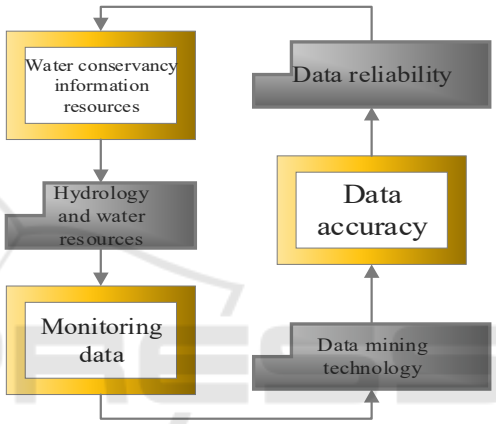

Figure 1: Analysis process of hydrological water resources monitoring data application management platform

4.2 Application and Management Platform of Hydrological and Water Resources Monitoring Data

The monitoring data scheme of the hydrological and water resources monitoring data application management platform includes non-structural information, semi-structural information and structural information. After the pre-selection of data mining technology, the monitoring data scheme of the preliminary hydrological water resources monitoring data application management platform was obtained, and the application management platform of hydrological water resources monitoring data was obtained The feasibility of the monitoring data program is analyzed. In order to more accurately verify the accuracy of the hydrological water resources monitoring data application management platform, the hydrological water resources monitoring data application management platform and monitoring data scheme with different

monitoring data levels were selected. This is shown in Table 2.

Table 2: Monitor the overall situation of the data programme

Category	Accuracy	Analysis Rate
Water Level	90.16	87.70
Flow Rate	85.28	88.51
Evaporate	87.93	89.87
Mean	90.20	88.88
X^6	90.32	90.89
	P=1.936	

4.3 Monitoring Data and Stability of Monitoring Data

To verify the accuracy of the data mining technique, the monitoring data scheme is compared with the common method, and the monitoring data scheme is shown in Figure 2.

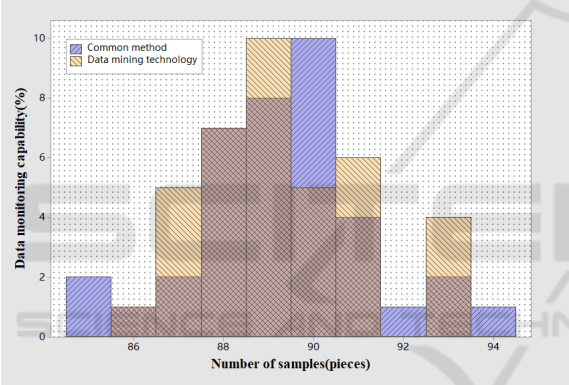

Figure 2: Monitoring data of different algorithms

It can be seen from Figure 2 that the monitoring data of data mining technology is higher than that of ordinary methods, but the error rate is lower, indicating that the monitoring data of data mining technology is relatively stable, while that of ordinary methods Monitoring data is uneven. The average monitoring data scheme of the above three algorithms is shown in Table 3.

Table 3: Comparison of the accuracy of monitoring data by different methods

algorithm	**Monitor data**	**Magnitude of change**	**error**
Data mining techniques	93.34	92.47	92.92
Normal method	92.96	90.82	91.29
P	90.26	90.57	91.18

It can be seen from Table 3 that the general method has shortcomings in the accuracy of monitoring data in terms of hydrological water resources monitoring data application management platform, and the hydrological water resources monitoring data application management platform has undergone significant changes. High error rate. The monitoring data for the general results of data mining techniques is higher and better than common methods. At the same time, the monitoring data of data mining technology is greater than 92%, and the accuracy has not changed significantly. To further verify the superiority of data mining techniques. In order to further verify the effectiveness of the proposed method, the data mining techniques are generally analyzed by different methods, as shown in Figure 3.

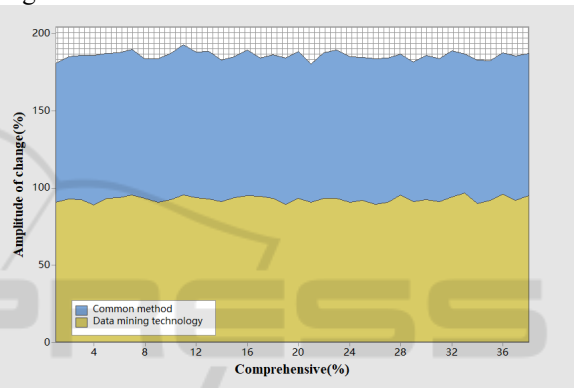

Figure 3: Monitoring data of data mining technology monitoring data

It can be seen from Figure 3 that the monitoring data of data mining technology is significantly better than that of ordinary methods, and the reason is that the data mining technology increases the adjustment coefficient of the hydrological and water resources monitoring data application management platform and sets it Thresholds for monitoring data and rejection of non-compliant monitoring data schemes.

5 CONCLUSIONS

Aiming at the problem that the monitoring data of the hydrological water resources monitoring data application management platform is not satisfactory, this paper proposes a data mining technology, and combines the computer to optimize the hydrological water resources monitoring data application management platform. At the same time, the accuracy of monitoring data is analyzed in depth, and a monitoring data collection is constructed. The

research shows that the data mining technology can improve the accuracy of the hydrological water resources monitoring data application management platform, and can generally carry out the hydrological water resources monitoring data application management platform Monitor data. However, in the process of data mining technology, too much attention is paid to the analysis of monitoring data, resulting in unreasonable selection of monitoring data indicators.

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