

## Retraction

# Retracted: Exploration and Analysis of Collaborative Matching Algorithm Empowering Large Data Fiscal Budget

### Journal of Function Spaces

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret 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 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.

## References

- [1] R. Gong and X. Zhang, "Exploration and Analysis of Collaborative Matching Algorithm Empowering Large Data Fiscal Budget," *Journal of Function Spaces*, vol. 2022, Article ID 8171318, 11 pages, 2022.

## Research Article

# Exploration and Analysis of Collaborative Matching Algorithm Empowering Large Data Fiscal Budget

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At present, many budget companies have realized high-level computerized accounting and have high-speed and advanced database management systems. In order to adapt to the growth of budget entity informatization, the financial department must improve its own financial budget level. Introduce information technology, and develop corresponding financial budget software to better perform its own financial calculation function. This paper explores and analyzes the full collaborative matching algorithm of enabling big data financial budget and builds a financial big data financial budget platform through offline and online data collection. Combined with the matching algorithm and linear regression prediction algorithm in data analysis, the financial data is analyzed in depth. Finally, the PSO-SA algorithm runs 10 rounds on the datasets with matching scales  $d = 10$  and 30, respectively. It is found that the fluctuation is large when  $d = 10$  and relatively stable when  $d = 30$ . When  $d = 10$ , the maximum value is 7.2354, and the minimum value is 6.9969. When  $d = 10$ , the maximum value is 26.6403, and the minimum value is 23.9599. It can be concluded that when  $d = 0$ , PSO-SA can obtain a relatively good matching scheme, but it is easy to fall into a local optimal solution. The superposition effect of “data + computing power + algorithm + scenario” can help enterprises make better decisions. Embed complex analysis into daily management and trading scenarios to build a financial empowerment platform. Make the increasingly complex work more automated and intelligent, and improve financial efficiency.

## 1. Introduction

With the popularization of technologies such as Internet+, mobile Internet, and cloud computing, the amount of data in human society has experienced explosive growth and has entered the era of large data. The rapid increase in the amount of data and the increasing competition between countries and enterprises require governments and enterprises to use a large amount of data to provide customers with products and services more accurately, quickly, and individually. Large data tech is a comprehensive data engineering application tech that includes statistical analysis, data mining, artificial intelligence, parallel computing, natural language processing, and data storage [1]. Big data audit refers to the construction of a data-based audit work mode based on the original data of the auditor's database. It forms an audit intermediate table by collecting, converting, sorting,

analyzing, and verifying the underlying data. And use query analysis, multidimensional analysis, data mining, and other technical methods to build a model for data analysis. Discover trends, anomalies, and errors; grasp the overall situation; and highlight the key points and accurately extend, so as to collect audit evidence and achieve audit objectives [2]. Today, large data-related technologies have profoundly changed and affected the growth of the entire society, and even the way of thinking. The transformation of human beings in turn affects the value system of human beings. Large data tech has attracted much attention. Therefore, it is necessary to centrally store large data and build a unified financial budget system; it is necessary to increase the intensity of financial budgeting, innovate financial budgeting methods, improve the efficiency and quality of financial budgeting, and gradually explore the application of large data tech in financial budgeting work. Budgeting in a timely

manner is conducive to macro-control and timely detection of problems, thereby improving the capacity, quality, and efficiency of budgetary work. In recent years, the Commissioner's Office has made some attempts in the supervision of fiscal revenue and the comprehensive fiscal supervision of central budget units. However, using data to analyze and predict the results is still superficial, because only historical data is used for simple linear analysis. . However, in the current financial budget information systems, due to the lack of a unified caliber, it is impossible to compare and coordinate, and it is difficult to carry out data analysis. (1) Project budget audit: Audit is a key work of the National Audit Office. The number of units within the central budget is huge and widely distributed and has a lot of data, making auditing difficult. In this process, the use of ABC classification method has played a great role in the audit of project budget. By establishing a database of key projects of local budget units, compiling ABC analysis charts, scientifically classifying project budget amounts, and comparing them with the data of the previous and next years, the quality and work efficiency of the audit are guaranteed. (2) Supervision progress data: use progress analysis to supervise the budget implementation of central basic budget units. Every half year, the third quarter, and the whole year collect statistics on the overall execution rate, basic expenditure, project expenditure, and "three public" funds execution rate of each department and compare them with the work progress, annual progress, and annual progress of each department. Analyze the budget execution of each department. Communicate the budget implementation and problems of financial departments at all levels so that financial departments at all levels can better understand and grasp the use of financial funds. (3) Payment audit data analysis process: First, by comparing the number of audits and the number of audited accounts over the years, we learned about the payment audit over the years. Secondly, the change of audit workload is analyzed. The third is to compare the changes in the total amount of audit funds over the years and reflect the overall progress of financial funds. On this basis, it analyzes and discusses the problems in the implementation of direct financial payment in my country. (4) Local government regulation and policy analysis: (1) Analysis of the scale and structure of central government revenue. Using the linear analysis method, this paper forecasts and analyzes the changes in the scale and structure of local government revenue. The various tax and non-tax revenues of the year are compared, and the changes in their scale and structure are analyzed and forecasted. . It is necessary to implement the research on the impact of the new corporate income tax law on local finance.

The core significance of big data audit lies not only in the reform of audit mode, but also in the breakthrough of audit ideas. In the era of big data, auditors need to make good use of big data thinking and awareness to improve the methods and ways to find clues to problems. Only by maximizing the use of audit results and improving audit efficiency can we achieve our audit goal—to find problem clues, evaluate risks, and reveal system defects [3]. Making good use of large data tech to carry out financial work is a way for the country to promote data transparency, sharing, and openness and

improve national data capabilities. . Secondly, with the continuous growth and improvement of Internet tech and the popularization of informatization of the financial budget system, various business and management information are gradually transformed into paperless, information flow, and automation. It has become more and more complex, getting rid of the business trajectory of paper finance of traditional financial budget and extending the scope of financial budget from internal data to external data, from traditional financial budget data to business data, resulting in an explosion of financial information. Growth, which poses a great challenge to the processing capacity of traditional financial budget analysis systems [4]. The traditional data analysis process is that professional data analysts discover possible doubts by observing and analyzing data, combined with past experience, repeatedly observe and analyze them, find problems, and provide corresponding suggestions for specific responsible business personnel, or It is the business personnel who put forward the corresponding requirements, and the analysts conduct related query and analysis according to the requirements [5]. All in all, it starts with the details of business data and draws relatively accurate conclusions with the professional knowledge and years of experience of financial personnel. Through large data tech, it is possible to obtain and comprehensively analyze the entire financial-related data, conduct analysis and mining, and then discover the internal connection hidden between the data, improve the financial system and personnel's insight into problems, and gradually strengthen the entire industry. The growth direction of the industry and the introduction of relevant systems and other macro-level understandings make predictive thinking and macro-level strategic deployment of the growth strategy of the entire industry and put forward specific growth goals that are staged, feasible, and assessable [6]. Therefore, this paper proposes a research on collaborative matching algorithm to empower large data financial budget. Collaborative matching algorithm and large data tech can gradually realize automatic financial budget and comprehensive financial budget, save labor costs, and help improve the quality and improvement of financial budget. The efficiency of financial budget and the research on collaborative matching algorithm to empower large data financial budget are of great significance.

In recent years, the function of the local regional budget to execute the financial budget has been continuously expanded, and it has played an active and effective supervisory role in many fields such as budget preparation management, non-tax revenue collection, and performance management [7]. In the era of large data, the level of informatization of budget execution units is increasing day by day, and financial and budget organs at all levels have begun to actively explore the application of emerging technologies such as large data financial budgets in budget execution, and have achieved initial results. However, at present, there are still some problems in the implementation of financial budgets of local regional budgets in China, such as imperfect laws and regulations, relatively lack of financial budget resources, and single technical means of financial budgets, which lead to limited functions [8]. For future work, the

Ministry of Finance and Budget has put forward the goals of integrating financial budget resources, focusing on the budget implementation of financial budget departments, conducting comprehensive financial budgets for budget units and subordinate units of budget units, and expanding the scope of financial budgets. At present, many budgeted units have achieved a high level of accounting calculating and have high-speed and advanced database management systems. In order to adapt to the growth of the informatization level of the budgeted units, the budgetary department must improve its own financial budget level and introduce information [9]. The platform uses large data tech to realize an all-round financial budget including overall budget, departmental budget, and special budget. Combined with related algorithms such as collaborative matching, association rules, and regression prediction in data analysis, it conducts in-depth analysis of financial budget data and discovers data. Therefore, the innovation of this paper is as follows:

- (1) According to the characteristics and existing problems of the current financial budget, the collaborative matching algorithm and big data technology are used to integrate the financial and business data of the budget unit and its related units. Combine manual labor with on-site financial budget execution system, and use structured query language and other relevant analysis languages.
- (2) The fiscal budget model reflects the advantages of “unified analysis, discovery of doubts, and decentralized verification,” thus realizing the transformation of the fiscal budget model from loose to joint, which helps to improve the work efficiency of the fiscal budget department

This paper is divided into five parts. The first section describes the research background and significance of collaborative matching algorithm enabling big data financial budget. Section 2 makes a multi-angle, multilevel, dynamic, and efficient statistical analysis of historical data from the perspective of big data matching algorithm technology. Section 3 analyzes the key technologies of big data audit and data mining. At the same time, the matching association rules are analyzed. This means that in the frequent itemset, some data can be derived from other data and reach the lowest confidence level. Section 4 is the experimental analysis. This part carries out experimental verification on the dataset to analyze the performance of the model. Section 5 is the conclusion and prospect. This part mainly reviews the main contents and results of this study. Finally, the full text is summarized. This paper expands the scope, breadth, and depth of financial budget. It also greatly shortened the time of members of the financial team on the audit site and effectively improved the efficiency of financial budget work.

## 2. Related Work

Large data matching algorithm tech is a multi-angle, multilevel, dynamic, and efficient statistical analysis of historical

data based on the use of efficient data analysis and matching tech to provide support for prediction, judgment, matching, and decision-making [10]. Since the 1990s, this tech has been used in various fields such as science and tech, business, economy, and public management and has continuously innovated management models, effectively reducing management costs and improving management levels. The application of large data in financial budget supervision has broad prospects and is of great significance.

Kilby et al. found that a hybrid approach of professional judgment and data mining can produce more accurate financial budget forecasts [11]. Singh et al. went further and argued that the analysis should be combined with qualitative data mining methods from financial budget management databases [12]. Aragonés et al. used neural networks and case-based reasoning, as well as the selection of two markets and the choice of passive or active trading strategies, to generate significantly more prediction of financial budgets holding returns [13]. Moghaddam et al. employ neural networks and use financial ratios and macroeconomic variables to predict market returns [14]. Wang et al. propose a deep learning approach to neural networks to construct financial distress prediction model [15]. Ahmadi et al. used the CART optimization algorithm to study the prediction performance and significance test of the short-term capital adequacy ratio of Chinese-listed companies [16]. Yu et al. believe that the combination of professional equipment and big data technology can provide a good help for professional budget analysis [17]. Koyuncugil proposed a financial risk early warning system model based on data mining [18]. Zhao examined the behavioral impact of large data on auditors' judgment and discussed issues such as information overload, information relevance, pattern recognition, [19]. Ming et al. argue that large data provides a complementary source of evidence for the budget function and should be budgeted based on adequacy, reliability, and relevance. The evidence standards framework assesses its use [20].

However, matching algorithms and large data tech will bring new financial thinking and directions in financial budgeting and give birth to new financial budgeting methods. Financial personnel need to keep pace with the times and actively learn new financial budgeting thinking modes and methods. The impact of large data on the growth of financial budgets. Fundamentally solve the loopholes and problems of sampling budget. Financial personnel collect all the data of the objects subject to the financial budget and use the complete and comprehensive business data information to conduct multidimensional analysis of the data to discover hidden financial budget problems. All in all, large data-related technologies provide professional financial personnel with new financial budgeting methods, can control the overall data, and help professional financial personnel find overlooked problems from a macro and more comprehensive perspective.

## 3. Methodology

**3.1. Key Technologies of Large Data Auditing.** Big data audit refers to the construction of a data-based audit work mode

based on the original data of the auditor's database. It forms an audit intermediate table by collecting, converting, sorting, analyzing, and verifying the underlying data. And use query analysis, multidimensional analysis, data mining, and other technical methods to build a model for data analysis. By discovering trends, anomalies, and errors; grasping the overall situation; highlighting the key points; and accurately extending, we can collect audit evidence and achieve audit objectives. Hadoop is an open source distributed storage computing platform of the Apache Foundation, which can store and process large amounts of data through simple program patterns. The infrastructure of Hadoop includes Hadoop Digital File System (HDFS) and MR framework. HDFS is a data storage system containing named nodes and data nodes. MR is responsible for the processing of data, including tracking, tracking, tracking, and working. The HDFS and MR processes are performed on the same computer, allowing direct communication. In the Hadoop ecosystem, there are many other elements, basically based on HDFS and MR. HBase is a distributed key-value database with randomness and range search performance. The software uses HDFS as the base storage, but is augmented by specific indexes and storage structures. All Hadoop clusters are built on a resource manager, and YARN is the default resource manager for Apache Hadoop. These components provide efficient parallel data processing services, enabling fast and reliable analysis of structured and complex data. The data processing of the Hadoop architecture is organized according to the operation, including three elements: data input, configuration, and program. This project is divided into two parts: One is Map and the other is Reduce (Figure 1).

**3.2. Data Mining.** Data mining refers to analyzing massive data and extracting useful information from it. In the past, data mining was only for knowledge discovery in databases, that is, to convert data into useful knowledge. The KDD process involves a series of data preprocessing to transform the raw data into a suitable format for subsequent analysis. Data mining technology is to convert existing data into patterns or models, then post-process them to evaluate the correctness and practicability of the extracted patterns and models, and integrate them into DSS using appropriate methods. This provides end users (business analysts, scientists, planners, etc.) with relevant information. Today, data mining represents the entire process of knowledge discovery in databases (KDD) and has been widely recognized as a powerful and general data analysis tool. The complete data mining process generally includes evaluating and specifying business objectives, data sources, data processing, and building analytical models using data mining algorithms such as logistic regression or neural networks Figure 2.

Figure 3 shows the overall architectural design of the data mining system, where data mining includes many tasks that can be used according to the needs of a specific application context, or even combined. Data mining tasks are usually divided into prediction tasks and description tasks. A prediction task refers to building a useful model for predicting the future behavior or value of some feature. These

include classification and prediction, i.e., from a set of data objects with known class labels, predicting the classification of objects with unknown class labels; in descriptive data mining tasks, built-in models are designed to be understandable, effective, and efficient. Form to describe the data. A related example of a descriptive task is data representation, whose main purpose is to summarize general characteristics of the target data class.

The overall design of the data mining project needs to divide the functional modules of the system based on the clear system requirements. Divide the work of system development and define the interface between each module. To prepare for the later detailed design and implementation. The data needs to be read first, that is, the data is read from the log file, and then the data put into the memory set is matched into the required data, and the matched set is sent to the server. The server receives the data, saves the data to the database, and the data enters the database for integration.

**3.3. Matching Algorithm.** Matching algorithm, also known as matching mining, is a task to find interesting relationships between data and data such as frequent patterns, associations, correlations, or causal structures, including two aspects: frequent itemsets and matching association rules. Frequent itemsets indicate that in a dataset, some data items appear frequently and exceed a set threshold. These data itemsets are called frequent itemsets. Matching association rules means that in the frequent itemset, some data can be derived from other data, and the lowest confidence level is reached, suggesting that there may be a strong relationship between different data, such as the implication of  $X > Y$ .

**3.3.1. Apriori Algorithm.** Support: Measure frequent itemsets; the support of an itemset is the proportion of records that contain this set in the dataset.

$$\text{sup port}(X, Y) = P(XY) = \text{number}(XY)/\text{number}(AllSamples). \quad (1)$$

Confidence or credibility: defined for association rules, for example, the confidence of the rule  $YZ \Rightarrow X$  is the conditional probability of  $X$  appearing when  $YZ$  appears. According to the definition of support, it can be transformed into the following formula:

$$\text{confidence}(YZ \Rightarrow X) = P(X|YZ) = \text{sup port}(X, Y, Z)/\text{sup port}(Y, Z). \quad (2)$$

Principle: If an itemset is frequent, then all its subsets are also frequent; conversely, if an itemset is infrequent, then all its supersets are also infrequent. For example,  $\{1\}$  is an infrequent item, then  $\{0, 1\}$ ,  $\{1, 2, 3\}$ , etc. are infrequent; using this principle can avoid the exponential increase in the number of itemsets and reduce the time complexity of the algorithm. In the subsequent description,  $C_k$  is used to represent the list of candidate itemsets, and  $L_k$  is used to represent the list of frequent itemsets.

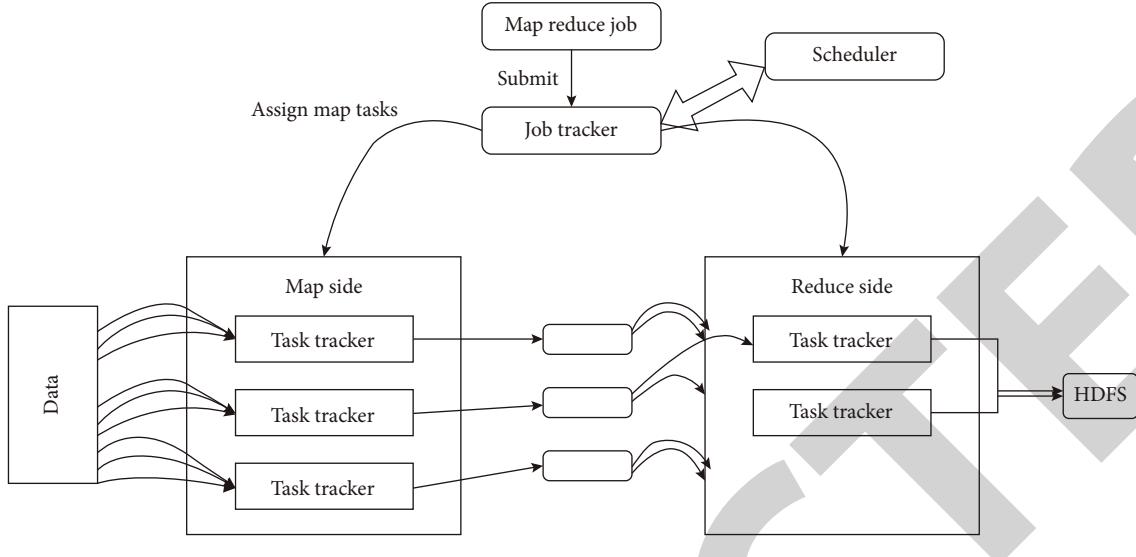


FIGURE 1: Map Reduce distributed workflow.

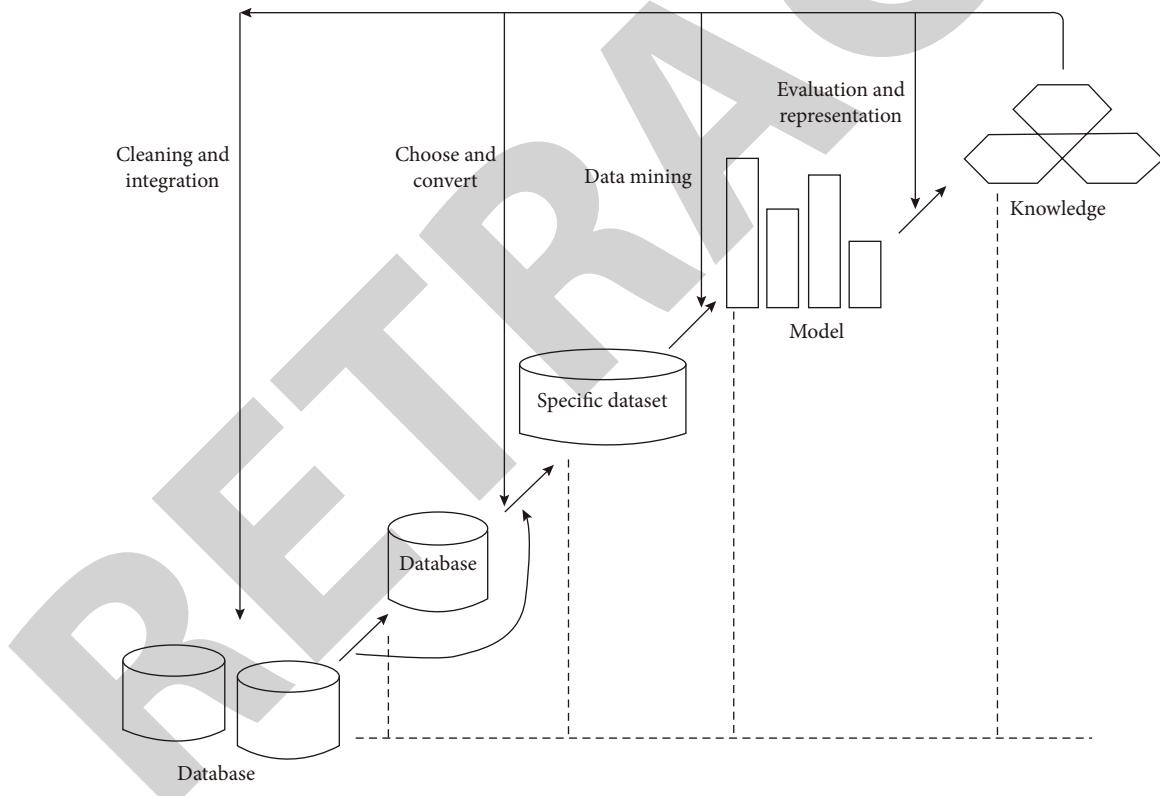


FIGURE 2: Schematic diagram of the data mining process.

**3.3.2. Apriori Algorithm Improvement (Table 1).** The candidate itemset of Apriori algorithm is generated by the upper-level frequent itemset. The method of generation is to compare whether the first  $k - 1$  items of the two elements in  $L_k$  are the same. If they are the same, then combine the two items to generate a candidate of  $k + 1$  elements. Items, the advantage of doing so is to reduce the number of tra-

versals to get duplicate itemsets. For example, it is known that  $\{0, 1\}$ ,  $\{0, 2\}$ , and  $\{1, 2\}$  are frequent itemsets, and now they generate ternary candidate itemsets. If each set is merged in pairs, it will be merged three times, and the same result  $\{0, 1, 2\}$  is obtained, but if the merge is performed only when the elements of the previous item are the same, only one merge is required, which reduces the number of

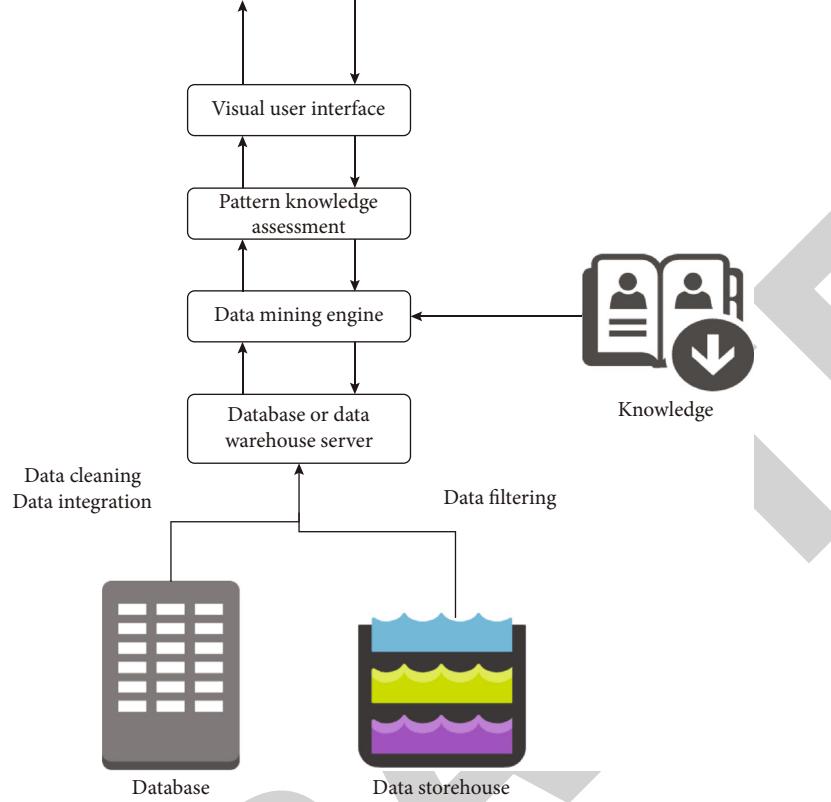


FIGURE 3: Overall architecture of the data mining system.

TABLE 1: Algorithm performance comparison.

	Apriori	Improved Apriori
C <sub>1</sub>	514	514
L <sub>1</sub>	95	95
C <sub>2</sub>	4370	841
L <sub>2</sub>	130	130
C <sub>3</sub>	586	0
L <sub>3</sub>	0	0
Scan dataset (number of times)	3	2
Time (S)	185	68

merges to obtain duplicate values. This method can effectively reduce the size of the candidate itemset and improve the efficiency of the algorithm. But not all candidate itemsets generated by frequent items are frequent itemsets, and the data of candidate itemsets need to be further reduced so that fewer comparisons are made when scanning the dataset. In order to further reduce the number of candidate itemsets and make full use of known infrequent itemsets, a filter set can be added during the generation process of candidate itemsets. Supersets are removed directly. The filter set generation formula can be expressed by the formula:

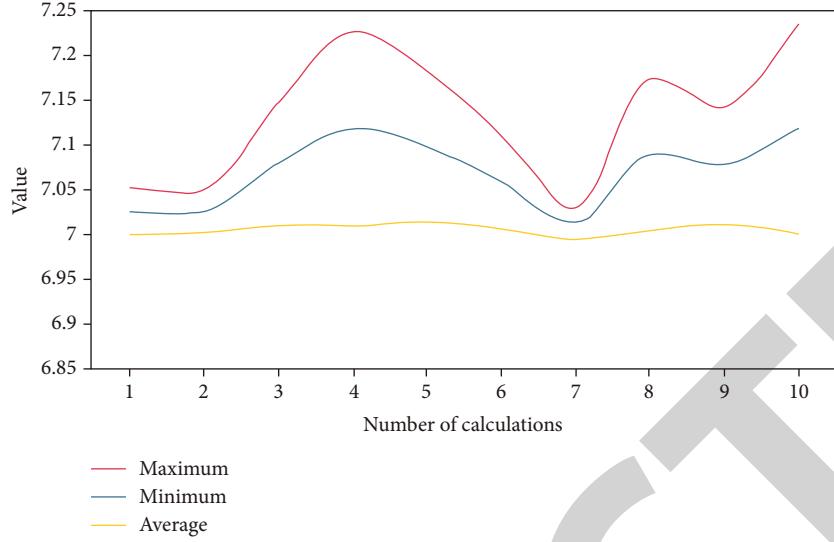
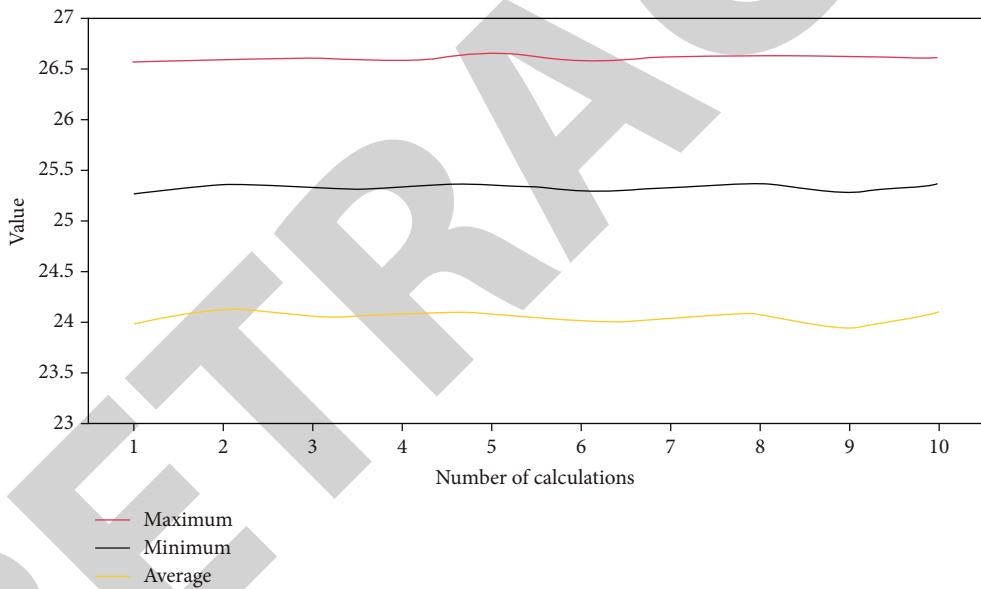
$$\text{filter} = C_k - L_k. \quad (3)$$

TABLE 2: Time complexity analysis of PSO-SA.

Step name	Time complexity
Update particle velocity and displacement	O(Sn)
Adjust solution by constraints	O(Sn)
Update local and global optimal particles	O(Sz(n))

**3.3.3. PSO-SA Algorithm.** Cooperative matching evolution algorithm is easy to implement and has a faster convergence speed, but it is easy to fall into the local optimal solution, which is characterized by strong convergence and low population diversity. The PSO evolution strategy used by PSO-SA is similar to the standard PSO strategy. Both the optimal position of the group and the historical optimal position of the individual are used to control the current speed of the particle. Table 2 shows the results of PSO-SA time complexity analysis.  $\lambda_1$  and  $\lambda_2$  Influence on inertia factor. (Table 2).

**3.4. Regression Analysis.** Regression analysis is a set of techniques and tools used in statistics to explore relationships between variables. In its simplest form (simple linear regression), with one variable considered as the dependent variable and one variable as the independent variable, ordinary least squares (OLS) is used to estimate the linear regression line. In regression analysis, you need to collect data on many variables and then determine if there is an actual relationship between those variables, and if so, the equation can be used

FIGURE 4: The statistics of the matching scheme solved by PSO-SA ( $d = 10$ ).FIGURE 5: Statistics of PSO-SA solving matching scheme ( $d = 30$ ).

to predict the value of the dependent variable if the independent variable takes on a specific value. Among them, the relationship model of these variables needs to be assumed first, and then a regression model is established, and the correlation coefficient is calculated according to the predicted value to determine whether the model is correct. Regression analysis is usually used to predict numerical targets. It is a predictive modeling technique that studies the relationship between independent variables and dependent variables. It is a very practical and common prediction algorithm.

The linear regression algorithm refers to the output of a regression equation composed of multiple input characteristic variables and uses the most suitable straight line (regression line) to establish the relationship between the

dependent variable  $Y$  and one or more independent variables  $X$ . Multiple linear regression has many methods ( $>1$ ) independent variables, while simple linear regression has only one independent variable.

Simple linear regression is also called univariate linear regression. The relationship between the independent variable and the dependent variable is represented by a straight line, and the linear correlation between the two variables is studied;  $X$  represents the independent variable, and  $Y$  represents the dependent variable. The regression equation is as follows:

$$Y = aX + b. \quad (4)$$

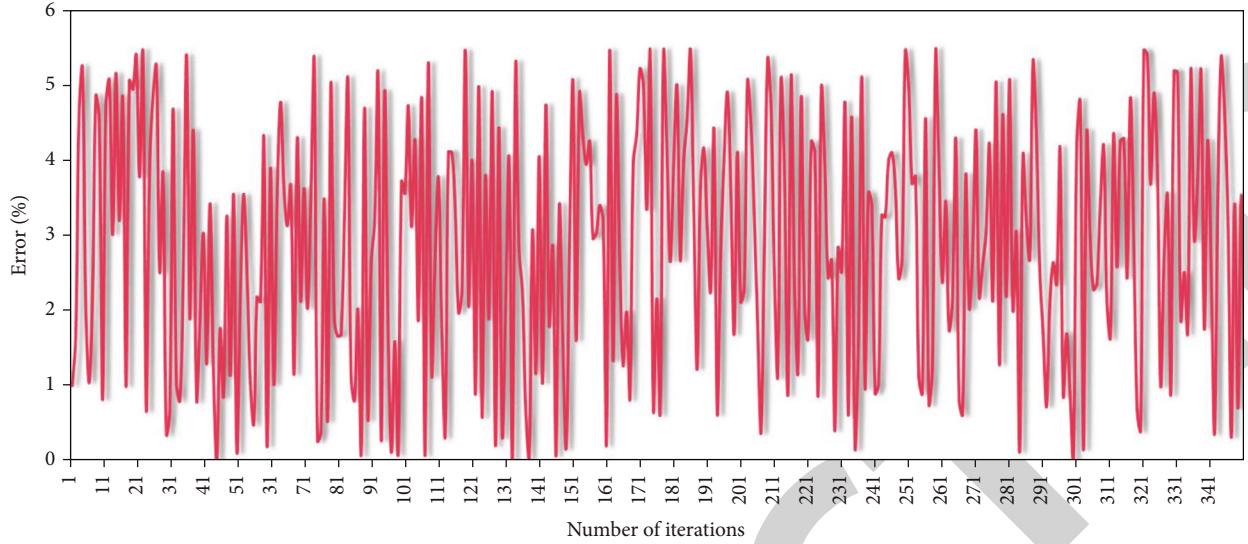


FIGURE 6: The relationship between the number of iterations and the error.

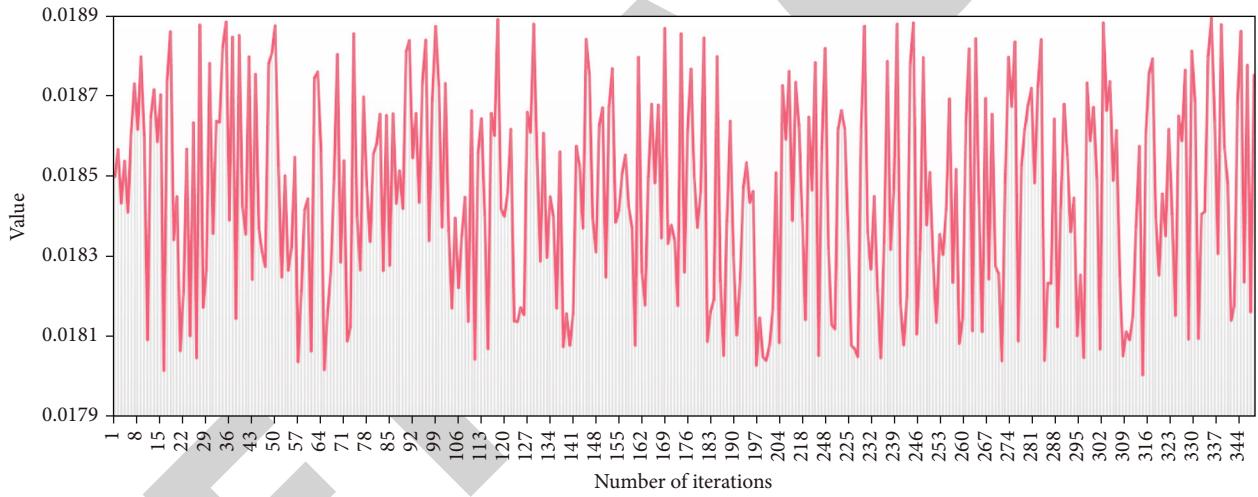


FIGURE 7: The relationship between the number of iterations and variance.

Among them,  $a$  and  $b$  are the regression coefficients required; the regression coefficients are solved by minimizing the sum of squares of the error between the actual value and the predicted value. The equation of the sum of squares of the error is as follows:

$$Q(a, b) = \sum_{i=1}^n (Y_i - (aX_i + b))^2. \quad (5)$$

Expand and simplify the above equation to get

$$Q(a, b) = n\bar{Y}^2 - 2an\bar{XY} - 2bn\bar{Y} + a^2n\bar{X}^2 + 2aBn\bar{X} + nb^2. \quad (6)$$

Partial derivatives with respect to  $a$  and  $b$ , respectively, and making them equal to zero, we get

$$\begin{aligned} a &= \frac{\bar{X}\cdot\bar{Y} - \bar{XY}}{(\bar{X})^2 - \bar{X}^2}, \\ b &= \bar{Y} - a\bar{X}. \end{aligned} \quad (7)$$

Multiple linear regression has multiple independent variables, and the regression equation is as follows:

$$Y_i = w_1x_{i1} + w_2x_{i2} + w_nx_{in}. \quad (8)$$

$X$  represents an input data,  $Y$  represented by a vector,  $n$  represents an input data with  $n$  independent variables, and the regression coefficient is represented by a  $W$  vector.

The establishment of the regression model is mainly to solve the regression coefficient  $W$  vector. The least squares

method can be used to find the value that minimizes the error of  $w$ . In fact, the least squares method is the loss function of the linear regression model, which minimizes the sum of squares subtracted from the actual value and the predicted value, as long as the loss function takes the minimum value. Parameter is the desired parameter.

#### 4. Result Analysis and Discussion

In the experiment, the horizontal comparison algorithm includes the PSO-SA algorithm. The vertical comparison group is serial collaborative matching and parallel collaborative matching. HPSOSA adopts SA strategy to try to jump out of the local area only when PSO-SA mutates many times, but the optimal value remains unchanged. The results of parallel collaboration are few, mainly represented by PSO-SA, which adopts PSP for collaborative matching (Figures 4 and 5).

On the datasets with question matching scales of  $d = 10$  and 30, the PSO-SA algorithm was run for 10 rounds, respectively, and it was found that the fluctuation was large when  $d = 10$ , while it was relatively stable when  $d = 30$ ; when  $d = 10$ , the maximum value was 7.2354, and the minimum value is 6.9969; when  $d = 10$ , the maximum value is 26.6403, and the minimum value is 23.9599. It can be seen that when  $d = 10$ , PSO-SA can obtain a relatively good matching scheme, but it is easy to fall into the local optimal solution, which is characterized by convergence.

It can be seen from Figures 6 and 7 that as the number of iterations increases, the error and variance are also different, changing all the time, and there are errors.

#### 5. Conclusions

Data is the basic support for financial auditors to carry out audit work and effectively exert the function of the “immune system.” The financial budget execution financial budget data comprehensive analysis system developed in this paper collects the backup data of all financial business systems and financial budget software; uses early warning, query, and multidimensional models for unified analysis; and further analyzes and confirms the doubts queried by each model. Each audit team conducts decentralized inspections, which expands the coverage of audits, transforms the traditional single department budget execution budget to reflect individual problems into a centralized reflection of general problems in the budget execution process of all budget units, and expands the scope of the financial budget. The breadth and depth also greatly shorten the time of the members of the financial team at the audit site and effectively improve the efficiency of financial budget work.

##### 5.1. Collect and Process Data to Build a Solid Foundation for Data Analysis

- (a) Collect data and establish a financial database. The acquisition and storage of massive data is a prerequisite for data analysis. Therefore, when the commissioner's office uses big data for budget supervision,

the first thing to do is to gradually expand the collection of data, the collection of data, the collection of data, the management of data, the management and management of data, etc., aspects of work. First, we must do a good job in the collection of financial data. In order to meet the requirements of “interconnection,” this paper promotes the research on treasury information system, department budget system, and government procurement system of the Commissioner's Office. Second, gradually collect social and economic data. Gradually collect local economic and social data, and establish a working mechanism for data collection with local finance, taxation, statistics, People's Bank, and other departments. Only on the basis of data sharing and openness can big data-related technologies be used for data mining and analysis

- (b) Strengthen the processing of financial data, and build a quality system for financial information. Financial data is an important carrier of the financial department, and its problems will have a significant negative impact on the financial decision-making of the financial department. In order to ensure the accuracy and integrity of financial data, the authenticity of data collection, analysis, and other links, it is necessary to build a financial data quality management system: first, to build a financial data structure and standardize the content of financial data and second, to build financial data. The quality management system uses a variety of methods such as grouping technology, comparative analysis technology, and model technology to construct the quality management process of financial data

*5.2. Introducing and Cultivating Talents and Providing Method and Technical Support.* The use of big data for financial budget management requires relevant departments to have a certain understanding of financial work and have certain financial management experience; the second is to have certain mathematics, statistics, data management, and data mining technology and be able to carry out from a global perspective. Dig and analyze. The training of professional and technical personnel is a long-term and systematic work. In the future, in the process of applying big data technology to financial budgeting, it is necessary to introduce a group of experts in the field of data analysis to mine complex and uncertain objects and perform specific data mining on them. At the same time, train the staff of various departments of the Commissioner's Office on data analysis and application so that they can accurately mine data through simple data tools or according to the requirements of supervision work. At the same time, due to the characteristics of high starting point and new technology for data analysis, this paper proposes a method of using technical personnel to analyze data to enhance cooperation with relevant universities and research institutes.

Auditing based on big data replaces the traditional auditing model. Local audit institutions should fully introduce big

data audit technology, combine big data technology with the existing digital audit platform, and through multi-angle, multifield, and in-depth analysis, find that the audited entity exists in financial, business, or fund management. The main measures are as follows: (1) Using big data technology, audit institutions should establish and improve dynamic analysis mechanisms. At present, some regions have realized the collection of quarterly data on budget execution, which improves the timeliness and timeliness of data and provides a good opportunity for local audit institutions to build a dynamic analysis mechanism based on big data. Audit institutions can carry out dynamic big data analysis on all aspects of the raising, distribution, and use of budget funds, so as to achieve the whole process of auditing of budget units and synchronous and continuous audit supervision and timely discover and resolve potential risks and risks of budget units. (2) Audit institutions should reform the data analysis model of budget execution audit. At present, the data model used by my country's audit institutions is relatively simple, and it is difficult to conduct a more comprehensive and accurate screening of audit doubts. Therefore, audit institutions should use big data technologies such as machine learning, natural language processing, and distributed stream processing to analyze the audit data of budget execution so that it can play a good role in improving the efficiency of audit work. For example, using machine learning methods, based on the core business indicators of the enterprise, build enterprise internal control evaluation indicators to build enterprise business risk evaluation and internal control risk evaluation models, so as to accurately identify the operational risks and internal control weaknesses of the budget execution unit. Use natural language processing technology to analyze text data of important meetings and internal programs of budget execution units. It overcomes the shortcomings of traditional audit that cannot identify and analyze a large amount of text data and changes the text and unstructured data that cannot be used effectively before. The use of distributed data processing technology can improve the automation of data collection, format conversion, data sorting, etc., thereby improving the standardization of budget execution audit work and thereby improving the overall budget execution audit work efficiency.

**5.3. Carry Out Data Mining and Analysis Pilot Projects and Build a Budget Supervision System.** The application of big data mining technology for budget supervision is still in the initial exploratory stage in my country, and it is relatively lacking in manpower, technology, and experience. When using big data for data mining and analysis, it is necessary to correctly select special projects with large data volume and high data quality for data mining and analysis, constantly summarize the phased results, and promote them within the scope of the commissioner's office so that big data technology has gradually become the basis for the Commissioner's Office to carry out budget supervision, and a budget supervision system of the Commissioner's Office based on big data technology has been built. Big data is the trend. With the continuous deepening of my country's fiscal budget supervision and fiscal informatization, the use of big data

technology to carry out fiscal reform and budget management will help promote the modernization of my country's government governance system and governance capacity and improve the scientificity and effectiveness of fiscal budget management. It plays an important role in deepening the reform of the fiscal and taxation system.

## 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 known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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