

Retraction

Retracted: Design of Enterprise Economic Information Management System Based on Big Data Integration Algorithm

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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) Manipulated or compromised peer review

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.

References

- [1] X. Liu, "Design of Enterprise Economic Information Management System Based on Big Data Integration Algorithm," *Journal of Mathematics*, vol. 2022, Article ID 3257748, 9 pages, 2022.

Research Article

Design of Enterprise Economic Information Management System Based on Big Data Integration Algorithm

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In economic growth, the gradual increase in the effect of information technology makes the enterprise economic information management increasingly important for the survival and development of the enterprises. This paper designs an enterprise economic information management system for the complex internal economic information management business and process of enterprises. It provides daily office, information access, document preview, and transmission. The proposed design (i) copes with the inconsistency and irregularity of enterprise economic information data, (ii) quickly obtains valuable information from these massive high-frequency data, and (iii) improves the economic benefits of data assets and data management efficiency. The printing function systematizes the information management for departments such as enterprise economic information, personnel, and production. The main focus of this research includes the mode, framework, and function of the whole system software. Moreover, it also comprises of the use of Internet platform big data technology to realize the practicality, stability, and security of the system database algorithm, which has been practically used by enterprises to improve office efficiency and meet the needs of daily management of enterprises. Based on the analysis of the current status of enterprise big data application, this paper constructs an enterprise economic informational management system based on big data and also describes in detail the key technologies of enterprise economic informational data management from three aspects: NoSQL-based big data storage management, Hadoop-based economic informational big data informational and economic informational big data analysis, and mining algorithm. Provide theoretical basis and basic technical support for online decision analysis.

1. Introduction

The competition among enterprises in today's market is no longer limited to the traditional sense of simple market competition behavior. In order to better adapt to the new form of business competition, people have started to explore the application of some new technologies in the construction of enterprise information systems in business management, especially the application of big data technology and cloud computing technology in it, which is popular research among scholars at present [1].

With the rapid development of Internet technology and data analysis technology, the information storm brought by big data is profoundly changing people's production, life, and way of thinking. In the era of big data, the degree of informational in management functions is deepening, and

the existing means of enterprise economic informational management is facing serious challenges [2]. How to apply information technology to the process of enterprise economic information management, improve its operational efficiency, and effectively promote the healthy, stable, and rapid development of the enterprise economic information management system has become the worthiest of in-depth consideration of enterprise economic information management personnel. Management informational refers to the development of information technology productivity with computers and other intelligent tools as the main medium, on the basis of the integration of advanced management concepts, the transformation of enterprise business processes, business methods, and other traditional management tools, and re-integration of enterprise strategic planning and management tools to achieve corporate goals and processes.

At present, enterprise economic informational management has gone through three stages: accounting computerization, enterprise economic informational management network, and group enterprise economic informational management. Accounting computerization mainly refers to the combination of accounting knowledge and information technology means, the daily accounting processing of various information as management information resources, the use of computers, and network communications based information technology means to obtain, process, and transmit information related to enterprise economic information [3]. Accounting computerization can solve the problems brought by manual bookkeeping such as bookkeeping errors, long data aggregation time, and much energy consumed by accountants in watchmaking, significantly improving the efficiency of enterprise economic information management and the speed and efficiency of data sharing. However, accounting computerization does not have the function of enterprise economic information management, and human factors have a greater impact on enterprise economic information management [4]. For example, to provide effective information for the purpose of management, accounting had to spend a lot of energy to a variety of data processing and deep analysis, and the processing of a lot of basic work greatly distracted the management accountant's main energy.

At present, state-owned enterprises have established enterprise economic information systems, but most of them are still in the stage of networked enterprise economic information management, that is, the stage of docking the construction of accounting information systems with other business information ports. The degree of economic informatization is not high, and related business modules have not been integrated to form data sharing and control sharing, and management coordination has not been formed [5]. Group enterprise economic informational management has largely improved the efficiency and effectiveness of enterprise economic informational data processing and realized enterprise economic informational management and data processing automation and intelligence. Nowadays, the management has gradually noticed that business processes and enterprise economic informational are inseparable. Enterprises should integrate enterprise economic informational with business processes and realize the complete sharing of resources with core business as the axis through the "five streams" of decision flow, capital flow, information flow, business flow, and logistics for the purpose of enterprise strategic management and goal-oriented management [6].

In this paper, Section 2 presents the demand analysis. Section 3 proposes the system design. In Section 4, the experimental verification has been given for the proposed methods. And Section 5 concludes the study.

2. Demand Analysis

Enterprise economic informational construction is a new technology in enterprise management that has emerged in recent years, and the application of big data technology has a

crucial impact on the improvement of enterprise management, especially the application of big data technology in economic informational construction is strongly promoting the speed of economic informational construction, so it is necessary to discuss the foundation of economic informational construction in the big data environment [7]. The development stages of domestic and foreign enterprises' economic management systems are shown in Table 1. Its informational basis contains two aspects: one is the informational basis of big data, big data has a specific definition of data information, the volume of information in big data is very huge, it is difficult for ordinary economic software to do effective capture, management, and application analysis and processing of economic information of big data and so on; second is the technical conditions of economic informational in the big data environment [8]. As we all know, cloud computing and big data have an inseparable relationship, and the technical conditions of economic informational in the big data environment are the distribution of processing cloud computing technology. In a sense, with only the use of big data "big," it is difficult to promote the process of economic information technology construction and the need for cloud computing cloud, in order to achieve the effective use of data and to provide the basis for enterprise management decisions [9].

The general practice of economic management of the company is to accurately account for the economic situation and business data of the company in a certain period of time according to the period specified in the plan. However, in this form, the collection of economic information may be delayed due to various circumstances. Now that we are in the era of big data management, we can make better use of big data for timely accounting and summary information in the economic management of the company [10]. It also simplifies the work of economic personnel in the aggregation of complicated information and can be completed in a shorter period of time to organize and analyze economic information. This can also reduce the unnecessary loss to the company because of the lag of information acquisition. In the past, the main content of the economic information of the company was according to the economic ratio and its three groups of tables for accounting [11]. However, due to the development of the times, this accounting method is no longer applicable to the economic management of the company and may hinder the long-term development of the company. To enable companies to obtain economic information more timely and accurately and to ensure the relevance of various types of information, companies must establish dynamic software analysis capabilities. Instead of using traditional forms of accounting, it is necessary to use the information management technology of big data.

3. System Design

The advancement and widespread use of big data management technology have led to a change in the old mode of operation forced by most industry sectors, including, of course, the economic management within the company [12]. The prerequisite for the use of big data is to ensure the

TABLE 1: Enterprise economic management system development stage.

Time	Development stage	Key technology	Stage characteristics
Before 1992	Monolithic financial software	DOS development platform	Simple accounting function
1993 to 1997	Accounting-based financial software	Local area network (LAN)-based sharing, limited expansion	Not conducive to long-term development
1998 to 2001	Structured financial software	C/S-based structure	Network-based information management
2002 to 2005	Structured financial system	Internet-based B/S structure	More comprehensive functions and more powerful interactivity
2006 to present	Intelligent financial management system	Integrated architecture	Data mining capability, integrated management, high level of information sharing

necessary correlation and timeliness between various information so as to avoid the economic information from lagging too much in the process of collection and collation and to help reflect directly the actual operating conditions of the company in that period through the company's economic information [13]. It also helps the top management of the company to find out the problems in the process of operation through economic information and give timely solutions. Therefore, the managers of enterprises should adapt to the development of big data era and put the technology into economic management, change the old economic information management methods, and require the company's economic personnel to master this advanced technology, to ensure the timely effectiveness of economic work. In addition, as big data technology is widely used in the current era, companies have more diverse types of index data in their daily operations. In order to better promote the reform of the company's economic management, it is necessary to set up a professional economic information management team within the company to ensure that the process of obtaining economic information can be timelier and more effective, so as to help the top management of the company to better use the data to make scientific decisions. First of all, the economic management personnel of the enterprise must have professional technical ability and high overall quality. Moreover, each employee responsible for economic work should learn from each other's strengths and merits and make a clear division of labor to improve efficiency in the process of accounting for economic information. The company should make a perfect system charter for the work of economic information management and regulate the behavior of economic management staff. And the company managers should also raise the status of economic management to strategic decision-making, so as to attract the attention of all employees and in the daily work can better help economic personnel to organize and analyze the economic information management [14].

The proposed system architecture is shown in Figure 1. Due to the current technological requirements of big data, the company has various indicators in terms of economic information. Therefore, in order to ensure that the company organizes and analyzes economic information in a timely and accurate manner, a real-time dynamic forecasting system must be designed [15]. First of all, it is required to divide the data of economic information according to the developed

classification system and make clear the actual role and meaning of each economic data. This helps the company to make decisions and improve efficiency in its daily operations.

The use of advanced big data management technology can also help companies to collect comprehensive economic information. The information is then integrated and analyzed according to certain rules to provide the company's top management with a data base and basis for decision-making. In addition, different management models can be constructed based on economic information to help managers understand the actual economic situation of the company in a more intuitive way and to help the company's employees clarify the actual development goals and directions of the company. Because the development of big data management technology is relatively short, so many domestic enterprises still do not have a good grasp of this technology and apply it to the actual operation of the company. Therefore, the top management of the company can apply the big data technology to the economic management of the company through the following ways. First, a cloud computing economic information management platform is established. This platform is initially established in accordance with the principle of systemic and articulation-based. The use of big data management technology is ensured to integrate and analyze the economic information of the enterprise, and it can be timely and accurate. Second, the applicability of the cloud computing service platform is enhanced. The company's managers and employees in charge of economic management should be clear about their responsibilities. And the economic information management system process to achieve a good grasp of the relevant system should also be established in the company for the protection of economic information security mechanism in order to promote the actual benefits of the service platform. Third, the economic control platform is improved in the business model. This must ensure the transparency and interoperability of information between the company's economic information and the economic management platform of cloud computing. And the company's economic personnel should have a certain understanding of the company's daily operation mode and the related production process. Then, before establishing the economic control platform, the cloud computing technology and economic information should be used as the basis. The ultimate goal is to improve the efficiency and mode of the company in its daily operations.

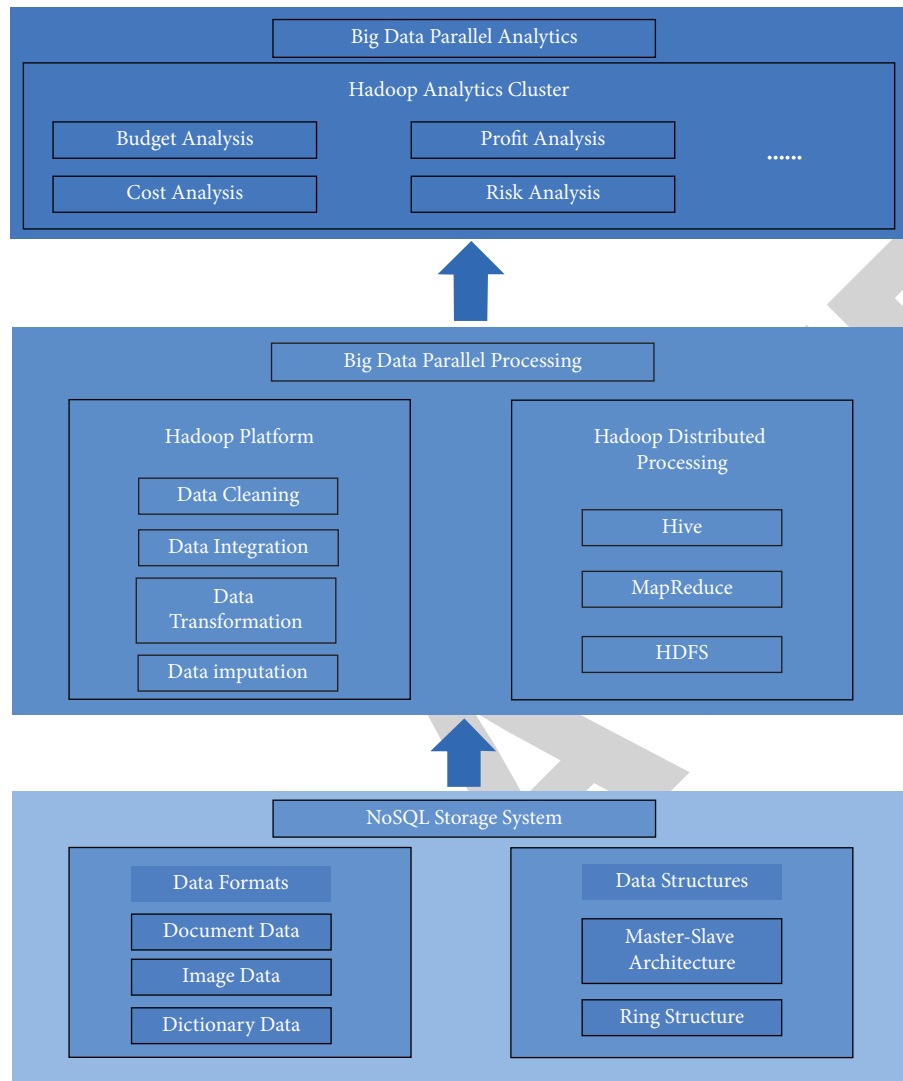


FIGURE 1: System architecture.

There are six main characteristics of big data: massive volume, complex and diverse data types, high timeliness, high variability, high data quality, and the search for high-quality value. (1) Hadoop ecosystem: HDFS is a distributed file system with high fault tolerance, high throughput, and so on, ideal for applications on large-scale data sets; H-base is a tool for fast access to NoSQL databases; Hive is a database framework that transforms structured data files into database tables and provides SQL-like query functions to convert user-written SQL statements into Map-Reduce tasks; Flume is a log collection system with high efficiency and high reliability. (2) NoSQL is a nonrelational database, which has the advantages of high scalability, large capacity, high performance, shareable, and high flexibility and can solve various challenges brought by massive and complex data, especially the problem of big data applications. Data mining methods are classified according to different mining perspectives, and the following are several common data mining methods. Association rules reflect the existence of a certain association between one thing and other things and mine

valuable data items through this association. Find out the characteristics of the data objects in the database through algorithms, then combine and classify the data in the database according to the specified characteristics, classify the data in the database into a given category, and then perform characteristic analysis. Clustering classifies data according to similarity, with as much similarity as possible in the same class and as little similarity as possible in different classes. Regression analysis maps the attribute values of data to some connection due to changes in time and maps the characteristics of the connection to the actual predicted function to analyze the relationship that exists between its data, mainly applied to feature prediction and analysis of data series.

The streaming data cleaning architecture is shown in Figure 2. The system involves multiple data sources, including Excel, monitoring logs, and relational databases. The data sources are pushed into the distributed message queue Kafka after unified encapsulation by the unified data access module. The computing cluster consumes the data and performs cleaning operations and finally outputs the cleaned

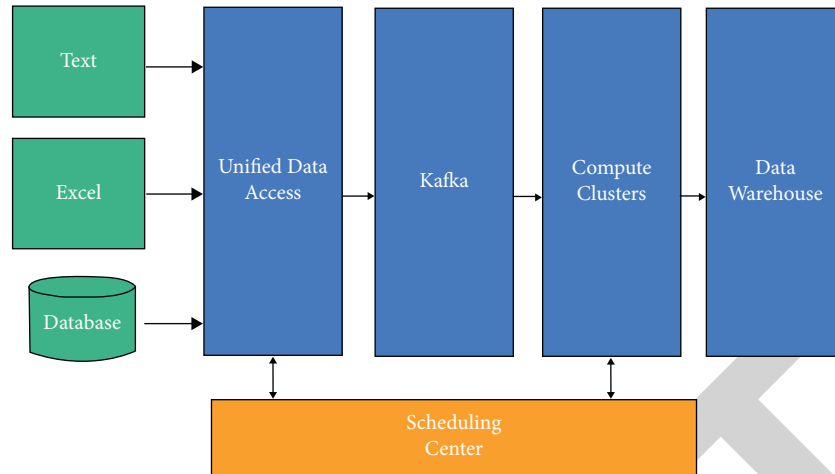


FIGURE 2: Stream data cleansing architecture.

results to the data warehouse. This architecture has the following main advantages:

- (i) It converts all the different types of data into stream form so that different data are unified in form. The computational nodes for cleaning data only need to care about the specific data and do not need to deal with the data source.
- (ii) The cleaning data are processed in a parallel and distributed manner, which improves the performance of data cleaning. The computing nodes can be scaled according to the actual load, which is highly scaled.
- (iii) The interactive scheduling center can visually configure the cleaning process according to the demand, which reduces the complexity of data cleaning.

3.1. Unified Data Access Architecture Design. The unified data access module mainly includes three submodules: timer, file monitoring, and SQL execution. Following is the brief explanation for each of these submodules:

- (i) *Timer Module.* The timer module provides timing function for the file monitoring module and SQL execution module. Through timing, it also controls the data collection rate. It enables the users to configure the timer through the interface. Additionally, it also allows the user to customize the execution period for each data source [13].
- (ii) *File Monitoring.* The file monitoring module is designed for log file collection. The file monitoring module reads the new file which is added to the monitored folder. Further, it parses the file according to the agreed parsing rules. It also generates the specified uniform data protocol and finally pushes it to Kafka.
- (iii) *SQL Execution.* SQL execution module implements the collection of relational databases such as

MySQL, Oracle, and SQL-Server. The SQL execution module regularly reads a batch of data from the database and pushes it to Kafka. The SQL execution module regularly reads a batch of data from the database and converts it into a unified data protocol and pushes it to Kafka.

3.2. Uniform Data Protocol Design. As shown in Table 2, the data protocol mainly has the following fields. Uid is the unique id of each data dynamically generated, name-id is the unique id of the data source, and timestamp is the time when these data are produced. Fields are a string array that holds the field names of relational databases or column names of Excel. Dates hold the specific data values.

3.3. Calculation Cluster Module Design. As shown in Figure 3, the computing cluster consists of several computing nodes:

- (i) *Interface Module.* The interface module is used to communicate with the scheduling center module and the unified data access module, including data source configuration interface, cluster management interface, process scheduling interface, and other interfaces. The interface module adopts RPC interface protocol, which is Remote Produce Call remote process call protocol, a computer communication protocol. The protocol allows a program running on one computer to call a subroutine on another computer without the programmer having to additionally program this interaction.
- (ii) *Synchronization Module.* The synchronization module is used to synchronize with the scheduling jobs in the database. This module keeps the real-time status of the job operation and reads the last running status of the job after the job restarts to ensure the correct operation of the cleaning job.
- (iii) *Metadata Module.* The metadata module keeps information about the data structure of the data

TABLE 2: Field table.

Fields	Name	Category	Required
Uid	Unique ID	String	False
Name-id	Data source name	String	True
Timestamp	Timestamp	Long	True
Fields	Field name	List<Field>	True
Datas	Loaded data	List<Field>	True

source and caches the dictionary code table information of the cleaning data.

- (iv) *Process Parser Module*. The process parser module reads the configuration information of the job cleaning process through the interface module and parses the configuration information into data the corresponding directed acyclic graph for cleaning.
- (v) *Operator Executor*. The operator executor reads the configured cleaning parameters and invokes the cleaning method in the operator for cleaning. The operator executor does not need to care about the specific cleaning process but only needs to focus on the cleaning method in the operator, which makes data cleaning scalar.

3.4. Scheduling Center Module Design. The scheduling center module serves as a window for system user interaction, providing users with a visual interface for cleaning process configuration, which facilitates the configuration of various complex cleaning processes. The scheduling center module has functional modules such as data source management, cluster configuration, operator management, cleaning dictionary management, and cleaning process management [14].

- (i) *Data Source Management Module*. The data source management module provides unified configuration management functions for different data sources. The module provides access rules for data sources, mainly including timing cycles, monitoring folders, extracting SQL statements, and unified data protocols, and interacts with the unified data access module to control the start and stop of the unified data access module.
- (ii) *Cluster Management*. The cluster management module provides management and monitoring functions for the unified access module clusters and computing clusters, such as monitoring the online and offline of clusters and monitoring the cluster. The cluster management module provides management and monitoring functions for the unified access module clusters and computing clusters, such as monitoring the online and offline of clusters, monitoring the utilization of resources, monitoring the execution of cleaning jobs, and providing early warning functions for erroneous jobs.
- (iii) *Computation Operator*. The computation operator is divided into computation operator and output operator. The computation operator is used for data

cleaning, and the output operator is used for the output of cleaning results. Commonly used output operators include Elasticsearch output operator, Hive output operator, database output operator, and Kafka output operator. When adding the operator, you need to configure the execution function, operator description, parameter name, and parameter type.

- (iv) *Cleaning Operator Dictionary Management*. The cleaning operator dictionary management module is designed for dictionary replacement operators. This module provides dictionary configuration functions and caches the mapping relationships in Redis. The dictionary replacement operator reads the Redis cache and does the dictionary mapping.
- (v) *Cleaning Process Management*. The cleaning process management module provides users with interactive cleaning process configuration functions. The user can drag and drop the cleaning operators on the canvas through the Web interface, configure the cleaning parameters corresponding to each cleaning operator, and connect them according to the cleaning rules to form a flow chart from the starting point to the output. This visual configuration gives users intuitive control of the cleaning process and reduces the complexity of data cleaning.

3.5. Integration of Map-Reduce-Based Canopy + K-Means Algorithm. Although the K-means algorithm is efficient, the randomness of the clustering parameters and the uncertainty of the initial clustering center are two drawbacks of the K-means algorithm, thus leading to unstable optimal values of clustering. In order to improve the stability and accuracy of the clustering effect, the Canopy + K-means algorithm is proposed. Using the Canopy algorithm to coarsely process the data, the processed data are used as the initial data of K-means, which can solve the problems of K-means and improve the efficiency of the K-means algorithm. In order to improve the efficiency of the Canopy + K-means algorithm, the combination with the Hadoop ecological Map-Reduce framework is used, and the multiserver deployment further improves the timeliness of the algorithm, which is also the core of the enterprise financial management system. The implementation process has mainly two stages:

- (i) *Canopy Clustering Stage*. The map process groups the data sets, and each group is clustered using the Canopy algorithm to get multiple Canopy clusters.

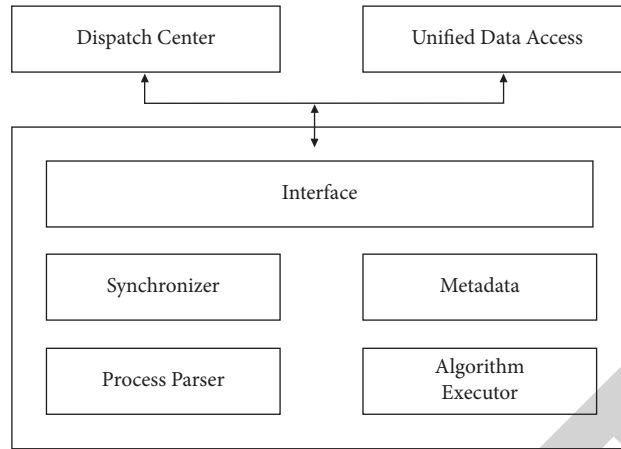


FIGURE 3: Calculation node module structure diagram.

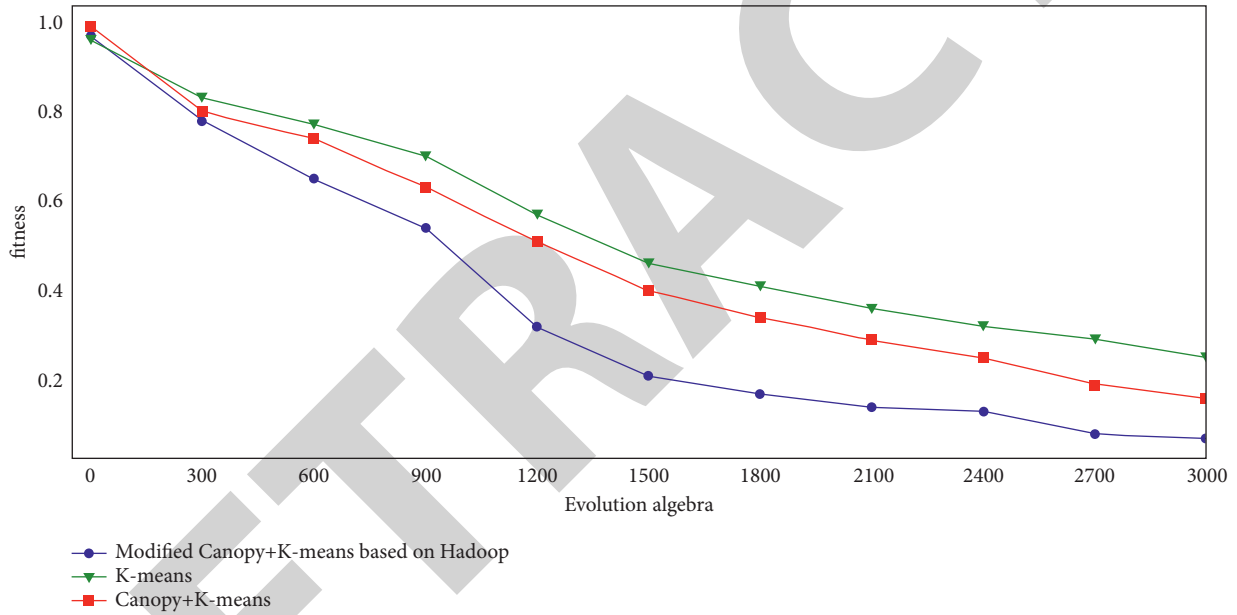


FIGURE 4: Algorithm comparison.

TABLE 3: Evaluation of clustering effect when setting the number of K-means clusters to 10.

Fields	Modified Canopy + K-means based on Hadoop	Canopy + K-means	K-means
REK	7	4	11
K	3	39	10
DB	1.39	1.79	1.69
SC	0.28	0.12	0.23
AMI	0.89	0.39	0.71
ARI	0.91	0.13	0.66
JC	0.016	0.078	0.005
TD	0.0015	0.0060	0.021

Reduce process merges multiple Canopy centers into one group and reprocess Hadoop platform data to obtain new Canopy center data.

- (ii) *K-Means Clustering Phase*. The Canopy center is used as the initialized clustering center for K-means, and one task in Map-Reduce is one iteration of K-means. The Map-Reduce function records the distance from each sample element to the cluster center and the result of each cluster and then recalculates it using the Reduce function. The steps are repeated until the clustering results are the most convergent and stable.

4. Experimental Verification

In order to verify the effectiveness of the enterprise economic information management system based on the big data integration algorithm, this paper selects one dataset, compares them with traditional Canopy + K-means and K-means algorithms, and evaluates the clustering effect based on clustering evaluation indexes such as DB, SC, and AMI.

First of all, the three algorithms are compared, i.e., Modified Canopy + K-means based on Hadoop, Canopy + K-means, and K-means. Then, their convergence is compared at the same iteration step, as shown in Figure 4. By analyzing Figure 4, it is found that the convergence speed and performance of Modified Canopy + K-means based on Hadoop significantly outperform the other two methods when we output the performance once every 300 iteration steps.

In Table 3, the evaluation of the clustering effect is shown for 10 numbers of K-means clusters. Table 3 describes that the clustering effect of the Canopy + K-means algorithm is significantly better than that of the K-means algorithm for each filed, i.e., DB, SC, AMI, ARI or JC, and TD. The K-means algorithm needs to set the parameter k in advance, while the optimized algorithm does not need to set the value of k in advance. However, it is capable of getting better initial clustering center, whose result is closer to the true value. The optimized algorithm does not need to set the k value in advance, but it can get better initial clustering center, which results in more realistic clustering results, and the combined Canopy + K-means clustering with Hadoop is better than the traditional Canopy + K-means algorithm.

5. Conclusion

In this paper, the information management technology was reasonably used to control the enterprise economic information management information under the environment of big data. Thus, the information management work was improved. Moreover, the foundation for the good development of the enterprise was laid. Furthermore, an enterprise economic data management system based on big data was constructed, using the Canopy optimized K-means algorithm combined with Hadoop platform and NoSQL database management in the background, to improve the standardization and efficiency of enterprise financial

management and achieve the purpose of increasing economic benefits. At the same time, in order to achieve good development of enterprises, both the top management and front-line managers of enterprises should pay enough attention to the information informational construction work, control the current level of information management of enterprises, and strive to solve the problems faced by the information construction work. In addition, advanced management technology should be continuously introduced to optimize the management mode under the big data environment, so as to improve the quality of enterprise information management work.

Data Availability

The data used to support the findings of this study are available upon request to the author.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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