

Research on the Application of Statistical Analysis in Financial Management under the Background of Big Data

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ABSTRACT

Starting from the perspective of big data statistical analysis in enterprise financial management, this paper explores the current development status of internal big data and artificial intelligence algorithm applications, as well as the construction of intelligent financial service systems. In response to the existing shortcomings, various big data technologies are introduced to establish a network financial platform and a Financial Shared Service Center (FSSC) based on the existing ERP (Enterprise Resource Planning) resource management software system. This strengthens intelligent financial auditing and accounting, big data statistical analysis, and business management, and can achieve more scientific, efficient, and systematic financial data and service management.

KEYWORDS

Big data; Statistical analysis; Financial management; Application

1 Introduction

Modern enterprise financial management mainly relies on establishing digital systems and financial sharing centers to centralize various dispersed financial management functions on a digital platform. Multiple financial modules are set up to complete data collection, statistical analysis, financial risk prediction, financial management decision-making, and cost control. Under the requirements of the intensive and intelligent financial management development model of enterprises, big data algorithm technology and shared service centers are introduced into the digital financial management system for the execution of internal fixed asset review, financial fund flow audit, financial bill audit, financial risk prevention and control work. This can deeply mine and statistically analyze financial data from different sources, more efficiently analyze data accuracy, data value and risk, and help enterprises continuously improve industrial management decisions and financial management quality.

2 Theoretical overview of statistical analysis and management of enterprise financial big data

Statistical analysis, as the most common mathematical method, mainly includes two types of methods: descriptive analysis and analytical analysis. Descriptive analysis includes principal component analysis, factor analysis, and cluster analysis, while analytical analysis includes multiple regression analysis and discriminant analysis. The statistical analysis process generally involves elements such as numbers, images, tables and reports, models, etc.^[1].

When it comes to big data statistical analysis of enterprise financial management, big data mining and clustering algorithms are usually used to systematically collect and organize relevant financial data from different departments and channels, including financial data indicators of a certain time period and type, such as fixed assets, prepayments/accounts receivable, investment and financing funds, working capital, employee salaries, scientific research investment, inventory funds, invoice documents, tax bills, purchase and sales contracts, and other data indicator information statistics; Then, using methods such as principal component analysis, factor analysis, and multiple regression analysis, we consider and analyze the strong correlation and quantitative relationship between multiple independent variables and the dependent variable. Based on this, we predict and estimate the direction of change of the dependent variable under the situation of independent variable changes, helping enterprises identify the main financial factors that currently affect internal industrial operations and the main risks faced in financial management. Based on this, we formulate targeted industrial project decisions and financial management improvement measures, providing support for scientific and stable financial and business operation management of enterprises.

3 The insufficient application of big data statistical analysis technology in enterprise financial management

3.1 The lagging application of big data and artificial intelligence algorithms brings about financial data processing problems

At present, some small and medium-sized enterprises have insufficient application of K-means clustering algorithm model, Apriori association rule algorithm model, and LSTM (Long Short Term Memory) network model in their daily financial audit and data resource management processes. The statistical analysis of financial indicators for "online and offline" still relies mainly on manual accounting. Some medium-sized enterprises have numerous internal departments,

and department personnel mainly use OCR (Optical Character Recognition) scanning and RFID wireless radio frequency recognition to automatically scan and upload various paper bills to the backend database and cloud server for accounts receivable/payable documents, outbound/inbound documents, accounting vouchers, tax bills, acceptance bills, purchase and sales contracts, and other bills; For the statistical analysis of online financial data resources, financial management personnel follow the process of "online reimbursement - issuance of online expense vouchers - online audit" to complete the review and recording of fixed or working capital of the enterprise, and integrate financial data into text or Excel spreadsheets ^[2]. However, the lack of introduction and application of big data machine learning models has led to inadequate collection, cleaning, and preprocessing of multi-source financial data, resulting in low efficiency in network financial data collection and insufficient filtering of missing data detection, duplicate or redundant data, leading to the dilemma of unscientific and inaccurate financial data statistics.

3.2 Insufficient construction of the intelligent financial service system leads to modular management and statistical analysis problems

Although most enterprises currently use resource management systems such as ERP, CRM (Customer Relationship Management), SCM (Supply Chain Management), etc. to carry out data classification management for internal project investment and financing, accounts receivable/payable, fixed assets, working capital, and tax payments, the differences in data formats and difficulties in data integration and sharing in heterogeneous systems result in high costs for enterprises in financial data statistics, data classification storage management, and data sharing.

In the absence of technical talent and financial support, some enterprises have not yet established a digital financial management system based on Hadoop distributed cluster component architecture, SQLserver database, web server, and cloud server, and have not used Apache Kafka message queue as a data bus to collect and statistically analyze network financial data. At the same time, there is a lack of professional technical personnel for big data statistical analysis within enterprises, who rarely use deep neural network algorithms for data modeling and "tree" structure diagram correlation analysis, which greatly restricts the collaborative operation of financial auditing and business decision management.

3.3 The lack of construction and application of financial shared centers brings about problems in data analysis and sharing

In the context of big data network interconnection in the "Internet plus" era, most enterprises have not established a sharing center service platform in financial management. For different departments and different types of financial data resources, they still conduct standardized analysis and storage according to the independent process of "non-interference" ^[3]. One is that the enterprise has not established a financial shared center system that covers the front-end, back-end business decision-making, and shared service layers, and has not set up user access permission verification components, process engines, and form engine components, resulting in insufficient classification, storage, and sharing of financial data from different channels; The second issue is that management personnel lack the application of risk monitoring, warning, and risk control components, and the integration of AI model tools for financial risk auditing and prevention is inadequate.

4 The application strategy of intelligent statistical analysis mode in financial management under the background of big data

4.1 Strengthen the intelligent cleaning and preprocessing of enterprise financial data based on deep learning algorithm models

The efficient management of enterprise financial audit and data statistics and analysis in the "Internet plus" era can rely on the Hadoop distributed cluster architecture to set Kafka, Spark, Hive, Flink and other components for massive financial data processing, providing support for end-to-end real-time processing of access to financial data.

Firstly, the Apache Kafka component is responsible for real-time collection of enterprise financial data from network trading platforms, ERP resource management systems, backend databases, and other channels, while the Flink component mainly participates in real-time processing of lightweight financial data streams; Then it is input into the Apache Spark data analysis engine to clean and transform financial text and chart data. During this process, K-means/ Apriori big data mining algorithm and LSTM deep learning algorithm model are introduced to perform correlation audit analysis of monthly/quarterly financial statement data, which can more efficiently detect and identify missing, duplicate or redundant data; Finally, the intelligently cleaned and preprocessed financial data is transmitted to the Hive enterprise level data warehouse, which can complete storage and management of different types and massive (TB/PB level) structured/unstructured financial data ^[4].

4.2 Build a digitalized financial service system to carry out modular data statistical analysis and management

Deploying web servers supported by public cloud service platforms such as Alibaba Cloud and Tencent Cloud, and

combining B/S (Browser/Server) browser/server web architecture, Hadoop distributed component architecture, and SQLserver database to establish a digitalized financial management system. Setting up functional modules covering the collection and mining layer, business and risk management layer, and cloud support layer, it performs financial audits, special data analysis, and financial data collection operations for different departments.

On the basis of the existing ERP, CRM, SCM and other resource management systems, and in combination with the cloud service platform of Internet enterprises, a "data middle office" management system is established, which integrates a variety of big data analysis, financial management component setting function modules, and carries out intelligent statistical management of fixed assets, working capital, accounts receivable/payable, employee salaries, invoices and bills of SMEs, so as to achieve more efficient statistical analysis, sharing and storage management of financial data.

4.3 Establish and utilize a financial sharing center to enhance the level of enterprise financial data analysis and sharing

To achieve the sharing of financial data resources among different departments within the enterprise, various financial bills or forms are automatically scanned and entered based on RFID wireless radio frequency identification tools and OCR scanners. The FSS financial sharing service center platform is constructed using big data and blockchain technology, O2O (Online To Offline) cloud technology, and a platform architecture is set up covering the business front-end layer, database back-end layer, image resource module, financial operation and sharing operation module ^[5].

Set up financial audit module and project business management module in the business front-end layer, based on RPA (Robotic Process Automation) robot, to automate the audit of enterprise fixed assets, working capital, accounts receivable/payable, liabilities/bad debts, invoices, bills, contracts and other data resources; The financial operation and shared task module is responsible for integrating and classifying financial texts, images, and reports from different business departments through financial statement engines, financial form engines, and process engines, providing support for resource sharing in financial auditing and decision-making. Finally, an image resource module is set up in the backend database layer, based on the What If prediction and analysis model, intelligent analysis and integration of unstructured financial images are performed to obtain BI statistical reports for financial asset and fund audit management, which assist senior management in analyzing and managing detailed financial and business data.

5 Conclusion

In summary, with the rapid development of big data and cloud service technology, as well as AI artificial intelligence technology, the construction of integrated financial and accounting systems based on deep learning algorithms and cloud service platforms has become an important direction for the transformation and development of financial management in enterprises and institutions. By constructing a digitalized financial management system that integrates data preprocessing, data statistical analysis, and financial sharing services, the original financial data statistics, big data analysis, and shared business processes can be reconstructed and restructured. This can form a diversified collaboration between financial departments and different business departments in financial management, promoting the improvement and efficiency of enterprise financial auditing and statistical analysis efficiency, as well as the quality of financial management.

About the Author

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