

Research on the application of big data analytics in corporate financial fraud detection

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ABSTRACT

With the expansion of the scale of enterprises and the increase of business activities, fraud in the financial field has become one of the serious challenges faced by enterprises. Traditional financial auditing methods appear to be inadequate in the face of increasingly complex financial fraud techniques. Therefore, this study focuses on the application of big data analytics in corporate financial fraud detection to improve the efficiency and accuracy of fraud detection. First, this study reviews the limitations of traditional financial auditing methods and analyses the advantages of big data analytics technology, including the ability to handle massive amounts of heterogeneous data, real-time performance, and the ability to detect hidden patterns. Subsequently, the study explores in detail the specific application scenarios of big data analytics in financial fraud detection, including the identification of abnormal transaction patterns, network analysis of supply chain relationships, and abnormal detection of employee behaviour. The results of the study show that big data analytics can not only detect potential financial problems earlier, but also reduce the false alarm rate and improve the accuracy of fraud detection. Finally, this study summarises the value of the application of big data analytics in corporate financial fraud detection and points out the direction of future research, including further optimisation of algorithms and improvement of data privacy protection. This study provides useful experiences and references for enterprises to introduce big data analytics in financial management, which is expected to achieve more significant results in the financial field.

Keywords: Big Data Analytics; Corporate Finance; Financial Fraud Detection; Real-Time And Accuracy; Data Privacy

1 INTRODUCTION

As the global economy continues to grow and the size of enterprises expands, the financial sector faces increasing challenges, one of which is the evolution and growth of financial fraud. Financial fraud not only brings huge economic losses to the enterprise itself, but also has a negative impact on the whole economic system. Traditional financial auditing methods have gradually become insufficient to cope with the complexity and variability of fraudulent means, therefore, to find more effective means to become one of the urgent needs of the current financial management [1].

In this context, big data analytics technology has emerged, and its powerful data processing capabilities and the development of deep learning algorithms provide a new

solution for the financial field. Big data analytics can not only process large-scale heterogeneous data quickly, but also mine the laws and patterns hidden behind the data, so as to detect potential financial anomalies more acutely [2]. This study aims to explore the application of big data analytics in the detection of corporate financial fraud, with a view to providing strong support for enterprises to improve their financial risk management.

2 RELEATED WORK

Research in the area of financial fraud detection has made significant progress since the end of the last century. Early research focused on traditional financial auditing methods, including sampling, comparison of accounts and transaction records. However, with the growing scale of enterprises and the increasing complexity of financial activities, these traditional methods have gradually revealed a number of limitations and are unable to meet the demand for more efficient and accurate detection of financial fraud [3].

In recent years, the rise of big data analytics has provided new perspectives and solutions for financial fraud detection. In the field of big data, the technologies represented by data mining, machine learning and artificial intelligence have made innovative breakthroughs, which provide powerful support for the in-depth analysis of financial data and the identification of fraud patterns [4].

Researchers have conducted extensive and in-depth studies on the application of big data in financial fraud detection. In terms of anomaly detection, some scholars have used big data analytics to identify anomalous patterns in transaction data and find signs of fraud. Meanwhile, network analysis techniques have also been widely applied to the detection of supply chain relationships, effectively identifying possible improper behaviours by mining node relationships in the supply chain [5].

However, although some results have been achieved, the application of big data in corporate financial fraud detection still faces a series of challenges, including data privacy issues, optimisation of algorithms and feasibility in practical applications. Therefore, this study aims to explore the potential of big data analytics in financial fraud detection and further improve and optimise the relevant algorithms, with a view to providing enterprises with more reliable and efficient financial management tools.

3 PROBLEM ANALYSIS

In the field of financial fraud detection, despite the new hope brought by big data analytics, there are still a series of problems that need to be thoroughly studied and solved.

Big data analysis requires large-scale data sets, however, corporate financial data involves sensitive information, such as personal identity and transaction details, etc [6]. Concerns about data privacy and security have become an important factor hindering the application of big data. This research will focus on how to safeguard the privacy and security of financial data in big data analytics and find effective data desensitisation and encryption methods. Algorithm selection and optimisation in big data analytics is crucial for the accuracy of fraud detection [7]. Currently existing algorithms may face insufficient adaptability to novel fraud techniques and computational efficiency issues with large-scale datasets. This study will focus on how to

optimise existing algorithms to improve the accuracy and efficiency of financial fraud detection. Big data analytics techniques perform well in theory, but may face some challenges in practical application, such as the integration of existing systems in the enterprise, training of employees, and cost [8]. This study will focus on how to solve these feasibility issues in practical applications to ensure that big data analytics can be successfully and effectively implemented in enterprise financial management.

Financial data within an enterprise involves multiple departments and business areas, and cooperation and information sharing between different departments is required to comprehensively identify potential fraud [9]. This study will focus on how to promote collaborative work across departments and establish an information sharing mechanism to achieve more comprehensive and in-depth financial fraud detection. Through in-depth research and solving these problems, this study aims to provide enterprises with more comprehensive and reliable financial fraud detection solutions, and to promote the further application and development of big data analytics in the financial field [10].

4 COUNTERMEASURE RESEARCH

In order to solve the problems faced by big data in corporate financial fraud detection, it is crucial to develop effective countermeasures. Efficient data desensitisation techniques are introduced to allow data to be analysed while protecting privacy. Adoption of means such as differential privacy techniques to ensure that sensitive information is not disclosed during analysis. Utilise advanced encryption techniques to ensure a high level of security is maintained during data transmission and storage, reducing the risk of unauthorised access. Explore deep learning-based algorithms to improve the ability to recognise complex fraud patterns [11]. Deep learning models are capable of learning from large-scale data and extracting more complex features. Introduce real-time updating mechanisms to ensure that algorithms can adapt to emerging fraud tactics in a timely manner and improve the accuracy of detecting unknown fraud patterns. Provide system integration solutions to ensure seamless integration of big data analytics with existing enterprise systems [12]. At the same time, provide training programmes to enable employees to become proficient in the use of new technology tools. Conduct cost-benefit analyses to accurately assess the ROI of introducing big data analytics and ensure that implementation is economically viable.

Create a cross-departmental information-sharing platform to facilitate real-time data sharing between departments. Ensure the comprehensiveness and accuracy of financial fraud detection. Establish clear co-operation agreements that define the responsibilities and rights of each department in information sharing and collaborative working to foster partnerships. By adopting these countermeasures, it is expected to better overcome the challenges of big data in corporate financial fraud detection and achieve more efficient, secure and viable financial management [13]. While implementing the countermeasures, it is recommended that they be evaluated and adjusted at different stages to ensure that the actual effects of the countermeasures are in line with the desired goals.

5 CONCLUSION

This study delves into the application of big data analytics in corporate financial fraud detection and proposes a series of countermeasures to the challenges faced in this area. Through the analysis of problems and countermeasures, we conclude that the introduction of big data analytics technology provides enterprises with a more comprehensive, real-time and

accurate means of financial fraud detection. By processing massive amounts of heterogeneous data and employing advanced algorithms, big data analytics technology can detect potential financial problems earlier, reduce false positives, and improve the accuracy of detection.

Despite its potential, big data analytics technology still faces many challenges in practical application, such as data privacy, optimisation of algorithms, practical application feasibility and cross-departmental cooperation. Therefore, it is necessary to consider various factors comprehensively and develop practical countermeasures [14].

In order to solve the problem, it is necessary to use a combination of countermeasures, such as adopting advanced data desensitisation technology and encryption protection to solve data privacy issues, introducing deep learning technology and real-time updating mechanism to improve the accuracy of algorithms, ensuring the feasibility of practical application through system integration and training, and establishing an information-sharing platform and formulating co-operation agreements to facilitate cross-sectoral co-operation. Financial fraud techniques are constantly evolving, and new technologies and market changes may also have an impact on financial management. Therefore, organisations need to stay on top of new technologies and readily adapt their financial fraud detection strategies to the changing environment.

In future research, it is recommended that the specific implementation effects of different countermeasures should be evaluated in depth and continuously optimised and adjusted to ensure the long-term effectiveness of big data analytics technology in corporate financial fraud detection. Through this series of efforts, enterprises will be able to better protect their financial security and improve their economic efficiency.

6 DISCUSSION

The application of big data analytics in the detection of corporate financial fraud involves a number of aspects, and big data analytics technology is capable of analysing large-scale data in real time to achieve rapid monitoring of financial data. This is critical for the rapid detection of potential fraud. However, the quest for real-time can be challenged by accuracy. Rapidly identifying truly anomalous patterns in big data while avoiding false positives requires meticulous algorithms and data quality assurance.

Corporate financial data involves sensitive information, and protecting data privacy is critical. Effective data desensitisation and encryption techniques are required in big data analysis to balance the need for data analysis with privacy protection compliance. Considering the data privacy regulations in different countries and regions, enterprises need to ensure that their big data analytics meet the relevant regulatory standards in terms of compliance. The algorithms used for big data fraud detection need to deal with complex financial patterns and anomalous behaviours. The introduction of advanced technologies, such as deep learning, may improve accuracy, but it also increases the complexity of the algorithms. Optimisation of algorithms is an ongoing process that needs to take into account emerging fraud techniques, as well as the changing financial environment. Regular optimisation and updating of algorithms is necessary. The introduction of big data analytics may require integration with an organisation's existing systems. This may involve technical challenges and the need to ensure smooth functioning of the systems. Employees of the organisation need to be equipped with the ability to use big data analytics tools and interpret the results. Therefore, the design and implementation of training programmes becomes critical. Introducing big data analytics requires capital investment, so organisations need to conduct cost and benefit analyses to ensure that the investment will yield a reasonable return. The long-term benefits of big data analytics may be in terms of reducing financial losses, improving economic efficiency and maintaining corporate reputation, rather than just a short-term return on investment.

REFERENCES

- [1] Putra, I., Sulistiyo, U., Diah, E., Rahayu, S., & Hidayat, S. (2022). The influence of internal audit, risk management, whistleblowing system and big data analytics on the financial crime behavior prevention. *Cogent economics & finance*, 10(1), 2148363.
- [2] Aboud, A., & Robinson, B. (2022). Fraudulent financial reporting and data analytics: an explanatory study from Ireland. *Accounting Research Journal*, 35(1), 21-36.
- [3] Saheed, Y. K., Baba, U. A., & Raji, M. A. (2022). Big Data Analytics for Credit Card Fraud Detection Using Supervised Machine Learning Models. In *Big Data Analytics in the Insurance Market* (pp. 31-56). Emerald Publishing Limited.
- [4] Li, J. (2022). E-Commerce Fraud Detection Model by Computer Artificial Intelligence Data Mining. *Computational Intelligence and Neuroscience*, 2022.
- [5] Benedek, B., Ciumas, C., & Nagy, B. Z. (2022). Automobile insurance fraud detection in the age of big data—a systematic and comprehensive literature review. *Journal of Financial Regulation and Compliance*, 30(4), 503-523.
- [6] Bose, S., Dey, S. K., & Bhattacharjee, S. (2023). Big data, data analytics and artificial intelligence in accounting: An overview. *Handbook of Big Data Research Methods: 0*, 32.
- [7] Banu, A. (2022). Big data analytics—tools and techniques—application in the insurance sector. In *Big data: A game changer for insurance industry* (pp. 191-212). Emerald Publishing Limited.
- [8] Bisht, D., Singh, R., Gehlot, A., Akram, S. V., Singh, A., Montero, E. C., ... & Twala, B. (2022). Imperative role of integrating digitalization in the firms finance: A technological perspective. *Electronics*, 11(19), 3252.
- [9] Saleh, I., Marei, Y., Ayoush, M., & Afifa, M. M. A. (2022). Big Data analytics and financial reporting quality: qualitative evidence from Canada. *Journal of Financial Reporting and Accounting*, (ahead-of-print).
- [10] Keskar, V., Yadav, J., & Kumar, A. (2022). Perspective of anomaly detection in big data for data quality improvement. *Materials Today: Proceedings*, 51, 532-537.
- [11] Nguyen, N., Duong, T., Chau, T., Nguyen, V. H., Trinh, T., Tran, D., & Ho, T. (2022). A proposed model for card fraud detection based on Catboost and deep neural network. *IEEE Access*, 10, 96852-96861.
- [12] Van Belle, R., Baesens, B., & De Weerd, J. (2023). CATCHM: A novel network-based credit card fraud detection method using node representation learning. *Decision Support Systems*, 164, 113866.
- [13] Aslam, F., Hunjra, A. I., Ftiti, Z., Louhichi, W., & Shams, T. (2022). Insurance fraud detection: Evidence from artificial intelligence and machine learning. *Research in International Business and Finance*, 62, 101744.
- [14] Mao, X., Sun, H., Zhu, X., & Li, J. (2022). Financial fraud detection using the related-party transaction knowledge graph. *Procedia Computer Science*, 199, 733-740.