

Financial risk prediction and prevention based on big data technology

Qiyu Liang

New York University, New York, United States

Keywords: Financial risks; Big data; Prediction; Keep away

Abstract: With the macro-economy entering the new normal, many new problems have been exposed in all walks of life, and credit risks in the financial field are also being exposed at an accelerated pace. In China, every year, on average, there are more than ten trillion yuan of new financing and hundreds of trillions of yuan of stock loans issued after maturity, at present, the financial industry will bring great pressure on the subsequent credit hazard management, prevention and control of large-scale credit expiration hazards. The rapid development of modern information technology has had a profound impact on various industries, and in this context, big data technology has become increasingly widely used in the financial industry, playing an important role in financial risk prediction and prevention. The study explored financial risk prediction methods based on big data technology from aspects such as credit risk analysis, and then explored financial risk prevention strategies supported by big data technology from aspects such as risk prevention awareness.

1. Introduction

Since the 1990s, financial crises have erupted in multiple regions around the world. These financial crises have had varying degrees of impact on the local economic environment and global financial markets, and to some extent have increased the pressure on the development of the real economy. Therefore, many countries attach great importance to predicting and preventing financial risks. Economic globalization has also made information in the financial industry more complex, and the scope and extent of financial crises are constantly increasing. Traditional financial risk prediction and prevention mechanisms are no longer able to keep up with the pace of economic development. In the context of the rapid development of modern information technology, more and more scholars are applying advanced information technologies such as big data and cloud computing to financial risk prediction and prevention, which can quickly process a large amount of complex financial data and improve the efficiency of extracting and analyzing important financial data. Based on this, the study explored financial risk prediction and prevention methods based on big data technology[1-2].

2. Financial risks and their prediction methods based on big data technology

2.1. Credit Risk

Credit risk is the most common type of financial risk in the big data environment, mainly manifested as commercial banks and other financial institutions establishing cooperative relationships with customers. Due to differences in customer credit and repayment ability, some customers are unable to repay in a timely manner, resulting in non-performing credit loans. In response to this financial risk, more and more financial institutions are choosing to apply big data technology to the credit risk prediction process of financial platforms or customers. Among them, Spark distributed computing architecture is currently a widely used big data computing framework, with good computing performance among various big data computing frameworks, mainly including data processing modules, streaming data processing modules, algorithm library modules, etc. This distributed computing architecture can provide multiple intelligent algorithms, making it easy for managers to extract and analyze important financial data with these advanced algorithms, in order to predict credit risk more accurately, the overall structure is shown in Figure 1.

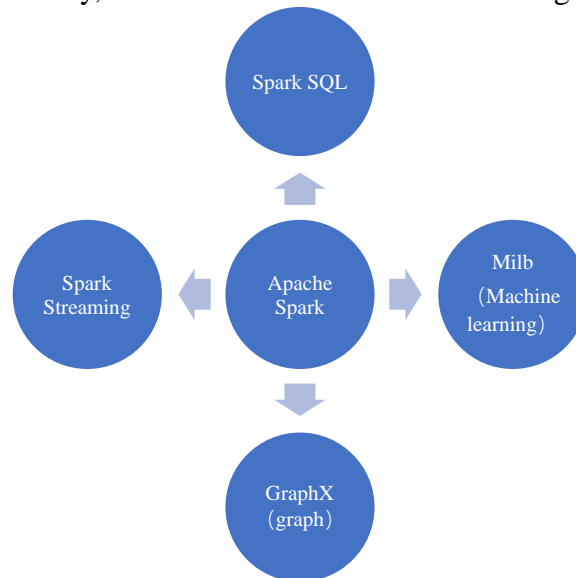


Figure 1: Spark Technical Architecture Diagram

2.2. Information Security and Data Analysis Risks

The application of big data technology has had a profound impact on the financial industry, improving the efficiency of financial institutions in handling various affairs, and also solving the problem of information asymmetry to a certain extent. Financial information includes important information such as personal identity information and transaction details of customers or related personnel. Once stolen, this information can easily have a significant impact on customers' daily lives, and may even cause huge economic losses for customers. The emergence of information security and data analysis risks in the big data environment is related to factors such as data separation in some financial institutions, data closure and latency, and inadequate security measures for information systems storing large amounts of data. In this situation, it is particularly important to protect the data stored in big data channels and ensure the confidentiality of output data. Therefore, more and more financial institutions are choosing to strengthen the identification, prediction, and prevention of information security and data risks through encryption, user access control, network traffic analysis, and other means. However, some of the functional frameworks in the existing market can be centrally

implemented within a single software or platform, with a focus on strengthening the management of IP addresses, network traffic, and users to minimize the possibility of unreasonable access and theft of important data. A certain Net Eagle management software framework on the market is shown in Figure 2[3].

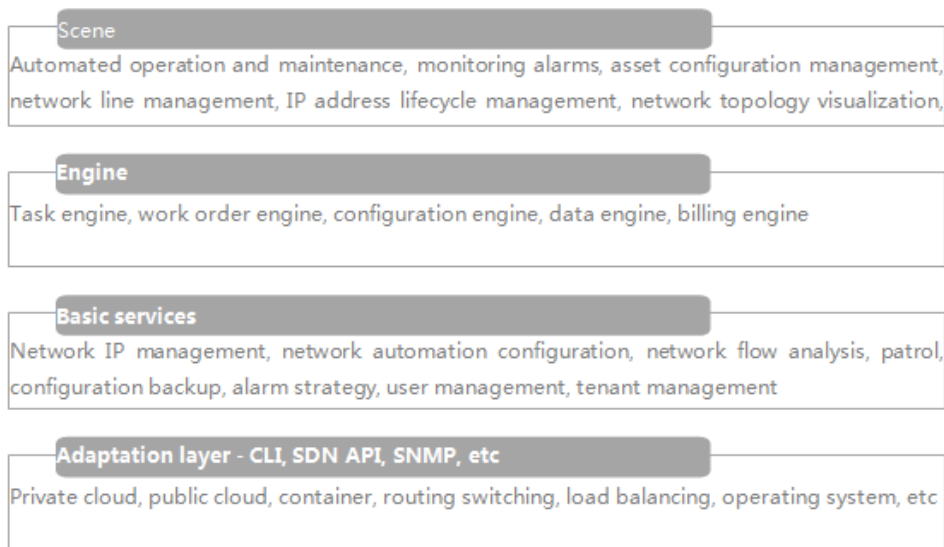


Figure 2: Net Eagle Management Software Framework Diagram

2.3. Market Risk

Market risk is also a common type of financial risk, mainly caused by factors such as the authenticity of market data, changes in market environment due to policies, and violations during financial transactions. Although applying big data technology to market risk prevention has certain effects, mainly in terms of data quality and quantity, most financial institutions use big data technology for simple data analysis. Once the collected data has problems, it will directly affect the prediction and prevention of financial risks[4].

3. Financial risk strategies based on big data technology

3.1. Establishing the Strategic Thought of Big Data

The prediction and prevention of financial risks in the big data environment face more complex situations, and it is even more necessary for relevant personnel to fully leverage the advantages of big data technology, strengthen the utilization of big data technology, and continuously enhance their own big data strategic thinking. On the one hand, staff should have a deep understanding of the impact of big data technology on financial risk prediction and prevention. The traditional prediction and prevention of financial risks largely rely on manual or conventional computer technology. In the new environment, it is even more necessary for staff to break away from fixed thinking, continuously enhance their awareness of big data strategy, deeply recognize the urgency and responsibility of applying big data to prevent financial risks, establish crisis awareness, and strengthen the learning and application of big data-related knowledge in daily work, Change work concepts and methods. The operators and managers of financial institutions should strengthen their internal publicity, especially by leveraging the exemplary and leading role of department heads. Through incentives such as bonuses, they should guide department leaders and all employees to establish a sense of foresight, create a good atmosphere for learning big data knowledge internally, and more importantly,

play the professional leading role of information technology personnel or departments, Enable all employees to recognize the importance of big data technology in preventing financial risks and actively apply it to their work[5].

On the other hand, staff should establish awareness of the strategic application of big data technology. Operators, managers, and other staff of financial institutions should strengthen the application of big data technology in financial management, especially in financial risk prevention, taking into account the market environment and internal control needs. They should strengthen mutual communication among staff, guide relevant departments to summarize the problems in the application of big data technology in financial risk prediction and prevention through regular meetings, and continuously summarize experience, Borrowing advanced experience and practices from internal or other companies, we aim to improve the application level and ultimate effectiveness of big data technology in financial risk prediction and prevention in financial institutions[6].

3.2. Improve the financial risk data sharing system

Financial risk data sharing can greatly improve financial institutions' understanding of various situations such as the market. Through a large amount of financial data, various types of financial risks such as market risks can be identified in real-time, and effective measures can be taken to prevent them. The application of big data technology has improved the sharing level of financial risk data, but it cannot be denied that big data technology may also cause information and data leakage. Therefore, when using big data technology to strengthen financial data sharing among financial institutions, it is particularly important to pay attention to the protection of privacy data and further optimize the financial risk data sharing system[7].

Financial institutions can choose the interface sharing mode between application groups, central database sharing mode, or even other new database sharing modes based on actual situations and needs. Among them, the inter organizational interface sharing mode mainly involves contacting other financial institutions for data sharing based on the needs of data sharing and predicting and preventing financial risks, including the sharing of customer credit evaluation and other data. This data sharing mechanism is generally achieved through the same database interface, where specific interfaces are set in the database to provide access services for staff from different financial institutions, Even in the process of sharing data, it can to some extent reduce data leakage. However, this data model may increase the technical cost of developing data interfaces, and because different financial institutions may have different privacy processing methods, more time is needed in the process of data integration. The central database sharing model utilizes third-party organizations to promote the sharing of important information and data among various financial institutions. By organizing the collected data from multiple financial institutions, a central database is formed. Within this system, financial institutions can extract information from the central database according to their own needs. This financial risk data sharing mechanism can reduce the monopoly of financial risk data. At the same time, third-party platforms are exposed to a large amount of raw financial data, which may also increase the risk of information leakage. The emerging sharing models based on technologies such as group learning or multi-party secure computing have largely made up for the shortcomings of the two financial risk data sharing systems mentioned above. However, the development cost is relatively high, so financial institutions need to choose a suitable financial risk data sharing system based on their actual situation[8].

3.3. Strengthen the cultivation of specialized talents

Excellent talents are an important force in improving the application level of big data technology, predicting financial risks, and preventing them. Therefore, financial institutions should also

strengthen the cultivation and management of specialized talents. On the one hand, financial institutions should attach importance to cultivating the core technical abilities of big data talents, that is, to increase the use of big data, analyze, process, mine, and integrate financial data during the training process. Through real project guidance, trained personnel should integrate big data technology with financial business, continuously improving the core technical abilities of talents, Enable it to apply big data technology to more effectively predict and prevent financial risks[9-10].

On the other hand, financial institutions should attach importance to the cultivation of other professional qualities and abilities of big data talents. The use of big data for financial risk prediction and prevention involves many important data. Once staff do not have good professional ethics and sense of responsibility, it is easy to cause important data leakage. Therefore, financial institutions should also pay attention to continuously strengthening the sense of responsibility and legal awareness of big data talents in their daily training and publicity processes, so that they can strictly follow relevant laws and regulations in the work process, and promote the reasonable application of big data technology in financial risk prediction and prevention.

4. Conclusion

Big data technology has had a profound impact on the financial industry. For the common credit risks, information security and data analysis risks, as well as market risks in the current big data environment, the use of big data technology can improve the effectiveness of predicting and preventing these financial risks. Of course, managers and other staff of financial institutions should also establish a big data strategy, continuously improve the financial risk data sharing system, and use more professional big data talents to improve the level of financial risk prediction and prevention.

References

- [1] Chen Zhenlong, Jin Shang. *Bilateral Burr distribution and its application in financial market risk prediction and optimization* [J]. *Systems Science and Mathematics*, 2023,43 (2): 505-530
- [2] Luo Peng, Chen Yiguo, Xu Chuanhua. *Baidu Search, Risk Perception, and Financial Risk Prediction - Based on the Perspective of Behavioral Finance* [J]. *Financial Forum*, 2018,23 (1): 39-51
- [3] Li Yanwen, Jiang Wenhua, Wang Chunjie. *Can online big data credit risk scoring effectively predict credit default risk?* [J]. *Economic Issues*, 2021 (7): 70-77
- [4] Liu Min, Ren Zhongyuan, Zhou Decai, et al. *Research on Internet Financial Risk Measurement and Prediction Based on Mixed Frequency Data* [J]. *Journal of Management*, 2022, 19 (12): 1847-1854
- [5] Zhou Lei, Qiu Xun, Zhu Yi, etc. *Empirical Study on Credit Risk Assessment of Supply Chain Finance Based on Big Data - Taking the Whole Vehicle Manufacturing Industry as an Example* [J]. *Financial Development Research*, 2022 (5): 64-70
- [6] Dang Zhang, Miao Ziqing, Zhang Tao, etc. *Progress in the application of big data methods in systematic financial risk monitoring and warning* [J]. *Financial Development Research*, 2022 (2): 3-12
- [7] Yang Kaisen, Fu Fei. *Anaconda A Financial Risk Early Warning System Based on Big Data* [J]. *Journal of Changchun University of Science and Technology (Natural Science Edition)*, 2021,44 (1): 135-142
- [8] Zhou Lei, Lai Shumou, Fu Yuqi. *Research on Credit Risk Assessment and Application of Big Data in Supply Chain Finance* [J]. *Financial Education Research*, 2023,36 (1): 64-73
- [9] Xing Sheng, Wang Shanshan. *Research on Financial Risk Prediction and Prevention Measures Based on Big Data* [J]. *Technological Innovation and Productivity*, 2018 (3): 1-4
- [10] Cao Min, Qiu Gelei, Lin Xing. *Research on Predicting Big Data Financial Risk Behavior Based on Deep Learning* [J]. *Journal of Xinyang Agricultural and Forestry University*, 2021, 31 (3): 119-122, 127