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Research on the Application of Artificial Intelligence Technology in Financial Risk Management

Huiya Di

Qilu Normal University, Jinan, 250200, China

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Abstract: The application and development of artificial intelligence technology is an important force in promoting the digital, intelligent, and personalized transformation of the financial industry. Its application in financial risk management can effectively enhance the level of risk prevention and early warning. However, the application of this technology in financial risk management has not yet been fully popularized, and many people are not familiar with the specific application methods of this technology. Therefore, this article will conduct relevant analysis and propose the application methods of artificial intelligence technology in financial risk management.

1. Introduction

Currently, with the continuous development of the economy and advances in technology, artificial intelligence technology has gradually penetrated into various industries, including the financial industry. In the current situation, artificial intelligence technology is mainly used in the operation and development of the financial industry, and its application in financial risk management is not widespread enough. Therefore, analyzing the application of artificial intelligence technology in financial risk management is of great significance for promoting the operation and development of the financial industry.

2. Basic concepts and main characteristics of artificial intelligence technology

2.1. Basic Concepts of Artificial Intelligence Technology

Artificial Intelligence (AI) technology is the theory, methods, and techniques for researching and developing a new generation of computer systems that can simulate human intelligent activities. The implementation of artificial intelligence must meet two major conditions, as shown in Table 1.

Table 1: Two major conditions for implementing artificial intelligence

Condition	Content
Artificial neural network	A digital model established to simulate human thinking nerves
Support vector machine	Changing the operating environment of neural networks

In addition, people can load various algorithms, models, and theoretical foundations in artificial intelligence, including data processing, machine learning, knowledge representation and reasoning, intelligent software development, and information security, to develop corresponding functions. Overall, artificial intelligence is a multidisciplinary and interdisciplinary field, with its core being the research and development of a new generation of computer systems that can simulate human intelligent activities[1].

2.2. Characteristics of Artificial Intelligence Technology

Firstly, autonomy: Artificial intelligence systems have autonomy, as they can learn, reason, and make decisions on their own without the need for human intervention or explanation of their behavior. Due to the independent learning, reasoning, decision-making, and task execution capabilities of artificial intelligence systems, their autonomy is not subject to external interference and limitations. It can achieve autonomous learning, reasoning, decision-making, and control.

Secondly, universality: Artificial intelligence technology can implement various algorithms, such as logical reasoning, rule-based reasoning, planning reasoning, evolutionary algorithms, etc. The core of these algorithms is based on certain mathematical models, which can be easily designed and implemented, and can be transplanted to different hardware platforms. This characteristic makes artificial intelligence technology universal and applicable to various fields[2].

Thirdly, intelligence: Artificial intelligence technology has stronger abilities in knowledge acquisition, representation, reasoning, learning, and decision-making than ordinary computers, and even surpasses human capabilities. For example, artificial neural networks have characteristics such as parallel computing and self-learning, and can randomly search in the data space by adjusting parameters to approach the optimal solution. Expert systems in artificial intelligence technology have the ability of "self-learning", constantly acquiring new knowledge from the environment and utilizing it to adapt to changes in the environment. Artificial intelligence technology has a wide range of applications in control, planning, design, manufacturing, and other fields. The expert system in artificial intelligence technology is a highly intelligent system with characteristics such as learning ability, reasoning ability, adaptive ability, and self-organization ability. It is the application of artificial neural network technology in the field of control.

Fourth, self-learning habits: The development of artificial intelligence cannot be separated from technological progress, which in turn cannot be separated from the learning of new knowledge, that is, learning from experience. This kind of learning can come from people, machines, environments, etc. Self-learning refers to a computer system automatically gaining experience from its environment, improving its performance, or making improvements. Self-learning involves the following steps: collecting data, building models, discovering patterns, analyzing data, and providing feedback on results. Self-learning techniques are mainly used in data mining, which is the most important component of machine learning.

Fifth, multi domain: Artificial intelligence technology has multi domain characteristics and has different applications in various fields. For example, knowledge representation and reasoning in artificial intelligence technology is a knowledge engineering technique, while in computer science it is information retrieval technology; Expert system in artificial intelligence technology is a human-computer interaction technology; Machine learning in artificial intelligence technology is an automatic learning method. It can apply these knowledge representations and reasoning methods to many different fields [3]. For example, machine learning in artificial intelligence technology can be used in fields such as pattern recognition, automatic control, and risk management.

3. Specific application strategies of artificial intelligence technology in financial risk management

3.1. Establishing Financial Risk Big Data

In financial risk management, the application of big data can enhance the risk warning capability of financial institutions, achieve pre prevention and in-process control of risks. Financial regulatory agencies use big data technology to analyze the credit information of enterprises and individuals, establish a credit system for enterprises or individuals, and build a big data platform that covers enterprise credit reports, personal credit reports, anti fraud, and other content. Financial regulatory agencies can collect relevant information of enterprises and individuals through big data platforms such as bank deposits, loans, investments, and wealth management, and establish a comprehensive financial risk management system based on this. In addition, financial regulatory agencies use big data technology to analyze the credit risk and default risk exhibited by enterprises or individuals in past trading activities, establish relevant models, identify potential risks, and issue timely warnings. In addition, in the application of big data technology, attention should also be paid to data quality issues. Only high-quality data can be utilized to achieve information sharing between financial institutions and individuals.

3.2. Choosing an Artificial Intelligence Neural Network Model

The neural network model in artificial intelligence technology is a data processing method that integrates input, output, and error feedback, which can achieve nonlinear processing of data information. It can not only effectively improve the level of financial risk management, but also reduce labor costs to a certain extent. Artificial intelligence neural network models can be divided into forward neural network models and backward neural network models, each with its own advantages. Among them, the forward neural network model is a commonly used prediction method, which mainly achieves nonlinear mapping through forward propagation algorithms to integrate and analyze inputs and outputs. The reverse neural network model, on the other hand, can use backpropagation algorithm to analyze the causes of risk occurrence from the risk results, thus achieving good risk warning effect and effectively improving the level of risk management[4].

Combining the characteristics of two neural network models and adhering to the principle of "prevention first", it is recommended to use a reverse neural network model for risk management. In the application, data information is first input into the reverse neural network model, and then manually corrected and adjusted to obtain the output results. The output results are analyzed and finally the financial risk warning results are obtained [5].

3.3. Financial Risk Big Data Analysis

Artificial intelligence technology can replace manual analysis of financial risk big data, helping financial institutions quickly and accurately obtain risk information. Through big data analysis, it can provide sufficient data support for risk prevention and control, and improve the level of risk prevention and control.

In analysis, the first step is to establish an artificial intelligence terminal, load neural network models and related algorithms, and then clarify the analysis direction, usually including: (1) understanding the flow of funds and the situation of fund flow in different channels; (2) Understand the probability and frequency of occurrence of different risks in trading scenarios [6]; (3) Analyze the dynamic development trends of various products and businesses in the market, and provide reference for financial institutions to formulate more scientific business development strategies.

3.4. Financial Risk Identification

Financial risk identification refers to the process of analyzing and judging financial markets and transactions, identifying risk factors, and classifying, quantifying, and evaluating them. In the process of identifying financial risks, it is necessary to establish reasonable models and standards, and at the same time, relevant technical means need to be used to improve the accuracy of risk identification. Artificial intelligence technology has powerful data processing and massive data storage capabilities, which can collect, process, and analyze a large amount of data in the financial market, providing data support for financial risk identification [7].

Therefore, artificial intelligence technology can effectively assess risks through machine learning, knowledge graphs, natural language processing, and other technologies. For example, when analyzing credit card transaction data, artificial intelligence technology can compare and analyze credit card transactions with traditional business models to identify various risk factors that may exist. By analyzing and evaluating credit card transaction data, various risk factors such as credit risk, fraud risk, liquidity risk, and operational risk can be effectively identified in credit card transactions [8].

3.5. Dynamic Early Warning of Financial Risks

In financial risk management, dynamic monitoring refers to the use of artificial intelligence technology to monitor and manage the financial industry. By analyzing the data information of the monitored objects, potential problems can be alerted so that relevant personnel can take timely measures to control them. In the financial industry, dynamic monitoring can be mainly divided into two levels, as shown in Table 2.

Table 2: The Two Main Levels of Dynamic Monitoring

Administrative levels	Content
Early warning mechanism based on artificial intelligence technology	One method is mainly to collect and analyze a large amount of data information, convert it into a data model, and use the model to warn of possible problems
Risk control mechanism based on artificial intelligence technology	Using artificial intelligence technology to predict and evaluate risks in the financial industry, analyzing data information to predict potential problems in the future and develop corresponding solutions

It is worth noting that the application of artificial intelligence technology in financial risk warning is not yet mature, and there are still many shortcomings, such as the lack of a sound financial risk warning mechanism; Need to process, analyze, and study a large amount of data; When collecting data, not all indicators can be included in the calculation scope; Due to the limited sample size, the predictive ability of the model is also affected to some extent [9]; The evaluation criteria for the model are relatively single. The application of artificial intelligence technology in financial risk warning mainly relies on the use of machine learning and deep learning algorithms to predict and analyze financial data. By analyzing a large amount of data, corresponding risk warning results are obtained [10]. For example, natural language processing technology can be used to convert speech information into text information, and by analyzing and processing the text information, prediction results can be obtained. In addition, it is also possible to collect, sort, classify and analyze the financial data published on the Internet, and then use machine learning and deep learning algorithms to build a financial risk early warning model to effectively improve the level of financial risk early warning.

4. Conclusion

The emergence and development of artificial intelligence technology have driven the transformation of various fields in society, promoted the digital transformation of the financial industry, improved the efficiency of financial risk management, and reduced the cost of financial risk management. Although the application of artificial intelligence technology in financial risk management has achieved certain results, there are also problems such as insufficient data processing capabilities, uneven development of the financial industry, and incomplete regulatory and industry self-discipline systems. At the same time, enterprises need to fully utilize artificial intelligence technology to improve their risk management level, continuously innovate and improve the application of artificial intelligence technology in financial risk management. This article analyzes the application of artificial intelligence technology in financial risk management, hoping to provide reference for relevant personnel.

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