Research on the Application of Artificial Intelligence in the Financial Field

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Abstract: With the development of high and new technology, artificial intelligence has become a powerful productivity that can not be ignored in modern times, especially in the financial industry. Artificial intelligence technology brought new impetus to the financial industry, financial processing efficiency significantly increased, showing its creativity and intelligence. This paper primarily examines the use of artificial intelligence in the financial sector and delves into the potential risks and challenges associated with its implementation. This paper aims to summarize the current research progress, classify the application of artificial intelligence in the financial industry, and look forward to the future development. By analyzing the existing research, this article hopes to provide a reference for further research, promote the sustainable development of artificial intelligence in the financial sector. Specifically, this article will discuss the artificial intelligence in the smart interest, risk management, personalized financial products, such as custom applications, data quality analysis, algorithm of prejudice and systemic risk simultaneously, putting forward the corresponding solution and the future research direction. This paper concludes that although artificial intelligence can bring a lot of convenience to the financial industry, there are still risks that cannot be ignored.

1 INTRODUCTION

With its wide range of applications and powerful capabilities, artificial intelligence has become one of the three cutting-edge technologies in the 21st century (Wang, 2017). Microsoft Copilot ChatGPT, Midjourney, and other breakthroughs in artificial intelligence demonstrate exceptional learning capabilities and natural language processing skills. These AI technologies are rapidly integrating into various fields such as healthcare, education, industry, and finance. Among them, the combination of artificial intelligence and the financial sector is particularly conspicuous, artificial intelligence for the financial sector to achieve the value creation, and gradually realize intelligent, personalized and customized financial services.

Because financial markets generate vast amounts of data, they offer abundant resources for the advancement of artificial intelligence, which in turn drives further growth in the financial industry.To err on the side of the development of financial technology, financial institutions to speed up the digital transformation in the backdrop of the financial sector combined with artificial intelligence and artificial intelligence to the financial industry has brought new opportunities at the same time it still has potential risks, both at home and abroad attach great importance to the development of the theory of artificial intelligence research and practice, But the applications in the field of artificial intelligence in the financial the lack of a systematic review and summarize. Liao Gao, ting-hui li duo to the artificial intelligence application in the field of artificial intelligence research is summarized, from generalizes the development stage and the development direction of (Liao, 2023). Shouyang wang and other scholars to generate type of artificial intelligence, especially chapgpt generalizes the application in the field of finance, and put forward solutions to its risk (Wang, 2023).

This research will be detailed from the main application fields of artificial intelligence, and related fields to carry out the main problems and puts forward the main problem of solution and the paper points out

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the future development in this field. This article structure arrangement is as follows: the second part will introduce artificial intelligence different scenarios in the financial industry, the third part introduces the problems existing in the application scenarios in the second part and the potential impact, and the fourth part will exist in the artificial intelligence industry in the financial industry in the future the impact of risk and proposed solutions are put forward. The fifth part is the literature summary and outlook.

2 THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN FINANCE

2.1 Application of Artificial Intelligence in the Trading Market

Trading market is an important game, investors and investment institutions in order to win the competitive advantage, investors and employees to continuously collect more information to assist decision making. In the information age, advanced information technology is regarded as an important enabler (Xiao, 2023). Artificial intelligence can through its intelligence and sophistication, quickly can gain a lot of information from the trading market for the huge amounts of data processing and analysis to provide a more reliable technical support. To help investors make correct investment, reduce the investment risk, and optimize the decision to obtain greater profits, scope for artificial intelligence in the trading market. Artificial intelligence technology in dealing with financial problems, especially when dealing with the nonlinear model, artificial neural network, expert system, variational mode decomposition method and hybrid intelligent systems in credit assessment, portfolio management, financial forecasting and planning field application accuracy significantly superior to the traditional statistical methods (Liao, 2023). AI technology can efficiently process and analyze massive data and provide rich and diverse trading decisions through various machine learning and deep learning models. At the same time, the ability of AI market prediction, especially in time series prediction and sentiment analysis, significantly enhances the investor's decision-making ability.

Artificial intelligence, rather than investors trading by oneself, in the speed of speed and efficiency will be much more than people, artificial intelligence algorithm can trade within millisecond level, through the high speed advantage to capture market price fluctuation in the tiny, high-frequency trading. Artificial intelligence is not only on the speed and efficiency of artificial traders but also has a great advantage in data processing and learning. By analyzing large amounts of data, artificial intelligence can more deeply understand the dynamics and trends of the trading market, to make decisions and execute trades in the millisecond level, catch the tiny price fluctuations in the market, and realize high-frequency trading. The advantages of AI in the trading market are also reflected in resource allocation and investment strategies.

Artificial intelligence has provided strong help in resource allocation and investment strategies, and artificial intelligence can make resource allocation more diverse. By proposing different types of resource allocation, it can provide investors with more choices, and artificial intelligence can also choose the best investment allocation and choice for investors. Ko and Lee(Ko, 2024) show that ChatGPT's selection shows a statistically significant improvement in the diversity index compared with random selection, indicating that its asset selection process is based on the asset allocation concept that emphasizes diversification. In addition, the portfolio performance analysis shows that the portfolio constructed using ChatGPT's selection outperforms the one constructed using random selection (Wang, 2023). Not only that, artificial intelligence has some power for market prediction

Through in-depth analysis of massive structured and unstructured data, artificial intelligence can help banks to carry out comprehensive and accurate market insights and provide sufficient basis for bank decision-making (Dwivedi, 2023). Artificial intelligence for the financial market forecast brings new methods and tools. Despite some challenges, AI's efficient data processing capabilities, automation and real-time, and continuous learning and improvement characteristics give it important application potential in financial markets. As technology continues to advance, AI will increasingly enhance the accuracy of financial market forecasts, offering investors more precise and effective decision-making support.

2.2 The Application of Artificial Intelligence in Personalized Financial Products

A personalized application refers to a specific use case of artificial intelligence in finance, designed to meet the unique needs of individual users. It applies the technology and algorithm in the basic application to

the financial situation to meet the personalized needs of users. By combining cross-domain knowledge graph, causal reasoning and deep learning technologies, artificial intelligence empowers machines with thinking logic and cognitive ability to solve users 'personalized needs and automatically adapt to users 'preferences, thereby improving users 'satisfaction. Artificial intelligence uses knowledge graph to enrich information background, uses causal reasoning to understand the causal relationship between user needs, and analyzes user preferences through deep learning

The research of personalized needs mainly involves processing user's personalized needs by artificial intelligence. With the development of economy and society, financial users are no longer limited to the general services provided by financial institutions, and financial institutions need to apply artificial intelligence more to solve the growing personalized needs (Liao, 2023). By personalizing and customizing financial products, artificial intelligence can better serve customers and effectively increase customer stickability. Through the deep application of artificial intelligence technology, it can realize intelligent and batch service to customers, so as to realize the popularization of artificial intelligence personalization, which will bring significant innovation to the consumer finance industry (Cheng, 2021). Tencent Cloud has launched Tencent Financial intelligent marketing platform to help customers customize financial products. The Industrial and Commercial Bank of China has piloted RPA technology to empower intelligent marketing. RPA technology has become an important tool for enterprise digital transformation because of its short implementation cycle, fast implementation speed, high processing efficiency and low cost. In addition to customize their own financial products, the application of artificial intelligence in the financial industry also exists in the bank of personalized customer service, in the front end of the financial services, artificial intelligence technology can provide the customers with the refinement, humanization, specialization, intelligent financial services. In China's financial services, artificial intelligence technology to bank credit, financial transactions, financial analysis, and other fields to provide decision support. A background in financial services and artificial intelligence technology can provide technical support for the risk prevention, control, and supervision of (Ma, 2018) . It effectively reduces the human burden, improves the efficiency, and can better serve the public. The personalized application of artificial intelligence can provide multiple programs for people who do not understand financial knowledge through its accurate algorithm and massive database as support. At the same time, through the choice of the masses, artificial intelligence can understand the preferences of the operator's investment risk through the choice of the operator's program so as to provide better programs for investors.

Intelligent advisors can outperform humans in investment allocation and trade execution, while also assisting investors in overcoming emotional biases.

2.3 Application of Artificial Intelligence in Risk Management

With the development of digital transformation in the financial industry, the automated management of financial risks by artificial intelligence has become indispensable. Artificial intelligence has been applied to financial risk management. Artificial intelligence can also be combined with other technologies to continuously learn and optimize the risk management process and continuously improve the efficiency and quality of the whole portfolio management platform (Wang, 2023). Artificial intelligence can help financial institutions identify and assess risks and provide more accurate risk prediction and advice, which is of practical significance for developing the financial field (Zhao, 2024).

The application of artificial intelligence in risk identification has significantly improved the ability of financial institutions to identify and manage risks. Artificial intelligence has played an important role in fraud detection. Through machine learning algorithms and big data analytics, AI can identify abnormal transaction behavior and thus detect potential fraudulent activity in a timely manner. Artificial intelligence algorithm can process mass transaction data, quickly locate abnormal trading patterns, and through the real-time monitoring and timely stop of suspicious transactions, reduce the financial loss.

Second, the artificial intelligence are widely used in the credit risk assessment. Traditional credit scoring method usually depends on the limited financial data, and artificial intelligence combines various data sources, such as social media, consumer behavior, geographical position, etc., to generate more accurate credit score. Through deep learning and other advanced machine learning technology, artificial intelligence can analyze customer behavior and credit record history, predict the future, and credit risk for financial institutions to provide more reliable risk assessment results. AI can help financial

institutions reduce risks and losses and improve customer service capabilities.

In market risk assessment, artificial intelligence provides banks with a comprehensive and detailed basis for credit risk assessment of corporate customers by learning and analyzing the financial reports and other public information of corporate customers. Different from the traditional artificial subjective judgment, the data-driven evaluation model adopted by artificial intelligence is more objective. On the level of automatic analysis of financial indicators, artificial intelligence can evaluate enterprise quality of accounts receivable, cash flow status, etc. The key elements. Through the depth of market data analysis and the forecast model, artificial intelligence can identify market volatility ahead of risk factors, to help investors make a more informed decision. Sentiment analysis technology uses natural language processing (NLP) to analyze news and social media content, assess market sentiment, and further improve the accuracy of market risk identification.

AI can help financial institutions reduce risk and losses and improve customer service capabilities. The adoption of artificial intelligence technology in the financial industry will rapidly increase, leading to more efficient, secure, and intelligent services. (Wang, 2023).

3 ARTIFICIAL INTELLIGENCE AND APPLICATIONS IN THE FIELD OF FINANCIAL CHALLENGES

3.1 The Potential Risk of Artificial Intelligence in the Trading Market and the Impact

The advancement of artificial intelligence enables people to take advantage of the characteristics of high-frequency trading. Still, the risk of market volatility brought by high-frequency trading is a significant problem for the application of artificial intelligence. Ai-driven high-frequency trading systems can execute a large number of trades in milliseconds or even microseconds, which improves market liquidity, but may also lead to extreme market volatility. When market sentiment changes or unexpected events occur, HFT systems may quickly amplify price fluctuations, leading to market instability. For example, the 2010 "flash crash" was triggered by the automated operation of the HFT system, in which the Dow Jones Industrial Average fluctuated wildly in 13 minutes, in part due to the rapid withdrawal of HFT when the market fluctuated wildly, resulting in decreased liquidity and amplified price movements. The incident prompted regulators to take measures, including a "circuit breaker" mechanism and increased monitoring of HFT, to prevent similar market turmoil. This shows that while HFT provides market liquidity and efficiency, it may amplify market risk during wild swings.

Artificial intelligence is powerful and can quickly use data. Behind it is vast amounts of data and powerful algorithms as a support, but the power behind there is a crisis of confidence, The application of artificial intelligence technology in the financial field has led to risks such as trust crisis and insufficient supervision due to the lack of transparency. (Ma, 2018) The algorithms applied by artificial intelligence in the trading market are relatively complex and difficult to understand. It is difficult for people to know how artificial intelligence processes data. Finally, it leads to the crisis of the application of artificial intelligence in the financial industry.

Artificial intelligence application in the market is also facing the uncertainty risk of machine learning to bring. Although the artificial intelligence system has the powerful data processing ability, but these systems cannot predict all the possible market events, especially in extreme events. For example, when encounter extreme market conditions, artificial intelligence model may not be able to adapt to change, resulting in prediction and decision-making errors. In addition, the machine learning may occur in the process of intermittent technical reasons, these uncertainties may affect the stability of the system and efficiency, so as to have a negative impact on financial market, which caused an economic loss of customers.

3.2 The Artificial Intelligence in the Risk of Financial Products Personalized Applications

Artificial intelligence is based on large data, inevitably in the process of its business on the magnitude of the personal information collection, processing and utilization, so to the customer's privacy and personal information protection (Zhao, 2024). Financial institutions and the relevant regulatory department attaches great importance to and take corresponding measures to deal with.

Data privacy and security risks are the main challenges in applying artificial intelligence in personalizing financial products. Personalization

services rely on collecting and analyzing a large amount of users' personal data, including their financial information, consumption habits, and social activities. Although these data can help AI algorithms better understand and predict user needs, it will pose a serious threat to user privacy once the data is leaked or misused. In recent years, multiple data breaches have shown that even top financial institutions cannot completely avoid data security issues. The disclosure of personal privacy information can lead to serious consequences such as poor social situation and even loss of job opportunities for consumers. The illegal trade and abuse of personal information seriously infringes the rights of financial consumers and destroys social relations. Because it has a complete independent legal personality, people enjoy the legal protection of the personal and property relationship of rights independently. As an independent object of rights, personal information is an important part of individual rights and should be protected by law. However, in the era of artificial intelligence, many consumer financial institutions use "big data" and "artificial intelligence" and other means to illegally trade and abuse consumers' personal information, resulting in consumers suffering from frequent consumer financial phone calls and SMS harassment, as well as malicious collection and violent collection problems. This kind of behavior not only cause significant damage to the financial consumers' social life, and in the case of without the consent of the parties to the trafficking and abuse of information, but also a serious violation of financial consumer rights. Therefore, financial institutions need to strengthen data protection measures to ensure the security of data in the process of collection, transmission, and storage, as well as to prevent data from unauthorized access and use.

Secondly, the algorithm of prejudice and discrimination problem is an important risk in AI personalized applications. ai systems rely on historical data for training, which may contain bias and discrimination. If left unchecked, AI systems can inadvertently amplify these biases, leading to unfair treatment of certain groups of users when accessing financial services. For example, in a credit scoring system, certain groups may be assessed as high risk because of biases in historical data, making it difficult to get loans. For example, in Nick Bostrum and Elieze Udkowski's hypothetical experiment on whether a machine learning algorithm should accept or reject a home mortgage loan, it is easy to find "algorithmic discrimination" when examining the neural network decision making process and the results: the loan application approval rate of blacks is significantly lower than that of whites (Cheng, 2021). Once the user is considered as a group, "top" or "bottom", they have received financial information, advertising and product recommendations, etc., will only with machine learning algorithms for its default identity. Machine learning algorithms complexity and limitation of led to consumer finance in the scene "algorithm discrimination", it will lead to the "digital" bottom always stay on "digital" bottom. Qualification of these potential customers may be because "discrimination" to be fair to obtain consumer financial services, may also be because of "price discrimination" inability to properly enjoy consumer financial services. To avoid this situation, financial institutions need to be introduced in data processing and algorithm design principles of fairness and transparency, and regularly review and adjust the model, to ensure that the AI system fair to all users.

3.3 On the Artificial Intelligence Applied in Risk Management of Risk

Although the application of artificial intelligence in the field of risk management has greatly improved the efficiency and effectiveness, it also brings a series of significant potential risks and challenges. The quality and bias of data are inevitable key issues in the risk management of artificial intelligence. These systems rely on a large amount of high-quality data for training and performing tasks, and any bias or uncertainty in the data may seriously affect the model's output. Financial data of the complexity and diversity, as well as universality and inconsistencies in the quality of the data sources, data problems may lead to risk assessment and prediction results appeared deviation, leading to wrong decisions. Model transparency is another challenge faced by AI in risk management. Based on the deep learning model, in particular, they "black box" feature makes the decision making process is difficult to explain. In the financial field, it is important to address the lack of transparency because regulators and users around the world need to understand the decision basis of the model. Suppose ai system decision-making process is not transparent. In that case, financial institutions will be difficult to verify and explain the risk assessment results, may lead to users and regulators mistrusted artificial intelligence system, causing legal risk. Although the artificial intelligence in the application of risk management has great potential and advantages, its potential risks and challenges are nots allowed to ignore. Financial institutions need to ensure that the application of AI technology in risk management is

both efficient and safe through comprehensive risk management measures and continuous technological optimization to promote the sustainable development of the financial industry.

4 SUGGESTIONS AND SOLUTIONS

Artificial intelligence is bound to bring great progress to the financial industry, but at the same time it will bring potential risks, so the regulation of artificial intelligence is essential, and regulation is an important guarantee for financial innovation and development. In order to promote the application of artificial intelligence technology in the financial field in an orderly way, this paper gives suggestions from the following perspectives: First, formulate relevant laws, regulations and regulatory rules then, focusing on protecting users 'personal information and privacy security; The second is to improve the accountability mechanism for the application of artificial intelligence technology in the financial field, formulate and improve the detection method of artificial intelligence technology, and remove obstacles for the application and promotion of artificial intelligence technology in the financial field. The deep integration of artificial intelligence and the financial industry will greatly improve the scope of automation and the level of intelligence in the financial industry, effectively improve production levels, reduce costs, promote business innovation and growth, generate economies of scale and scope, and greatly improve the service quality and operational efficiency of financial institutions. The application of ai in the financial field is still in its early stage, and it still faces great challenges. For the violation of consumer privacy by artificial intelligence, consumer financial institutions should fully respect the personal financial information security rights of financial consumers. The right to personal financial information security is an important right of financial consumers, and it is also the institutional basis for the protection of consumer rights at the level of consumer finance. Only when financial institutions obtain formal authorization or consent of financial consumers in advance, they can collect or provide financial consumers' personal information to third parties in compliance, to better protect the personal financial information security right of financial consumers (Xing, 2018). Algorithm discrimination and black box problems are two major challenges in the application of artificial intelligence in finance. The problem of algorithm discrimination can be solved from the source, the algorithm. Before artificial intelligence is formally used in financial products, data cleaning and preprocessing are carried out to ensure the accuracy of data, while ensuring the diversity of data, and avoiding the calculation bias caused by data.

5 CONCLUSIONS

This paper conducts a systematic analysis of the application and current development of artificial intelligence in the financial sector using a literature review approach. Firstly, this paper studies the main application scenarios of artificial intelligence in the financial field, including trading markets, personalized financial products, and risk management. These studies show that artificial intelligence technology has significant advantages in improving trading speed, optimizing resource allocation, and improving market prediction ability and personalized service. However, we also note that there are certain risks and challenges in these applications of AI, such as the risk of market volatility caused by high-frequency trading, privacy protection issues in personalized financial products, and algorithmic discrimination and black box issues. On the basis of summarizing the findings of the study, this paper proposes several solutions to reduce the potential risks of AI in financial applications. For example, reducing algorithmic bias through data cleaning and preprocessing, adopting explainable algorithms to improve transparency, and developing stricter policies and measures in terms of privacy protection. These solutions not only help solve the current problems, but also provide directions for future research. Finally, the future development of artificial intelligence in the financial field is prospected. With the continuous progress of technology, the application of artificial intelligence in the financial field will be more extensive and in-depth. Future research can further explore how to minimize risks while maintaining technological advantages. The research of this paper provides an important reference for this field, and it is hoped that it can provide valuable guidance for subsequent research and practice to promote the sustainable development of ai in the financial field. By combing and summarizing existing research, this paper hopes to provide reference for further research and promote the sustainable development of artificial intelligence in finance. Future research should focus on the combination of technology and ethics to ensure that artificial

intelligence technology can bring convenience. At the same time, it does not damage users' interests and the market's stability.

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