The Influence of Artificial Intelligence on the Financial Industry

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Abstract. It can be seen that artificial intelligence has brought a lot of positive impacts to the financial industry but has also brought a lot of risks. Therefore, this paper focuses on analyzing the advantages and disadvantages of AI for the financial industry and puts forward measures to reduce the negative impact. AI used in the finance industry brings both advantages and disadvantages. As for the benefits, AI improves the customer experience and increases efficiency. Also, AI enhances the ability to control risk for companies. However, the risks that AI brings to the finance industry are hard to avoid, including security risk, model risk, and market risk. The trend that AI is used in finance is inevitable, although AI brings risks to this industry. And, there are many successful cases of benefits from using AI in finance.

Keywords: Artificial Intelligence, AI Model Risk, Cyber Security, Market Risk, Financial Supervision.

1 Introduction

The growing maturity of artificial intelligence technology makes it more closely related to various fields. Its application in the financial field also conforms to the trend of the times and has achieved good performance. Whether it is the rapid development of the Internet or the advent of the big data era, the financial industry has put forward better requirements, while financial institutions, regulators, and consumers all require the financial industry to continue to innovate, promoting the intelligent development of the financial industry. According to existing risks that AI brings to the finance industry, Baviera found that model risks that AI brings to finance industry due to its complexity and explanation ability. It increases the risks of evaluation model development as AI models are hard to operate [1]. Also, according to Fang and other researchers, experts can only see a part of the AI system, increasing the limitations of transparency, which could increase risks during the evolution of the finance industry [2]. This essay is based on previous research related to diverse risks and classifies them according to their characteristics. Besides, the author also categorized different management strategies for relevant risks. As Artificial Intelligence is developing rapidly, it changes various aspects, including human daily life, the finance industry and others. However, AI also brings risks. This essay will introduce three risks that AI brings to the finance industry

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and the management strategies to reduce these risks. This essay is based on various existing research. It focuses on the risks that AI brings to the finance industry and the strategies that could reduce the risks. This essay is divided into 4 parts, including the introduction of AI, advantages that AI brings to finance, risks that AI used in finance leads to, and risk management strategies. This essay summarizes and categorizes various risks and risk management strategies, making the research more clear. Also, this essay analyzes the future of AI use in finance, which provides a direction for future research.

2 Introduction of AI

AI is also called machine intelligence. John McCarthy defines it as "science and engineering related to manufacturing intelligent machines" [3]. On this basis, Winston of MIT, a famous research university, explained that "artificial intelligence is to solve how to make computers complete the work that can only be completed by humans" [4]. In fact, artificial intelligence is a scientific project to create an intelligent machine that can learn computing programs, which is inseparable from the need for human intelligence. Artificial intelligence was born in 1950, showing a wave of development. After 2000, the development was particularly rapid. In this process, the computing power of artificial intelligence has been continuously improved, more and more data resources have been accumulated, and new developments have been made [5]. At present, artificial intelligence has entered the financial industry and many other fields, and has prompted significant changes in these industries. Taking the financial industry as an example, the traditional financial industry is monopolized, and customers need to pay a lot of extra costs. In the Internet era, this monopoly pattern has been broken, the service costs have been reasonably allocated, and the costs are borne by the customers and institutions. However, due to the suppression of the traditional financial industry and the risks brought about by economic globalization, the use of customers has benefits, while financial institutions always suffer. The application of artificial intelligence, such as Intuit Mint or TurboTax, to the financial industry can reasonably allocate service costs so that financial institutions and consumers can benefit at the same time without any damage. Moreover, artificial intelligence can help the financial industry avoid the risks of economic globalization and promote the better development of the financial industry.

3 Advantages and Disadvantages AI bringing to Finance

3.1 Advantages

Improving Customer Experience. Customer experience can be improved by making the customer operation process easier, which is important for the financial industry. Artificial intelligence system receives the information sent by the customer, matches the information with the existing content in the database, and finally gives feedback or solutions effectively to customers. At present, the financial industry is making efforts to

improve the artificial intelligence system to provide customers with a more personalized experience[6]. Many banks have adopted artificial intelligence systems, which can provide services to a large number of customers and reduce the customers' waiting time so that customers can have a good experience.

Enhanced Risk Control Capability. China's financial risk control business process is very complex, which includes many important links and can involve the privacy of customers. Therefore, dealing with financial risk control business requires a lot of time and capital costs. The application of artificial intelligence can use big data to conduct in-depth analysis of financial risks and establish customer credit model. Through the credit model, experts can objectively analyze the economic ability of customers, so as to enhance the ability of risk control [6].

Stimulated Emerging Industries. The integration of artificial intelligence and the financial industry has enabled many new technologies to be applied to the financial industry, including cloud computing and big data, which has broadened the service scope of the financial industry. For example, the intelligent investment adviser is a result of the integration of artificial intelligence and the financial industry. Intelligent investment advisers are less expensive and more reliable than traditional investment advisers. Also, the intelligent one can break the shackles of traditional questionnaire research, accurately analyze customers' risk-taking ability and investment habits, so as to effectively screen economic information and provide customers with more reasonable investment suggestions [7].

3.2 Disadvantages

Security Risk. Many AI systems were built with neural networks which are complex inter-connected node systems, serving as the engine. People can only see the input and output through systems, so artificial intelligence can share data resources to a certain extent, but it still lacks transparency, which will pose security risks to investors. On the other side, the precondition that AI can play its roles is having a complete database, containing data from personal information, investment behaviors, and others in the financial market. Only with complete data can artificial intelligence perform its functions through accurate matching and screening. However, using public databases to analyze user characteristics can lead to data privacy and database leakage. If the protection approaches of artificial intelligence cannot surpass the attack means of network hackers, it will be a great threat to the participants in financial market activities once the data is leaked [2]. For instance, lax cybersecurity led to a data breach in 2017 at an artificial intelligence company that provided chatbots for Delta Air Lines. This data breach resulted in the exposure of credit card information and other personal information of as many as 825,000 customers and resulted in a serious lawsuit [8].

Operational Risk. At present, financial institutions are developing models on a large scale and applying them to the whole process scenario of automated credit business. The development of AI models in the financial industry is shown in Table 1:

Table 1. Development of AI model in financial industry (Drawn by the author)

Stage 1: no model	Stage 2: few models	Stage 3: multi model coexistence
Financial institutions rely on rules to make decisions	Financial institutions gradually accept the model and integrate it into risk control means	Financial institutions began to incorporate models into their daily risk control work on a large scale, using models to judge risks in multiple scenarios

With the wide application of AI models, the corresponding operational risk arises. It can be said that there are model risks in the whole life cycle of an AI model, including the process of model design, construction, deployment, monitoring, and reporting. The core problem of AI model risk lies in its complexity and explanation ability. Complexity mainly means that artificial intelligence models will become more complex with the increase of use, and will bring many non-financial risks, including network security, data protection, and privacy. When the artificial intelligence model is too complex to understand or operate, it will increase the difficulty of evaluation model development. The explanation ability is to explain how the artificial intelligence system works and how to achieve results, which helps people better apply artificial intelligence and build customer trust [1].

Market Risk. The increasingly strong dependence of the financial sector on computer technology and Internet technology has become an irreversible situation, which will cause the third party to rely on the network, resulting in liquidity risk. As the personnel using artificial intelligence technology do not only include financial institutions, but also participants in stock trading, if participants in the market use similar artificial intelligence technology, there will be risks to financial stability. For example, insiders or cyber criminals may use high-level optimized artificial skills or artificial intelligence to predict the rise of stocks, which may influence the operation of market prices. At present, the financial market prediction may be realized as artificial intelligence can carry out data mining and use historical data, short-term exchange rates, interest rates and other relevant data to predict the stock price. For example, Bloomberg in the United States used the machine learning model to predict whether the financial statements of listed companies exceeded the expected accuracy. The rate of success related to model performance reached 60%. Besides, Mitsubishi UFJ Morgan Stanley Securities also used machine learning to predict the rise and fall of the Japanese stock market within 30 days, with a success rate of 68%. With the gradual development of artificial intelligence, the prediction of the financial market in the later stage may become more and more accurate. The prediction of the financial market may cause relevant cyber criminals or insiders to manipulate the market price of stocks, affect the stability of the financial market and exacerbate the volatility of the financial market [9]. In addition,

the convergence of trading behaviors may increase market volatility. Users with similar backgrounds and using similar investment research systems may get the same investment suggestions. If more market entities adopt the same or similar algorithms, they are likely to have the same trading behavior. For example, the market may have a single sale but no one buys, which will have a great impact on the market in the short term.

4 Risk Management Strategies

4.1 Operational Risk

In an international bank it surveyed, its budget for managing model risk has increased seven fold in four years, but effective model risk management means will increase the efficiency of model validation and reduce costs by up to 30% [10]. Therefore, relevant financial institutions using artificial intelligence should adopt the model risk management process to improve the efficiency of model verification and ensure that all processes implemented can be suitable for the artificial intelligence model.

For financial institutions using artificial intelligence, recording, input and output processes and risk control measures are very important, which need to ensure that relevant financial risks can be effectively controlled. Firstly, in terms of records, financial institutions need to record and agree on the AI review and sign off process, including the list of all AI systems and the methods and processes for identifying and managing deviations. Also, financial institutions are supposed to strengthen the management of AI input and output. Secondly, it is necessary to record the life cycle of AI and ensure that there are sufficient processes to back up data. Among them, real-time data, output data, and training data all need to be backed up, so as to make plans based on this, correct the existing problems, and meet the regulatory requirements [10]. There is no doubt that there are still many model risks in the backup environment. Therefore, financial institutions should pay full attention to this, ensure that the data can be tracked, show the decision-making process, and disclose the operation process of the system. The backup can ensure that the customer's business will not be interrupted when the identified model has risks.

4.2 Security Risk

The financial industry should flexibly use artificial intelligence technology, establish a security risk prevention system, and take security precautions in the whole process of financial transactions. In the early stage of financial transactions, artificial intelligence technology should be used to conduct prior analysis, identify transaction risks and the possibility of fraud as soon as possible, and check all possible potential risks, so as to minimize possible losses. In the process of financial transactions, artificial intelligence should be deeply studied to integrate and apply relevant data resources. However, if there are loopholes in the artificial intelligence system, it will lead to the risk of data leakage. Therefore, the financial industry should effectively prevent this potential safety hazard, that is, repair and update relevant systems to improve the safety factor. At the payment terminal, it is also necessary to guard against loopholes in convenient

payment, prevent users' property losses and personal injuries, comprehensively apply multi-factor security protection technology during payment, such as combining face recognition and fingerprint recognition, and constantly upgrade and update the technology to prevent criminals from taking advantage of it[11]. Therefore, the financial system should comprehensively carry out the whole process transaction monitoring through artificial intelligence technology, synchronously record and analyze the user's business processing information, then summarize the user's business information through the data model, and make a personalized forecast on the transaction development trend according to the user's financial transaction mode and content. When the user's actual financial transaction behavior deviates seriously from the predicted value, or there are obvious abnormalities compared with the values of other normal users, including user information verification errors, abnormal use of equipment terminals, etc., the financial system can timely find and stop, and prevent the occurrence of financial fraud.

4.3 Market Risk

To deal with market risks, the state should improve the financial supervision system. For example, at the legislative level, the basic concepts in the supervision process are clarified to avoid ambiguity and the phenomenon of mutual prevarication between the parties. Besides, the current laws & regulations system and supervision & management structures should be appropriately adjusted, and the financial transaction rules should be improved according to the new supervision system to ensure the effectiveness of supervision. Generally speaking, the process of financial supervision is characterized by continuity, circularity, and perfection. Therefore, every step of financial supervision is very important. Therefore, clear rules should be formulated for these steps, including daily operation supervision, risk and evaluation, market access and exit. The financial regulatory authorities always pay attention to trading behaviors in the financial market. Once it finds that some trading activities are abnormal or finds that insiders or network criminals are manipulating the market price by using artificial intelligence software through the system, it can intercept and start the alarm system in time to bring the criminals to justice in time, which could help to ensure the stability of the financial market and prevent relevant cyber criminals or internal personnel from operating the market price of stocks to increase the volatility of the financial market[9]. Finally, companies are supposed to implement the accountability system, audit the application of artificial intelligence in the financial industry with audit schemes, and monitor its client, server, load management, and other data in real time on the basis of security testing.

5 Future Stage of AI Using in Finance

At present, many successful application cases of artificial intelligence have been accumulated in the financial industry. For example, wealthfront in the United States and finance scout24 in Germany have introduced a large number of artificial intelligence

technologies into investment and wealth management. Rebellion, a fund based on artificial intelligence technology, once calculated the stock market crash in 2008 in advance. When HP rated Greek bonds as A-level in the traditional way, rebellion had already given such an evaluation as f-level, one month ahead of the official decision to downgrade. Cerebellum based on artificial intelligence has $90billion and has not lost money since 2009[12]. Ant financial is a successful AI application in China. At present, the fields involved include Internet microfinance, asset allocation services, and insurance customer services. The risk control system of Zhirong financial service can make 1.2 million loans per month, and it only takes 8 seconds to process the machine audit. Also, China Merchants Bank has already opened a visual counter. Besides, the core technology of Kuangshi technology company is machine vision, which can be used to provide identification and verification solutions for the financial field [12]. According to the current application of artificial intelligence in the financial industry, the two are bound to continue to develop, and the ultimate trend is financial intelligence. In the future, artificial intelligence will be better integrated into the financial field and have a more positive impact [13]. In short, the application of artificial intelligence in the financial industry has become an inevitable trend. Therefore, all financial institutions should formulate relevant artificial intelligence application strategies and strengthen the layout to achieve better development.

6 Conclusion

In a word, artificial intelligence has played an important role in the development of the financial industry. Compared with human beings, artificial intelligence has obvious advantages, including strong data storage, and a relatively low cost. Therefore, the application of artificial intelligence in the financial industry has also had a lot of positive effects, not only improving the customer experience but also broadening the service scope. Moreover, the risk control capability has been enhanced. In the future, the field of artificial intelligence and the financial field could achieve a more in-depth integration. However, it cannot be ignored that artificial intelligence has also brought certain negative effects to the financial industry, including operational risk, model risk, security risk, market risk, and so on. This requires the financial industry to make full and reasonable use of artificial intelligence according to its actual situation and to take corresponding control measures to prevent relevant risks. This essay summarizes 3 risks that AI brings to finance, while more risks will exist in the future as the development of AI, which is hard to forecast. Also, in the essay, the data is limited, so the uncertainty would increase during research. In the future, it is important to collect more data related to the risks that AI brings to finance and analyze the risks from an empirical aspect.

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