The Impact of AI Software on Financial Transactions

Boyang Li[*]

Asian-Australian Business School, Liaoning University, 110000 No.58, Daoyi South Street, Shenbei New District, Shenyang, China

Abstract. The rapid advancement of artificial intelligence (AI) has profoundly transformed financial trading, enhanced efficiency, accuracy, and customer service while introducing new challenges. This paper explores AI's applications in quantitative trading, risk forecasting, and intelligent customer interactions, demonstrating its ability to optimize decision-making and reduce operational costs. However, the integration of AI also raises significant concerns, including data security risks, algorithmic opacity, and increased market volatility, as evidenced by incidents like the 2010 "Flash Crash" and recent AI-driven stock fluctuations. To address these challenges, the paper proposes strengthening data protection through advanced encryption and access controls, improving algorithmic transparency with Explainable AI (XAI), and enhancing regulatory frameworks to monitor high-frequency trading. By balancing technological innovation with robust risk management and policy support, the financial industry can harness AI's potential while ensuring market stability. The study underscores the need for collaboration among financial institutions, technologists, and regulators to foster sustainable development in AI-driven financial markets.

1. Introduction

With the rapid development of artificial intelligence (AI) technology, the field of financial trading is undergoing unprecedented transformation. AI software, with its powerful data processing capabilities, efficient algorithmic models, and real-time decision-making abilities, is reshaping the way financial markets operate. Research on the application of AI in financial trading holds significant theoretical importance and profound practical value. Firstly, the introduction of AI technology has significantly improved trading efficiency, reduced human errors, and opened up new profit models [1]. Secondly, AI's applications in risk management, market prediction, and investment decision-making provide financial institutions with more precise tools to navigate complex and ever-changing market environments [2]. Therefore, exploring how AI impacts financial trading not only helps in understanding the role of technology in driving the financial industry but also offers practical guidance for practitioners.

The application of artificial intelligence in the field of financial language is still relatively underdeveloped, mainly reflected in the inaccuracy of financial information extraction and

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[*] Corresponding author: gefeng2518@163.comemail.org

push. As well as the inefficiencies in translating and extracting insights from in-depth market literature [3]. This paper aims to reveal the specific pathways of AI's application in financial trading, analyze its positive impacts on trading activities, and explore the challenges AI faces in this domain along with potential strategies to address them. This paper will unfold in the following five aspects: specific pathways of AI application in financial trading, the positive impacts of AI on financial trading activities, challenges faced by AI in the financial trading field, strategies to address these challenges, and future development trends and prospects. Through systematic analysis, this paper aims to provide readers with a comprehensive perspective on how AI technology is transforming the present and future of financial trading.

2.The specific ways AI are applied in financial trading

2.1 Quantitative trading and intelligent trade execution

On July 15, 2024, Intercontinental Exchange, Inc (ICE) officially launched its high-frequency trading platform, ICE.AI. The platform leverages deep reinforcement learning, adaptive neural network technologies and quantum computing to achieve microsecond-level market data analysis and trade execution.

Through real-time learning and dynamic optimization, the algorithms significantly enhance trading efficiency and precision [4]. The market response has been positive, with institutional investors widely believing that ICE.AI will reshape the landscape of high-frequency trading and drive industry competition to new heights. However, experts have also warned that it may exacerbate market volatility, calling for stronger regulation to balance innovation and risk. Additionally, ICE.AI seamlessly integrates with major global exchanges, providing traders with a stable, secure, and reliable trading environment. By optimizing network architecture and cutting-edge algorithms, the platform achieves ultra-fast trade execution speeds, enabling traders to react swiftly in rapidly changing markets and improve trade success rates. Furthermore, utilizing big data technology and artificial intelligence, it conducts in-depth real-time analysis of market trends and trading opportunities, offering traders timely and accurate decision-making support.

2.2 Accurate risk forecasting

Artificial intelligence (AI) can more accurately predict risks in financial transactions by analyzing vast amounts of historical and real-time data. By processing large datasets and employing machine learning methods, AI provides more precise risk assessments and predictions, enabling investors, banks, and other institutions to gain a comprehensive understanding of project risks [5]. Machine learning methods can uncover hidden patterns and relationships within data, identifying risks that traditional methods might overlook. For example, some intelligent risk assessment models integrate information from various sources, such as market trends, corporate financial data, and national economic indicators, to provide investors with timely and accurate risk warnings.

As a global financial services institution, UBS Group has leveraged AI technologies to analyze market data, predict asset price fluctuations and risks, monitor customer communications using natural language processing (NLP) to identify potential compliance risks, and utilize time series analysis to forecast the impact of economic cycle changes on investment portfolios. These applications have received consistent praise from clients. As shown in the stock price chart, UBS's stock price has demonstrated an overall upward trend

over the past five years, with an increase of 190.58%, reflecting strong market confidence in the assets.

3 The positive impact of AI on financial trading activities

3.1 Enhance transaction efficiency

By applying AI technologies such as quantitative trading and intelligent trade execution, financial trading has become significantly more efficient. Intelligent trading systems process transaction data rapidly, enabling immediate decision-making and execution. For instance, in high-frequency trading, AI algorithms can analyze market data in an extremely short time, identify opportunities, and place orders much faster than humans. Additionally, robot-advisors, powered by AI, assist human advisors by collecting data and designing investment strategies, thereby accelerating decision-making processes [5].

3.2 Optimize customer service

In financial trading, AI has significantly improved customer service. Intelligent customer service systems, utilizing natural language processing (NLP) technology, can quickly respond to customer inquiries, resolve common issues, and operate 24/7. Moreover, AI can provide personalized investment advice and product recommendations based on customers' past transactions and preferences, enhancing customer retention. For example, UBS Group has heavily invested in intelligent customer service, primarily employing two major AI models to optimize its services. UBS uses automated content generation (NLG) technology to produce client reports including investment performance, market analysis, and risk assessment after transactions. Automated report generation not only improves efficiency but also ensures the accuracy and timeliness of reports. Additionally, UBS employs deep learning models to enhance the predictive capabilities of reports, such as forecasting future performance based on market trends, providing clients with more forward-looking insights and helping them better understand their investment status. As a result, the quantity, efficiency, and overall experience of customer service have significantly improved.

3.3 Reduce operating costs

In daily operations, market monitoring, and robotic consulting services, the application of artificial intelligence has significantly improved the operational efficiency and precision marketing capabilities of Financial Institution Group through data-driven decision optimization, real-time risk early warning, and intelligent customer interaction, while significantly reducing labor costs and operational risks. Financial Institution Group deploying AI technology can reduce operating costs by an average of 20% -30% and improve the response speed of Client Server by more than 80%, which allows it to establish significant advantages in key competitiveness indicators such as compliance, innovation, and customer experience [6]. For example, Guoquan Securities completed the first domestic deployment test of the deep search model in the securities industry. This model, known for its powerful performance and low cost, can reduce brokerages' technology development expenses. It improves the efficiency of generating artificial intelligence, machine learning, information retrieval, document processing, and industry research. According to securities analysts, the

ability to perform secondary retrieval and intelligently predict market trends from massive documents can increase investment research efficiency by more than 300%.

4 The challenges faced by AI in the field of financial trading

4.1 Data security and privacy issues

Data breaches have always been a key concern for the financial industry and regulatory authorities. When platforms with vast amounts of data are exposed, the risk of data leakage becomes significant [7]. According to IBM's "2023 Cost of a Data Breach Report," the global average cost of a data breach reached $4.45 million, with the financial industry facing even higher costs, averaging $5.95 million. For instance, the 2017 Equifax data breach exposed the personal information of over 143 million users, including names, ID numbers, and transaction records, ultimately costing Equifax more than $700 million in settlements. Similarly, the 2021 Robinhood data breach resulted in hackers stealing private information of over 7 million users. These incidents not only caused substantial financial losses but also severely damaged user trust.

4.2 Algorithmic risks

The complexity and opacity of AI algorithms pose potential financial risks. Algorithms may contain vulnerabilities or be subject to malicious attacks, which can lead to abnormal or unfair trading outcomes [8]. For example, during the 2010 "Flash Crash," the erratic behavior of high-frequency trading algorithms caused the Dow Jones Industrial Average to plummet nearly 1,000 points within minutes, wiping out nearly $1 trillion in market value. This incident highlighted the vulnerability of algorithmic trading under extreme market conditions. Additionally, the "black box" nature of AI algorithms makes their decision-making processes difficult to interpret, which is particularly critical in financial trading. For instance, a major hedge fund once suffered significant losses due to an AI model's incorrect prediction of market trends. However, due to the algorithm's lack of transparency, the team struggled to quickly identify the root cause of the issue.

4.3 Intensifying market volatility

The trading methods using AI may exacerbate market fluctuations. When many traders use similar AI models, certain conditions in the market can lead to a large number of trades being in the same direction, causing an excessive market reaction [9]. For instance, in the stock market, AI algorithms would issue sell orders simultaneously when stock prices fall, causing prices to drop faster and further. On January 27, 2025, the US stock market experienced a significant decline, particularly hard on the technology sector, due to the impact of an AI model from the Chinese AI startup Deep Seek. NVIDIA's stock price plummeted by about 17%, Broadcom's stock price fell by 17%, Advanced Micro Devices (AMD) saw a 6% drop, and Microsoft's stock price decreased by 2%. Among AI computing stocks, Cambricon's stock price plunged nearly 10%, and ZTE Communications dropped by over 6%. This event indicates that when new significant technological changes or competitive factors emerge in the market, AI trading strategies may rapidly alter investors' expectations for the relevant industries, which can then lead to substantial stock price volatility through a large volume of buying and selling operations.

5 How to address the challenges of AI in financial trading

5.1 Strengthening data protection

Financial institutions must establish a robust data management system to address the increasingly severe challenges of data security and privacy. First, advanced encryption technologies, such as the AES-256 encryption algorithm, should be employed to protect sensitive data, ensuring that even if data is stolen, it cannot be easily decrypted. Second, multi-layered access control mechanisms, such as role-based access control (RBAC) and multi-factor authentication (MFA), should be implemented to ensure that only authorized personnel can access critical data. Additionally, financial institutions should conduct regular data security audits and vulnerability scans to promptly identify and address potential security risks.

Beyond technical measures, employee awareness and capabilities are equally crucial. Financial institutions should provide regular data security training to help employees understand the latest cybersecurity threats and protective measures. For example, simulated phishing attacks and social engineering tests can enhance employees' ability to identify potential risks [10]. At the same time, a clear data breach emergency response mechanism should be established to ensure rapid reaction in the event of a data breach, minimizing losses as much as possible.

5.2 Enhancing algorithm transparency and regulation

According to the U.S. Securities and Exchange Commission (SEC), more than 60% of market transactions are driven by algorithms, which has led regulators to place higher demands on the transparency and explainability of algorithmic transactions.

To address algorithmic risks, regulators should introduce regulations or set standards that require financial institutions to be more transparent about their algorithms, ensuring that they are both fair and understandable. Then it is necessary to strengthen the intensity of review and supervision and find and deal with the existing problems at any time. Financial institutions need to strengthen the testing and monitoring of algorithms, while developing Explainable AI (XAI) models to ensure transparency and compliance in trading decisions.

5.3 Strengthening market monitoring and regulation

Regulatory agencies need to enhance real-time monitoring of financial markets to address potential market volatility and systemic risks posed by AI technology. First, an AI-based market monitoring system should be established to track high-frequency trading behaviors and algorithmic trading patterns in real time, identifying abnormal trading activities. For example, machine learning models can be utilized to analyze trading data and detect potential market manipulation or algorithmic failures. Second, regulatory agencies should collaborate with financial institutions to establish transparency standards for AI-driven trading, requiring financial institutions to disclose the core logic and risk control measures of their algorithmic trading systems to ensure explainability and compliance.

Additionally, regulatory agencies should encourage financial institutions to adopt diversified trading strategies, avoiding over-reliance on a single algorithm or model. For instance, through policy guidance, financial institutions can be encouraged to integrate traditional financial theories with AI technologies to develop more robust trading strategies. At the same time, a dynamic regulatory mechanism should be established to implement

temporary measures (such as suspending high-frequency trading or adjusting trading rules) during periods of abnormal market volatility, thereby maintaining market stability.

In conclusion, by strengthening data protection and market monitoring, financial institutions and regulatory agencies can better address the challenges brought by AI technology, ensuring the safety, stability, and sustainable development of financial markets.

6 Conclusion

AI technology has brought unprecedented opportunities to the financial trading industry, significantly enhancing trading efficiency, accuracy, and customer service quality. However, its widespread application also comes with numerous challenges, such as data security risks, algorithmic opacity, and market volatility. Addressing these issues requires collaborative efforts from financial institutions, technology developers, and regulatory authorities. By strengthening data protection mechanisms, improving the transparency and explainability of algorithms, and refining regulatory frameworks, the potential of AI in financial trading can be maximized while mitigating associated risks.

Research indicates that the role of AI in financial trading extends beyond technical optimization; it lies in the integration of technological innovation and policy support to promote the sustainable development of the entire industry. For example, policies such as the European Union's General Data Protection Regulation (GDPR) and the U.S. Algorithmic Accountability Act provide crucial regulatory guidance for the application of AI in the financial sector. Additionally, the improvement of market monitoring and adjustment mechanisms can effectively address market volatility potentially triggered by AI-driven high-frequency trading, ensuring the stability of financial markets.

Looking ahead, as technology continues to advance, the application of AI in financial trading will become even more widespread and profound. Financial institutions should actively embrace technological innovation while proactively addressing challenges. By establishing more robust risk management systems and transparent algorithmic mechanisms, they can drive the healthy development of the financial trading sector. Only through the complementary integration of technological innovation and regulatory policies can long-term stability and prosperity in financial markets be achieved.

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