

<sup>1</sup>Sunil Kumar  
Das<sup>2</sup>Dr Shaista  
Anwar<sup>3</sup>Urvee Tulsyan<sup>4</sup>Yash Gupta<sup>5</sup>Rahul Vudatha<sup>6</sup>Dr Syed Hassan  
Imam Gardezi

## The Role of AI in Financial Markets: Impacts on Trading, Portfolio Management, and Price Prediction



**Abstract:** - Today artificial intelligence (AI) has become an indispensable assistance for human traders. AI systems provide human traders with numerous advantages, such as the capability to conduct genuine high-frequency trading (HFT), which capitalizes on price discrepancies and market anomalies, and to analyze a massive data set from multiple sources in a fraction of a second. The main goal of this research is to examine the role that AI plays in the financial markets, with an emphasis on how it affects trading, portfolio management, and price prediction. In this study, quantitative research methodology was utilised. Primary and secondary sources of data were used in the investigation. An online questionnaire was used to collect the primary data, and finance databases, pertinent industry bulletins, and already published literature were used to collect the secondary data. It was found that there is an increasing incorporation of AI and machine learning technologies into financial institutions. Many of the participants revealed that these technologies are used moderately to significantly in their organizations. The most prominent AI and machine learning applications are “algorithmic trading, risk management, fraud detection, credit scoring, and customer service”.

**Keywords:** AI; Financial Markets; Trading; Price Prediction; Portfolio management

### INTRODUCTION

Due to the vast number of significant factors that come from the “economic and psychological environment, trading” in the financial markets is a complicated and chaotic process. In addition to this, the industry is distinguished by the rapidity of information inflows, which can have an impact on the profitability of trades in a matter of seconds [1,2]. As a result of these factors, academics and practitioners have attempted to implement AI systems that are capable of assisting individual investors in making trading decisions or automatically managing the entire trading process [3]. The improvements in computing and algorithms have resulted in the fields of AI and ML having a significant impact on the financial markets. Different industries, particularly the financial sector, are being reshaped by these technologies since they are improving trading operations and risk management [4].

<sup>1</sup> Faculty Of Management Sciences, India and Department of Commerce, KSUB College, Soa (Deemed to Be University), Bhubaneswar, Odisha, Bhanjanagar, Odisha, India

Email Id: sunilkumardas9999@Gmail.Com

<sup>2</sup>Assistant Professor (Finance & Accounting), Liwa College, Abu Dhabi, UAE

Email Id: shaista.anwar@lc.ac.ae

<sup>3</sup>Senior Manager, AKM Global

Email Id: urvee95@gmail.com

<sup>4</sup>Department of CSIS, BITS Pilani, Rajasthan

Email Id: f20191138@pilani.bits-pilani.ac.in

<sup>5</sup>Associate Engineer (Working professional), Vellore Institute of Technology, Andhra Pradesh

Email Id: rahulvudatha@gmail.com

<sup>6</sup>Executive Director, Board Member, Union Investments LLC, UAE

Email Id: hassanwiz17@hotmail.com

The first use of AI and ML in the financial sector date back to the 1980s [5,6]. Since then, their functions have expanded to encompass more complicated tasks such as price forecasting and fraud detection. Additionally, AI and ML have started to revolutionise the financial sector by improving decision-making processes, automating jobs, and personalising services [7]. This is all happening through the use of these technologies. According to the findings of a study conducted by the “World Economic Forum (2018)”<sup>2</sup>, the successful implementation of these technologies within the financial sector may result in an increase in value of one trillion dollars by the year 2025 [8,9].

Despite this, there is a very small body of investigate that has thoroughly investigated how AI and ML have improved the performance & stability of the financial sector. Therefore, it is necessary to conduct additional research on the impact that these technologies have on the financial markets, as well as to gain a knowledge of how it could be effectively incorporated into the existing financial infrastructures.

The subsequent part provides a detailed analysis of the previous literature that is relevant to the present research.

## LITERATURE REVIEW

The following table elaborates the studies related to the role of AI in financial markets.

**Table 1: Related studies.**

| AUTHORS AND YEARS                        | METHODOLOGY   | FINDINGS  |
|--|---|---|
| <b>Sharma et al., (2020) [10]</b>        | The literature on AI in stock market predictions is synthesised in a systematic study and interpreted in a narrative review in this work.   | The integration of AI, neural networks, and stock market predictions in this study will open the door to future research.   |
| <b>Mokhtari et al., (2021) [11]</b>      | Stock market prediction using AI techniques is the focus of this article.   | The stock market can be predicted using technical and fundamental research. Technical analysis uses regression machine learning (ML) algorithms to anticipate stock price trends at the end of a business day using previous data.  |
| <b>Cohen (2022) [12]</b>                 | This study examined recent publications on improved strategies for financial asset trend forecasting and their potential for successful trading in complicated financial markets. | All trading systems utilise DL and ML procedures to investigate non-obvious relationships and events that impact trading success. Forecasts are derived from linear or nonlinear models, sometimes utilizing sentiment analysis of social media investors or pattern recognition. |
| <b>Rahmani et al., (2023) [13]</b>       | This article looked at stock market projections, oil price forecasting, and AI's impact on the global economy.  | Numerous research publications predicted economic direction using DL. All models have high accuracy, and some are efficient or beneficial.  |
| <b>El Hajj &amp; Hammoud (2023) [14]</b> | The survey showed that financial professionals and organisations must adjust to data privacy,   | The research helped policymakers, regulators, and professionals comprehend AI and ML in finance's benefits and drawbacks.   |

<sup>2</sup> [https://www3.weforum.org/docs/WEF\\_Technology\\_and\\_Innovation\\_The\\_Next\\_Economic\\_Growth\\_Engine.pdf](https://www3.weforum.org/docs/WEF_Technology_and_Innovation_The_Next_Economic_Growth_Engine.pdf)

|                               |  |   |
|-------------------------------|--|---|
|                               | regulatory compliance, and ethical issues.   |   |
| <b>Ma et al., (2024) [15]</b> | In this study, a risk and return multi-task learning model with a heterogeneous graph attention network (HGA-MT) was developed as a means of predicting stock ranking for the purpose of portfolio optimisation. | It has been demonstrated through extensive trials that HGA-MT is superior to other state-of-the-art approaches in terms of its performance in stock ranking and backtesting trading evaluation tasks. |

**Research Gap:** After conducting an in-depth examination of the existing research on the application of AI & ML in financial markets, along with the observed patterns, obstacles, and potential advantages, it is clear that a comprehensive strategy involving “regulation, workforce adaptation, and ethical considerations” is essential for fully utilising the capabilities of AI and ML technologies.

## METHODOLOGY

The study utilises a quantitative research methodology. This research approach is highly suitable for this study because to its ability to comprehensively capture the intricate characteristics of the financial industry and the diverse methods in which AI and ML technologies are being utilised and viewed by financial professionals. The survey's quantitative data offers unbiased insights into the frequency, influence, and difficulties related to the utilisation of AI and ML in financial markets.

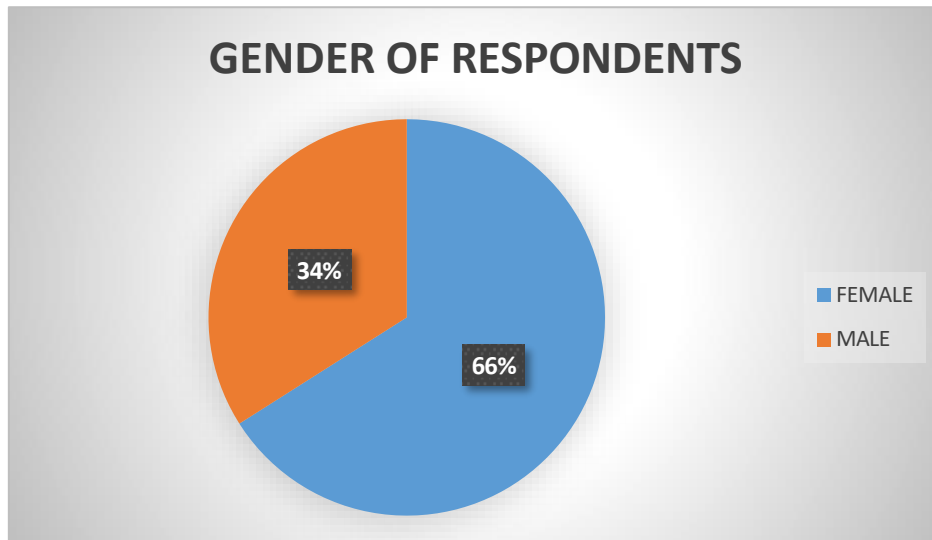
The data for the study will be obtained through a combination of primary and secondary sources. The online survey will be utilized to gather the primary data, whereas supplementary information will be extracted from relevant industry publications, financial databases, and existing literature. A wide range of financial professionals, such as analysts, portfolio managers, and traders, will be included in the survey. The research will investigate the manner in which individuals integrate AI and ML into their routine responsibilities, evaluate the impact of these technologies on their functioning, and collect their viewpoints regarding the advantages and disadvantages of employing AI and ML in financial markets. Purposive sampling will be utilized in this study to ascertain that the participants are endowed with the requisite knowledge and expertise to provide significant insights on the subject. Secondary data will be gathered from a variety of sources, including specialized financial sector publications and reports and academic databases such as JSTOR, ScienceDirect, and Google Scholar. Furthermore, an extensive investigation will be conducted in key finance, AI, and ML publications, such as " the Journal of Finance, IEEE Transactions on Neural Networks and Learning Systems, and the Journal of Machine Learning Research, to pinpoint pertinent articles.

The online survey was administered via the Google Forms platform. The survey specifically focused on financial professionals, including traders, portfolio managers, and analysts. The survey sought to obtain varied perspectives from both financial markets.

## RESULTS AND ANALYSIS

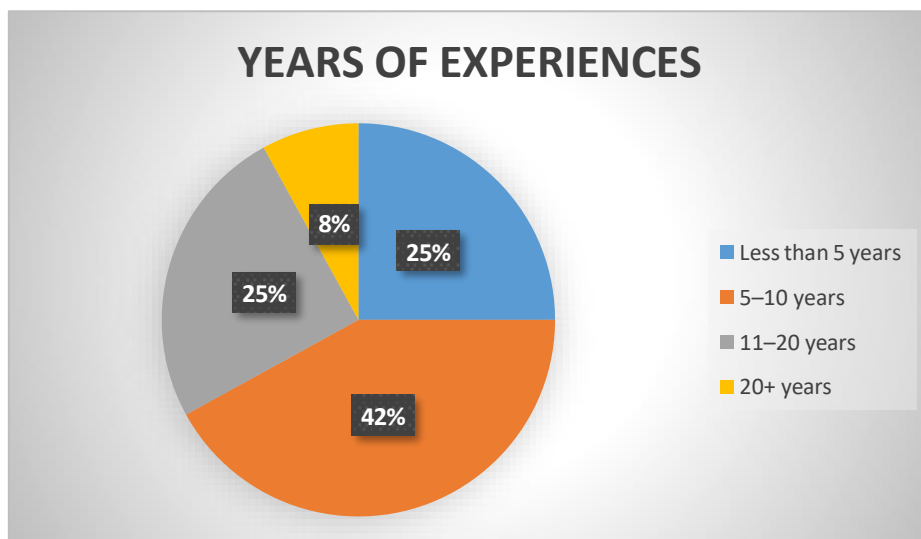
The objective of this section is to present the results of the investigation, offering a thorough and comprehensive analysis of the data collected through extensive research methodology. Through the analysis of quantitative data, our objective is to gain a comprehensive understanding of the impact of AI and ML ML on financial markets. The statistical analysis of the gathered survey data revealed several significant findings concerning the impact of AI and ML in financial markets. A total of 120 responses were received out of the 145 surveys that were sent out for this research. These 120 responses received from participants a comprises of traders, portfolio managers, and analysts.

The graph below depicts the gender distribution of the responses.



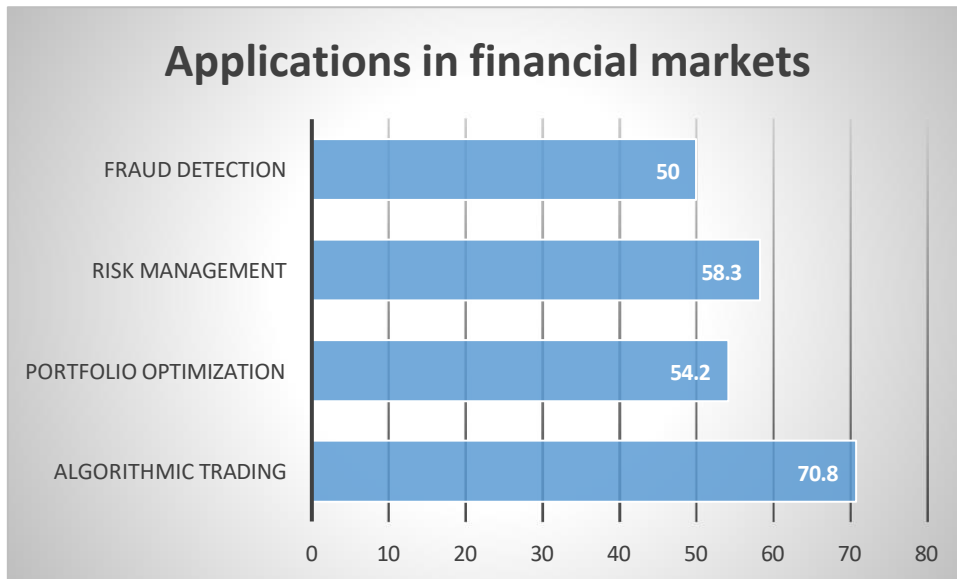
**Figure 1: Gender of Respondents**

The diagram below depicts professional experience of the participants in this particular industry. 42% of the participants possess a professional background ranging from 5 to 10 years.



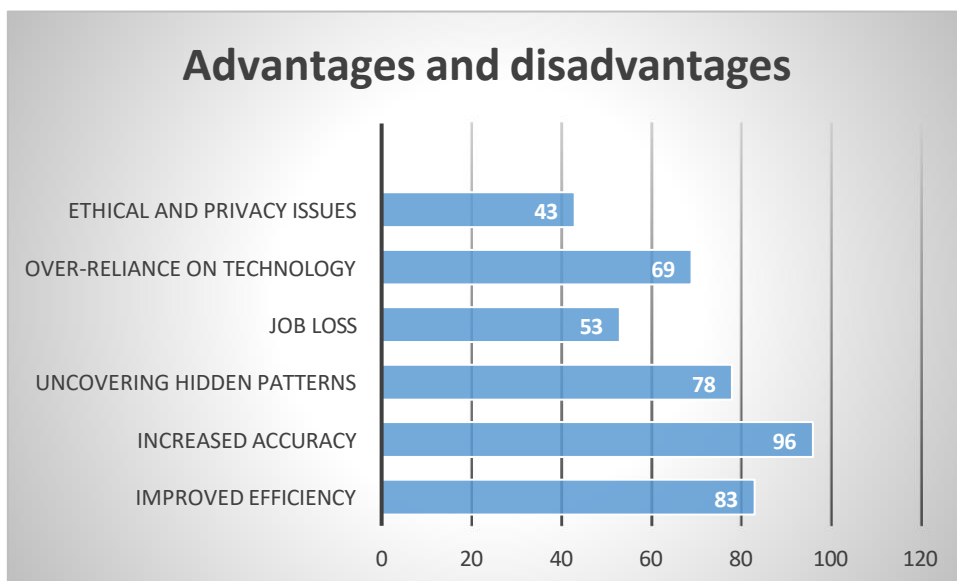
**Figure 2: Years of experiences of respondents in percentage**

Figure 3 presents data regarding the frequency and percentage of respondents utilizing AI and ML tools in their professional endeavors. Algorithmic trading has emerged as the most prevalent field of application, accounting for 70.8% of usage. Risk management follows closely after, with a usage rate of 58.3%.



**Figure 3: AI and ML applications in financial markets.**

The viewpoints of the respondents regarding the advantages and disadvantages of utilising AI and ML in financial markets is provided in Figure 4. The benefits of enhanced efficiency and heightened accuracy were widely recognised. Nevertheless, the respondents expressed conflicting opinions regarding potential disadvantages such as unemployment and ethical and privacy issues.



**Figure 4: Advantages and disadvantages of AI and ML in financial markets**

The study's findings provide valuable insights into the application and effects of AI and ML in the finance industry. The findings indicate that a substantial percentage of financial professionals are utilising AI and ML tools, aligning with the growing practice of incorporating state-of-the-art technology into the financial sector. The application of AI and ML in algorithmic trading and risk management emerges as key areas, in line with existing literature that emphasises the potential of these technologies to improve trading strategies and enhance the effectiveness of risk management. AI and ML are increasingly crucial components of modern finance, assisting in enhancing decision-making and optimising resource allocation.

Most surveyed participants viewed the influence of AI and ML on finance as advantageous, with the most common reasons being improved effectiveness and precision. This aligns with existing literature, which emphasises the ability of AI and ML to revolutionise financial services by streamlining processes, reducing costs, and enhancing

overall industry performance. The benefits of AI and ML may promote the growth and development of applications in finance, as professionals and institutions aim to leverage these technologies to gain a competitive edge in the market.

Notwithstanding this positive viewpoint, participants express concerns regarding possible job reductions and ethical and privacy issues stemming from the implementation of AI and ML.

The issue of job displacement caused by task automation is a frequent topic of discussion in the field of AI and ML, suggesting the possibility of workforce redundancies in various industries, including finance. Although the participants of this study did not view job loss as an imminent danger, it continues to be a subject of debate among policymakers, practitioners, and scholars. The deployment of AI and ML technologies necessitates careful attention to ethical and privacy dilemmas, including decision-making bias and unauthorised data access. In order to tackle these concerns, it is crucial to establish appropriate regulations and industry guidelines to guarantee the responsible and ethical utilisation of AI and ML.

To summarise, the discussion suggests that the incorporation of AI and ML into financial markets is increasing, presenting substantial opportunities for enhanced efficiency, precision, and risk management. Nevertheless, the study emphasises the importance of tackling issues related to job displacement, ethical considerations, and privacy concerns in order to facilitate the responsible and sustainable implementation of AI and ML in the finance sector.

Furthermore, the findings underscore the importance of continuous education and professional development in the domains of AI and ML. Financial professionals must adapt to the changing technological environment and acquire the requisite skills to succeed in the AI-enhanced financial market. The study's findings unequivocally endorse the notion that an all-encompassing strategy, encompassing legislation, workforce restructuring, and ethical deliberations, is vital for enhancing operational efficiency, decision-making procedures, and fostering public confidence in financial markets. The data derived from the literature review and analysis of key subjects validates the importance of these factors in effectively leveraging the potential of AI and ML technologies in the financial industry.

## CONCLUSION

In summary, the results of this study offer significant contributions to the understanding of how AI and ML are being incorporated and impact the financial industry. The quantitative findings indicate that financial institutions are increasingly adopting AI and ML technologies. A considerable proportion of the respondents indicated that their organizations exhibit a moderate to substantial degree of utilization of these technologies. In the realm of business, the most prominent implementations of AI and ML include customer service, algorithmic trading, risk management, fraud detection, and credit scoring. This study has provided insight into the complex interplay of variables that influence the implementation and impact of AI and ML in financial markets. This highlights the imperative for collaboration among financial professionals, organizations, and regulators to address the challenges posed by these disruptive technologies and to exploit the opportunities they offer in an efficient manner. As AI and ML continue to transform the financial industry, it will be critical to undertake ongoing research to monitor emerging trends, assess the repercussions of new developments, and assist stakeholders in making well-informed decisions that promote responsible and sustainable innovation.

## REFERENCES

- [1]. Cheng, L., Shadabfar, M., & Sioofy Khoojine, A. (2023). A state-of-the-art review of probabilistic portfolio management for future stock markets. *Mathematics*, 11(5), 1148.
- [2]. Olorunnimbe, K., & Viktor, H. (2023). Deep learning in the stock market—a systematic survey of practice, backtesting, and applications. *Artificial Intelligence Review*, 56(3), 2057-2109.
- [3]. Arifovic, J., He, X. Z., & Wei, L. (2022). Machine learning and speed in high-frequency trading. *Journal of Economic Dynamics and Control*, 139, 104438.
- [4]. Buchanan, B. G., & Wright, D. (2021). The impact of machine learning on UK financial services. *Oxford Review of Economic Policy*, 37(3), 537-563.

- [5]. Arslanian, H., & Fischer, F. (2019). *The future of finance: The impact of FinTech, AI, and crypto on financial services*. Springer.
- [6]. Fletcher, G. G. S., & Le, M. M. (2021). The Future of AI Accountability in the Financial Markets. *Vand. J. Ent. & Tech. L.*, 24, 289.
- [7]. Sun, S., Wang, R., & An, B. (2023). Reinforcement learning for quantitative trading. *ACM Transactions on Intelligent Systems and Technology*, 14(3), 1-29.
- [8]. Chopra, R., & Sharma, G. D. (2021). Application of artificial intelligence in stock market forecasting: a critique, review, and research agenda. *Journal of risk and financial management*, 14(11), 526.
- [9]. Nametala, C. A., Souza, J. V. D., Pimenta, A., & Carrano, E. G. (2023). Use of econometric predictors and artificial neural networks for the construction of stock market investment bots. *Computational Economics*, 61(2), 743-773.
- [10]. Sharma, G. D., Erkut, B., Jain, M., Kaya, T., Mahendru, M., Srivastava, M., ... & Singh, S. (2020). Sailing through the COVID-19 crisis by using AI for financial market predictions. *Mathematical Problems in Engineering*, 2020, 1-18.
- [11]. Mokhtari, S., Yen, K. K., & Liu, J. (2021). Effectiveness of artificial intelligence in stock market prediction based on machine learning. *arXiv preprint arXiv:2107.01031*.
- [12]. Cohen, G. (2022). Algorithmic trading and financial forecasting using advanced artificial intelligence methodologies. *Mathematics*, 10(18), 3302.
- [13]. Rahmani, A. M., Rezazadeh, B., Haghparast, M., Chang, W. C., & Ting, S. G. (2023). Applications of artificial intelligence in the economy, including applications in stock trading, market analysis, and risk management. *IEEE Access*.
- [14]. El Hajj, M., & Hammoud, J. (2023). Unveiling the influence of artificial intelligence and machine learning on financial markets: A comprehensive analysis of AI applications in trading, risk management, and financial operations. *Journal of Risk and Financial Management*, 16(10), 434.
- [15]. Ma, Y., Mao, R., Lin, Q., Wu, P., & Cambria, E. (2024). Quantitative stock portfolio optimization by multi-task learning risk and return. *Information Fusion*, 104, 102165.