

HARNESSING AI AND MACHINE LEARNING FOR FINANCIAL FORECASTING: A SYSTEMATIC LITERATURE REVIEW

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Abstract

The rapid advancement of artificial intelligence (AI) and machine learning (ML) technologies has significantly transformed the fields of finance and accounting, particularly in financial forecasting. This article presents a systematic literature review of 15 recent scientific publications from 2019 to 2025 that explore the application of AI and ML in predicting prices, earnings, cash flows, and the quality of accounting information. The findings show that models based on artificial neural networks, evolutionary optimization algorithms, and hybrid models such as DLSTM and GRU significantly improve financial prediction accuracy. Additionally, sentiment analysis and big data analytics (BDA) approaches have also proven to enhance the quality of accounting information systems. This review emphasizes the importance of AI adoption not only from a technical standpoint but also by considering transparency, multidisciplinary collaboration, and adaptation to local regulatory contexts. Recommendations are provided to encourage further research and the development of Explainable AI (XAI) models to support accountable data-driven financial decision-making.

Keywords: Artificial Intelligence, Machine Learning, Financial Forecasting, Accounting Information Systems, Big Data Analytics

INTRODUCTION

The advancement of digital technology has significantly impacted the fields of finance and accounting. One of the most discussed innovations is the application of artificial intelligence (AI) and machine learning (ML). AI is capable of analyzing vast amounts of data, detecting patterns, and generating precise predictions. Traditionally associated with historical recordkeeping, accounting is now transitioning toward predictive approaches. Forecasting plays a vital role in supporting business decision-making, risk management, and strategic financial reporting (Xu & Zhang, 2021).

The Fourth Industrial Revolution, characterized by the integration of information technology, the Internet of Things (IoT), and data-based systems, has further accelerated the adoption of AI in various business sectors, including finance. In this context, accounting information is no longer merely used for annual financial reports but has become an analytical resource that provides insight into a company's future financial prospects (Lakhchini et al., 2022).

AI, with its diverse intelligent algorithms such as decision trees, support vector machines (SVM), and deep learning, can process large datasets and produce predictive outputs in real-time. This capability is particularly relevant for financial institutions that require real-time predictions of stock prices, cash flows, asset valuations, and financial risk (Hall & Rasheed, 2025).

According to Kureljusic & Karger (2024), the application of AI in financial accounting information systems enables management to take proactive actions based on predictions rather than merely reacting to historical reports. This is supported by the structured nature of accounting data, typically stored in rule-based systems, making it ideal for AI algorithms.

Furthermore, machine learning enables automation in auditing, transaction anomaly detection, and investment decision-making based on historical data and financial trend projections. For instance, neural network algorithms have been used to predict stock and property market values (Sharma et al., 2022; Xu & Zhang, 2021), while reinforcement learning is being explored in banking systems to optimize portfolio allocations (X. Li et al., 2024).

This transformation is increasingly relevant as businesses demand faster, more accurate, and forward-looking financial information. Lin & Lobo Marques (2024) highlight that AI methods such as LSTM and ANN have been widely used in stock market predictions, demonstrating their effectiveness in handling time series and complex structures. AI is also employed to process sentiment data, as shown by Rajendiran & Priyadarsini (2023), who applied sentiment analysis from social media to forecast stock price movements.

Meanwhile, Elbatal et al. (2025) employed machine learning-based regression techniques to forecast financial results and found that Multi-Layer Perceptron (MLP) outperformed traditional models like ARIMA and ARDL in prediction accuracy. Tang et al. (2023) developed a deep learning-based accounting information system, particularly DLSTM optimized with evolutionary algorithms, to enhance earnings prediction accuracy.

Big data analytics (BDA) also plays a vital role, as discussed by Nurhayati et al. (2023), in improving the quality of accounting information systems amid the high volume of available data. They demonstrated that top management support and user knowledge, when combined with big data analytics, can significantly enhance the effectiveness of accounting systems.

Thus, integrating AI and ML in accounting and finance practices not only provides competitive advantages but also opens up opportunities for redesigning more adaptive, intelligent, and responsive accounting information systems.

LITERATURE REVIEW

The integration of Artificial Intelligence (AI) and Machine Learning (ML) into financial forecasting has gained increasing attention in recent years. Various studies have demonstrated the effectiveness of AI algorithms in enhancing the predictive capability of accounting information, particularly when aligned with International Financial Reporting Standards (IFRS).

Xu & Zhang (2021) employed Artificial Neural Networks (ANN) to predict housing prices in major Chinese cities, finding that even a simple ANN model with three hidden neurons could produce highly accurate results. This highlights ANN's strength in processing structured financial data. Similarly, Sharma et al. (2022) developed a hybrid model combining Genetic Algorithm (GA) and ANN for stock market forecasting. Their model outperformed traditional Backpropagation ANN, especially under volatile market conditions such as during the COVID-19 pandemic.

To further improve model accuracy and convergence, several researchers proposed hybrid optimization models. Zheng et al. (2022) combined GA with the Ant Colony Optimization (ACO) algorithm to enhance the training of BP Neural Networks, significantly reducing prediction errors. Zhao et al. (2024) introduced a novel Chimp Optimization Algorithm, which achieved a 20% improvement in convergence speed and forecasting accuracy for profit predictions.

In the domain of regulatory financial forecasting, S. Li et al. (2021) explored the impact of mandatory IFRS adoption on the usefulness of accounting information. Although their research did not apply AI techniques, they suggested that AI could be integrated to further leverage IFRS-based data for earnings and cash flow forecasting.

Hall & Rasheed (2025) conducted a comprehensive survey on ML methods for time series prediction. Their findings indicated that while tree-based models like LightGBM and XGBoost offer superior computational efficiency, deep learning models such as RNN and GRU deliver better

accuracy for sequential financial data. Kureljusic & Karger (2024) echoed this by emphasizing the value of AI in rule-based accounting systems and called for further empirical research, especially in developing economies and SMEs.

Lakhchini et al. (2022) provided a broader classification of AI applications in finance, identifying seven key areas including forecasting, robo-advisory, and high-frequency trading. However, they noted that few studies focus specifically on predictive accounting aligned with IFRS frameworks.

Farhood (2019) addressed the role of Information Technology (IT) in enhancing the predictive quality of accounting data, especially in the context of IFRS. His conceptual review suggested that IT significantly supports the relevance and reliability of financial information, providing a foundation for future integration with AI technologies.

Furthermore, advanced models like Deep Gated Recurrent Units (DGRU) and Deep LSTM (DLSTM) have shown remarkable improvements in financial prediction tasks. Li, Khishe, and Qian (2024) used a Marine Predator Algorithm to optimize DGRU, while Tang et al. (2023) applied Chimp Optimization to enhance DLSTM for profit forecasting. Both studies reported substantial accuracy improvements over traditional models.

Elbatal et al. (2025) compared various machine learning regression models and concluded that Multi-Layer Perceptron (MLP) consistently outperforms classical statistical models such as ARIMA and ARDL in accounting forecasting tasks. Meanwhile, Rajendiran & Priyadarsini (2023) employed sentiment analysis and reinforcement learning to predict stock behavior, showing that behavioral finance signals can be effectively leveraged using AI techniques.

Lastly, Nurhayati et al. (2023) demonstrated that Big Data Analytics (BDA), combined with organizational support and user competence, enhances the quality and predictive power of accounting information systems.

These studies collectively affirm that AI and ML play a crucial role in transforming accounting from a descriptive to a predictive function. However, research gaps remain in areas such as real-time decision integration, interpretability, cross-country validation, and alignment with regulatory frameworks like IFRS.

RESEARCH METHODS

This study employs a systematic literature review method based on selected scientific articles published between 2019 and 2025. A total of 15 articles were used, including experimental studies, literature reviews, and the development of hybrid AI models. The analysis focuses on how AI/ML techniques are used for forecasting in the context of finance and accounting, the methods applied, and the strengths and limitations of each approach.

Article selection was based on topic relevance, contribution to the field of AI in finance, and research methodology quality. Each article was reviewed to extract data on the types of AI/ML methods used (e.g., ANN, LSTM, GRU, GA, ACO), domains of application (e.g., price prediction, earnings, cash flow), and key findings.

RESULTS AND DISCUSSION

1. Application of Artificial Neural Networks in Financial Prediction

Artificial Neural Networks (ANN) are among the most commonly used approaches in financial forecasting. A study by Xu & Zhang (2021) demonstrated that a simple ANN model could predict property prices in 100 major cities in China with an average error of only 1% using a three-neuron hidden layer. This finding illustrates the efficiency of ANN in processing complex data without relying on rigid statistical models. Moreover, ANN is flexible and can be customized for various types of inputs, such as macroeconomic data, interest rates, and social media sentiment.

2. Hybrid Models: Integration of AI and Optimization Algorithms

To improve accuracy and avoid local convergence, several researchers developed hybrid models. Sharma et al. (2022) integrated a Genetic Algorithm (GA) with ANN for stock market prediction. GA was used to optimize weights and biases in the neural network structure, thereby overcoming traditional backpropagation limitations such as overfitting and local minima. Similarly, proposed a Deep Gated Recurrent Unit (DGRU) model optimized with the Improved Marine Predator Algorithm (IMPA), achieving an 18% error reduction compared to a standard DGRU.

Zhao et al. (2024) introduced a novel method called Objective-Based Survival Individual Enhancement in the Chimp Optimization Algorithm and reported a 20% increase in convergence speed for accounting profit prediction. This approach illustrates the effectiveness of evolutionary algorithms for predictive tasks in nonlinear and multivariate data environments. Hybridization allows for the integration of exploration capabilities from evolutionary algorithms and the complex representation strength of deep learning.

3. Earnings and Cash Flow Forecasting Using AI Approaches

Earnings and cash flow forecasting are key focuses due to their importance in assessing financial performance and guiding investment decisions. (S. Li et al. (2021) examined the impact of mandatory IFRS adoption on the usefulness of accounting information in predicting future earnings and cash flows. Their study showed that prediction accuracy improved significantly post-IFRS adoption. While not explicitly employing AI, the authors recommended AI as a logical next step to maximize the predictive potential of IFRS data.

In this context, AI technologies can also aid in accrual component analysis, financial statement classification, and fraud probability assessment. The use of GRU, LSTM, and other deep learning models enables long-sequence time series processing while maintaining data context.

4. Comparison of Models and Their Effectiveness

Hall & Rasheed (2025), in their comprehensive survey of ML methods for time series prediction, concluded that tree-based methods such as Light GBM and XGBoost excel in computational efficiency, while RNN and GRU models offer superior accuracy for sequential and complex data. Therefore, model selection should consider data type, dataset size, and the need for precision versus speed.

Furthermore, a meta-review by Lin & Lobo Marques (2024) emphasized that SVM, LSTM, and ANN are the most commonly used AI methods in stock market prediction, with historical price data as the dominant input. However, the study also highlighted the need for exploring alternative data sources and broader performance metrics.

In the study by Rajendiran & Priyadarsini, (2023) sentiment analysis was used to predict stock market behavior, showing promising results, particularly when combined with reinforcement learning and hybrid Naïve Bayes classification.

Research by (Nurhayati et al., 2023) also underscored that the use of big data analytics (BDA) can strengthen accounting information systems, particularly by improving information quality and predictive accuracy through a dynamic approach.

CONCLUSION

Based on this review, it can be concluded that the use of AI and ML in financial forecasting holds great potential to enhance the accuracy, efficiency, and flexibility of accounting information systems. Hybrid models that combine neural networks and evolutionary algorithms are particularly effective. Furthermore, AI can support IFRS implementation by providing more accurate earnings and cash flow forecasts. However, challenges remain regarding model interpretability, large data requirements, and resistance to technological adoption in accounting practices.

Looking forward, collaboration between data scientists and accounting professionals is essential to develop predictive systems that are not only technically sophisticated but also practically relevant. Additionally, attention to ethics and data security is crucial to ensure that AI adoption remains responsible and trustworthy.

Table 1. Summary of Research

Author	Research Focus	Research Gap	AI Method/Model	Key Findings
Integration of genetic algorithm with artificial neural network for stock market forecasting Sharma et al. (2022)	Developing a hybrid GA-ANN model for stock prediction	Not yet tested under extreme market conditions and unstructured data	Genetic Algorithm + ANN	GANN is more accurate than BPANN, even during the pandemic
House Price Forecasting with Neural Networks (Xu & Zhang, 2021)	Predicting house prices using artificial neural networks	Focuses on structured data; does not integrate external market or macroeconomic data	Artificial Neural Network (ANN)	ANN model with 3 hidden neurons results in low error
An Optimal BP Neural Network Track Prediction Method Based on a GA-ACO Hybrid Algorithm (Zheng et al., 2022)	Optimizing BP Neural Network for trajectory prediction	Not yet tested in real financial applications such as cash flow or earnings forecasting	GA-ACO Hybrid + BP Neural Network	GA-ACO hybrid reduces error and accelerates convergence
Objective-based survival individual enhancement in the chimp optimization algorithm for the profit prediction using financial accounting information system (Zhao et al., 2024)	Enhancing prediction efficiency by developing Chimp Optimization algorithm	Only tested in simulation environments; not empirically validated on actual financial reports	Objective-based Chimp Optimization	Accuracy & convergence improved up to 20%
Mandatory IFRS Adoption and the Usefulness of Accounting Information in Predicting Future Earnings and Cash Flows (S. Li et al., 2021)	Examining the effect of IFRS adoption on earnings & cash flow prediction	Does not use AI models; lacks direct integration of IFRS and AI	Regression (pre/post analysis)	IFRS enhances the usefulness of accounting info for forecasting
A Survey of Machine Learning Methods for Time Series Prediction (Hall & Rasheed, 2025)	Surveying ML methods for time series prediction	Does not address interpretability and regulatory integration such as IFRS or auditing	RNN, LSTM, GRU, LightGBM, XGBoost	Tree-based is fast, RNN and GRU are accurate for sequences

Forecasting in financial accounting with artificial intelligence – A systematic literature review and future research agenda (Kureljusic & Karger, 2024)	Analyzing AI effectiveness in financial accounting forecasting	Limited empirical evidence in developing countries and small-scale organizations	Systematic Literature Review	AI supports rule-based accounting system forecasting
Artificial Intelligence & Machine Learning in Finance: A literature review (Lakhchini et al., 2022)	Classifying AI/ML applications in finance	Still general; lacks focus on predictive accounting approaches based on IFRS or historical financial reports	Qualitative Review	Seven key areas including forecasting, robo-advisory, HFT
Information Technology and its Impact on the Predictive Ability of Accounting Information by Using the Application of International Financial Reporting Standards (IFRSs) (Farhood, 2019)	Examining the impact of information technology on improving the predictive ability of accounting information through IFRS implementation	Few empirical studies have comprehensively linked IT and IFRS in the context of accounting information prediction	Literature Review and Conceptual Analysis	Information technology supports the relevance and reliability of accounting information under global standards such as IFRS
Evolving deep gated recurrent unit using improved marine predator algorithm for profit prediction based on financial accounting information system (X. Li et al., 2024)	Improving profit prediction accuracy based on accounting information systems	Not yet tested across countries and under long-term economic conditions	Deep GRU + Marine Predator Algorithm	Hybrid model outperforms conventional deep learning models
Predictive analytics in accounting: Using regression models to forecast financial outcomes (Elbatal et al., 2025)	Financial outcome prediction using accounting data	Lacks integration with real-time decision systems and model interpretability	Multi-Layer Perceptron (MLP), classical regression	MLP outperforms ARIMA and ARDL in accounting prediction accuracy
Profit Prediction Optimization Using FAIS by Optimized DLSTM (Tang et al., 2023)	Profit prediction based on accounting information systems	Lacks comparison with other optimization methods and tests on diverse real data	Deep LSTM, Chimp Optimization Algorithm	COA-optimized DLSTM improves profit prediction accuracy & efficiency

Stock Market Prediction Using Artificial Intelligence (Lin & Lobo Marques, 2024)	Systematic review of stock market prediction	Limited exploration of alternative input variables and non-traditional evaluation metrics	LSTM, ANN, SVM	LSTM, ANN, and SVM are most common; historical prices are key inputs
Survival Study on Stock Market Prediction Techniques Using Sentimental Analysis (Rajendiran & Priyadarsini, 2023)	Stock market prediction based on investor sentiment	Not tested across various financial markets and limited model scalability	Sentiment Analysis, Reinforcement Learning, Naïve Bayes	Sentiment and RL combo shows promise in stock price prediction
The Predictors of the Quality of Accounting Information System (Nurhayati et al., 2023)	Improving the quality of accounting information systems	Not yet generalized beyond Islamic social institutions; lacks longitudinal validation	Big Data Analytics (BDA), Partial Least Squares (PLS)	Management support and user knowledge improve system quality with BDA integration

BIBLIOGRAPHY

- Elbatal, I., Almetwally, E. M., Alaskar, M. Z., Alsaedi, B. S. O., Alzubaidi, S., & Yusuf, M. (2025). Predictive analytics in accounting: Using regression models to forecast financial outcomes. *Alexandria Engineering Journal*, 128, 484–492. <https://doi.org/10.1016/j.aej.2025.05.087>
- Farhood, S. B. (2019). Information Technology and its Impact on the Predictive Ability of Accounting Information by Using the Application of International Financial Reporting Standards (IFRSs). *Journal of Engineering and Applied Sciences*.
- Hall, T., & Rasheed, K. (2025). A Survey of Machine Learning Methods for Time Series Prediction. In *Applied Sciences (Switzerland)* (Vol. 15, Issue 11). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/app15115957>
- Kureljusic, M., & Karger, E. (2024). Forecasting in financial accounting with artificial intelligence – A systematic literature review and future research agenda. In *Journal of Applied Accounting Research* (Vol. 25, Issue 1, pp. 81–104). Emerald Publishing. <https://doi.org/10.1108/JAAR-06-2022-0146>
- Lakhchini, W., Wahabi, R., & El Kabbouri, M. (2022). Artificial Intelligence & Machine Learning in Finance: A literature review. *International Journal of Accounting, Finance, Auditing, Management and Economics*. <https://doi.org/10.5281/zenodo.7454232>
- Li, S., Sougiannis, T., & Wang, S. (2021). *Mandatory IFRS Adoption and the Usefulness of Accounting Information in Predicting Future Earnings and Cash Flows*. <https://ssrn.com/abstract=2948775> Electronic copy available at: <https://ssrn.com/abstract=2948775>
- Li, X., Khishe, M., & Qian, L. (2024). Evolving deep gated recurrent unit using improved marine predator algorithm for profit prediction based on financial accounting information system. *Complex and Intelligent Systems*, 10(1), 595–611. <https://doi.org/10.1007/s40747-023-01183-4>
- Lin, C. Y., & Lobo Marques, J. A. (2024). Stock market prediction using artificial intelligence: A systematic review of systematic reviews. In *Social Sciences and Humanities Open* (Vol. 9). Elsevier Ltd. <https://doi.org/10.1016/j.ssaho.2024.100864>
- Nurhayati, N., Hartanto, R., Paramita, I., Sofianty, D., & Ali, Q. (2023). The predictors of the quality of accounting information system: Do big data analytics moderate this conventional linkage? *Journal of Open Innovation: Technology, Market, and Complexity*, 9(3). <https://doi.org/10.1016/j.joitmc.2023.100105>
- Rajendiran, P., & Priyadarsini, P. L. K. (2023). Survival study on stock market prediction techniques using sentimental analysis. *Materials Today: Proceedings*, 80, 3229–3234. <https://doi.org/10.1016/j.matpr.2021.07.217>
- Sharma, D. K., Hota, H. S., Brown, K., & Handa, R. (2022). Integration of genetic algorithm with artificial neural network for stock market forecasting. *International Journal of System Assurance Engineering and Management*, 13, 828–841. <https://doi.org/10.1007/s13198-021-01209-5>
- Tang, W., Yang, S., & Khishe, M. (2023). Profit prediction optimization using financial accounting information system by optimized DLSTM. *Heliyon*, 9(9). <https://doi.org/10.1016/j.heliyon.2023.e19431>
- Xu, X., & Zhang, Y. (2021). House price forecasting with neural networks. *Intelligent Systems with Applications*, 12, 52. <https://doi.org/10.1016/j.iswa.2021.20>
- Zhao, G., Martín, D., Khishe, M., Qian, L., & Jangir, P. (2024). Objective-based survival individual enhancement in the chimp optimization algorithm for the profit prediction using financial accounting information system. *Engineering Science and Technology, an International Journal*, 60. <https://doi.org/10.1016/j.jestch.2024.101897>

Zheng, Y., Lv, X., Qian, L., & Liu, X. (2022). An Optimal BP Neural Network Track Prediction Method Based on a GA–ACO Hybrid Algorithm. *Journal of Marine Science and Engineering*, 10(10).
<https://doi.org/10.3390/jmse10101399>