Accounting and Auditing with Application

www.aaa.reapress.com

Acc. Aud. Appl. Vol. 3, No. 1 (2026) 45–51.

Paper Type: Review Article

The Application of Artificial Intelligence and Big Data–Based Predictive Models in Accounting

Parisa Dodangeh*

Departmant of Accounting, University of Zanjan, Zanjan, Iran; parisadodange80@gmail.com.

Citation:

Received: 1 October 2025 *Revised: 13 December 2025* *Accepted: 15 Februrary 2026*	Dodangeh, P. (2026). The application of artificial intelligence and big data–based predictive models in accounting. *Accounting and auditing with application*, 3(1), 45-51.

Abstract

In today's data-driven and modern world, data is recognized as one of the most important informational resources that can be utilized in making intelligent and optimized decisions. The accounting profession, in the age of the information explosion, faces an unprecedented volume of financial and non-financial data. This study, employing a systematic literature review method, examines modern predictive models and their transformative applications across various areas of accounting. Predictive models are key tools in data science, capable of forecasting future events and simulating behaviors by using historical data and statistical or machine learning methods. These models are applied across numerous industries, including healthcare, business, finance, education, and even weather forecasting. The findings show that algorithms such as Artificial Neural Networks (ANN), Support Vector Machines (SVM), and particularly deep learning and Large Language Models (LLMs), demonstrate a high capacity for predicting bankruptcy, Financial Fraud Detection (FFD), credit risk, asset valuation, and even analyzing accounting texts. By utilizing big data (a combination of structured financial data, news, social media, etc.), these models have significantly enhanced the accuracy of traditional predictions. The conclusion of the paper indicates that integrating these technologies into auditing and reporting frameworks has become not only a competitive advantage but a necessity to ensure the reliability and timeliness of financial information.

Keywords: Predictive models, Artificial intelligence in accounting, Big data, Financial fraud, Machine learning.

1 | Introduction

Accounting, as the language of business, has traditionally relied on the analysis of historical data to inform decisions about the future. With the advent of Artificial Intelligence (AI) and Big Data technologies, the accounting paradigm is shifting from "historical reporting" toward "forward-looking insight generation."

Corresponding Author: parisadodange80@gmail.com

https://doi.org/10.22105/aaa.v3i1.91

Advanced predictive models, with the capacity to process thousands of linear and nonlinear variables, enable the identification of complex patterns and the forecasting of financial events with unprecedented accuracy. This paper aims to provide a comprehensive review of the most significant predictive models and their practical applications within the accounting profession [1].

2 | Theoretical Foundations and Definition of Predictive Models

A predictive model is a mathematical or statistical framework that forecasts future outcomes or events using historical data and machine learning algorithms. The primary objective of these models is to transform raw data into actionable insights for future decision-making.

By identifying patterns, relationships, and trends within data, predictive models can generate estimates about future developments. Forecasts may take a numerical form (e.g., predicting the price of a commodity) or a categorical form (e.g., estimating the likelihood of a specific event, such as a customer purchasing a product).

In other words, predictive models enable businesses and organizations not only to analyze the past but also to anticipate the future. Overall, predictive models are considered key tools in data science for analysis and forecasting [2].

In data science, predictive models are regarded as key tools for analysis and forecasting. These models are employed to process and analyze large volumes of data, enabling organizations to use raw information to anticipate future patterns. Predictive models are typically applied in high-level decision-making processes within businesses and organizations. By leveraging historical data and employing advanced techniques such as machine learning, statistical analysis, and data mining, these models allow organizations to simulate future trends and behaviors.

Early studies in the field of financial forecasting primarily focused on simple statistical models, such as audit analysis using the Altman Z-Score [3]. With the advent of technology, Artificial Neural Network (ANN) models were employed for bankruptcy prediction, often demonstrating higher accuracy than linear models [4]. Over the past two decades, with the availability of big data, more complex models such as Random Forest and Gradient Boosting (XGBoost) have emerged as the new standard in research on Financial Fraud Detection (FFD) [5].

3 | Widely Used Predictive Models in Accounting and Finance

3.1 | Regression Models

These models are used to predict continuous (numerical) values.

I. Examples in accounting: forecasting stock prices, predicting next month's sales, and projecting future cash flows.

II. Common models: linear regression and logistic regression (for binary predictions, such as bankruptcy vs. non-bankruptcy) [6].

3.2 | Classification Models

These models are used to predict discrete labels, such as yes/no outcomes.

I. Examples in accounting: detecting financial fraud, predicting customer churn, and classifying financial documents.

II. Common models: decision trees, Support Vector Machines (SVM), and machine learning algorithms such as XGBoost [7].

3.3 | Neural Networks and Deep Learning

These models are designed to process complex, high-dimensional data, such as images and text.

I. Examples in accounting: automated detection of fraudulent financial statements, sentiment analysis of management reports, and identification of anomalous patterns in transactions.

II. Common models: Convolutional Neural Networks (CNN) for scanned documents and Recurrent Neural Networks (RNN).

3.4 | Time Series Models

These models are used to forecast future values based on past data arranged in chronological order.

I. Examples in accounting: predicting seasonal sales, forecasting product demand, and projecting economic indicators that affect financial statements.

II. Common models: ARIMA, Prophet, and Long Short-Term Memory (LSTM) networks.

3.5 | Decision Tree Models

These models are widely used for both classification and numerical prediction tasks. Decision trees split data into nodes, where different decisions are made based on specific features at each node. They are particularly well-suited for interpretable problems that require an explanation of the decision-making process. Examples in accounting, credit risk assessment, and identification of dissatisfied customers. In this section, the models are categorized according to the type of accounting problem.

Table 1. Classification of predictive model applications.

Application Area	Widely Used Predictive Models	Brief Description and Advantages
bankruptcy and credit risk prediction	Z-Score model (Altman) ANN SVM XGBoost algorithm	ANN and XGBoost exhibit higher accuracy due to their ability to model complex nonlinear relationships among financial ratios.
FFD	Logistic regression decision trees and random forests deep neural networks (deep learning)	Random forest is highly popular due to its ability to reduce overfitting and handle high-dimensional data. Deep learning models can detect complex and hidden patterns of fraud.
Stock value and return prediction	ARIMA (for time series of prices) LSTM Transformers	LSTM is specifically designed for sequential data, such as stock prices, and incorporates both long-term and short-term memory.
Sentiment and text analysis of financial reports	Natural Language Processing (NLP) language models such as BERT	These models can analyze stress, ambiguity, or positive/negative sentiment in management reports, financial statements, and news, and use this information to forecast future performance.
Cash flow and sales forecasting	Linear/multiple regression time series models (prophet) RNN	Integrating internal financial data with big data sources, such as economic indicators, enhances predictive accuracy.

4 | The Role of Big Data in Empowering Predictive Models

Modern predictive models do not rely solely on structured accounting data, such as balance sheets. They leverage heterogeneous data sources to enhance accuracy, including:

I. Textual data: annual reports, news articles, and social media analyses.

II. Real-time data: online transactions and sensor data from the supply chain.

III. Alternative data: weather information for forecasting seasonal product sales, traffic data for property valuation.

This integrated approach has enabled the emergence of "predictive accounting [8].

5 | Advantages and Applications of Predictive Models

5.1 | Based on Existing Research, Predictive Models Enable Organizations

I. Mitigate risks (e.g., credit risk, fraud risk): accurate prediction of adverse events, such as declining demand, financial difficulties, or market fluctuations, can help companies proactively manage and prevent risks.

II. Identify new opportunities (e.g., emerging markets or consumption patterns): these models can assist in detecting potential opportunities, such as novel market demands or favorable industry trends.

III. Enhance productivity (through process and resource optimization): by forecasting demand, inventory levels, and future trends, firms can allocate their resources more efficiently, thereby achieving higher productivity.

IV. Reduce costs (by preventing resource wastage and improving demand accuracy): accurate demand forecasting enables companies to avoid unnecessary expenditures and utilize resources more effectively [2].

5.2 | Practical Applications Include

I. Sales and demand forecasting: In numerous business contexts, predictive models are employed to forecast product sales and demand. These models enable companies to optimize inventory levels and mitigate the risks of both stockouts and excess inventory.

II. Stock price forecasting: in financial markets, predictive models assist analysts in simulating trends in stock and asset prices, thereby facilitating more informed decisions regarding buying and selling activities.

III. Individual and public health forecasting: within the healthcare domain, such models support the anticipation of disease trajectories and the identification of health risks. They also aid in projecting requirements for specific medications or therapeutic interventions.

IV. Weather and climate forecasting: in atmospheric sciences, predictive models are utilized to forecast weather conditions and to anticipate natural disasters, including storms and floods.

V. Customer behavior analysis: in marketing and commerce, predictive models are applied to examine customer behavior and to forecast their future needs and preferences [9].

5.3 | Advantages of Various Predictive Modeling Approaches

These advantages enable firms to compete more effectively in the market, reduce costs, and enhance their performance:

I. Enhanced understanding of competition: these models assist firms in gaining a clearer comprehension of competitors and their own market positioning.

II. Strategic deployment for competitive advantage: by anticipating market and customer behaviors, firms can formulate strategies to outperform rivals.

III. Optimization of existing products or services: data-driven analyses enable firms to improve their offerings and more effectively meet customer needs.

IV. Insight into consumer requirements: predictive models help firms identify the actual needs of their customers.

V. Profiling the general customer base of an industry or firm: these models provide firms with a comprehensive overview of their customers and their preferences.

VI. Reduction of time, effort, and cost in outcome estimation: predictive models accelerate forecasting processes while minimizing associated costs.

VII. Forecasting external factors affecting productivity or workflow: these models enable firms to anticipate and manage the impact of external variables on performance.

VIII. Identification of financial risks: predictive models can detect potential future financial risks and prepare firms to address them proactively.

IX. Forecasting inventory and resource management processes: these models support the optimization of resource allocation and inventory control.

X. Detection of emerging trends: firms can leverage these models to identify future market trends and behavioral patterns for strategic advantage.

XI. Workforce analytics and turnover planning: predictive models aid firms in workforce planning and in reducing employee attrition.

6 | The Predictive Model Development Process (Six Stages)

Predictive modeling is a structured process that comprises the following stages:

I. Problem understanding and objective definition: precisely determine what needs to be predicted.

II. Data collection: gather relevant historical data from internal and external sources.

III. Data preprocessing: clean, transform, and integrate data to prepare it for analysis.

IV. Feature selection: identify key variables that significantly influence the prediction.

V. Model training: employ machine learning algorithms to build the model using training data.

VI. Model evaluation: test the model on new data and assess its accuracy, sensitivity, and error metrics [10].

7 | Challenges and Practical Considerations in Predictive Modeling

Despite their numerous advantages, the implementation of predictive models is accompanied by several challenges:

I. Data quality: predictive models rely on accurate, complete, and up-to-date data. Noisy or incomplete data can lead to erroneous predictions.

II. Prediction instability: in dynamic and unpredictable environments (e.g., economic crises), model accuracy may decline abruptly.

III. Historical data limitations: models based on historical data may be misleading if future conditions differ significantly from the past.

IV. Explainability: complex models, such as deep neural networks, are often considered "black boxes," which can conflict with auditing standards that require transparency and traceability of decisions.

V. Data bias: if training data are biased, model predictions may also be unfair, for example, in credit risk assessment.

VI. Cost and expertise: developing and maintaining these models requires significant investment and skilled personnel in data analytics and accounting.

VII. Ethical and privacy considerations: the use of big data must comply with data protection regulations, such as the GDPR [11].

8 | Conclusion and Recommendations

AI and big data–based predictive models are transforming the role of accountants and auditors from mere recorders of events to strategic analysts and management advisors. These technologies have the potential to enhance efficiency, reduce risk, and generate new value for businesses. To ensure effective utilization, the following recommendations are proposed:

I. Training and empowerment of human resources: integrate data science and AI courses into accounting curricula.

II. Development of regulatory frameworks: professional organizations (e.g., auditing bodies and the FASB) should guide auditing and reporting for AI-based models.

III. Emphasis on interpretable models: prioritize models whose decision-making logic can be justified and explained.

IV. Interdisciplinary collaboration: form teams comprising accountants, data specialists, and software engineers [8].

Conflict of Interest

The authors confirm that there are no financial or personal relationships that could have influenced the work reported in this paper.

Data Availability

The datasets generated and analyzed during the current study are available in the article.

Funding

This research was conducted without financial support from any funding organization.

References

[1] Kokina, J., & Davenport, T. H. (2017). The emergence of artificial intelligence: How automation is changing auditing. *Journal of emerging technologies in accounting*, *14*(1), 115–122. https://doi.org/10.2308/jeta-51730

[2] Shmueli, G., & Koppius, O. R. (2011). Predictive analytics in information systems research1. *MIS quarterly*, *35*(3), 553–572. https://doi.org/10.2307/23042796

[3] Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance*, *23*(4), 589–609. https://doi.org/10.2307/2978933

[4] O'leary, D. E. (1998). Using neural networks to predict corporate failure. *International journal of intelligent systems in accounting, finance and management*, *7*(3), 187–197. https://doi.org/10.1002/(SICI)1099-1174(199809)7:3%3C187::AID-ISAF144%3E3.0.CO;2-7

[5] West, J., & Bhattacharya, M. (2016). Intelligent financial fraud detection: A comprehensive review. *Computers & security*, *57*, 47–66. https://doi.org/10.1016/j.cose.2015.09.005

[6] Brooks, C. (2014). *Introductory econometrics for finance*. Cambridge university press. https://doi.org/10.1017/CBO9781139540872

[7] Han, J., Kamber, M., & Pei, J. (2012). Data mining: Concepts and. *Techniques, waltham: Morgan kaufmann publishers*, 2012–2013. http://homes.di.unimi.it/ceselli/IM/2012-13/slides/02-KnowYourData.pdf

[8] Warren, J. D., Moffitt, K. C., & Byrnes, P. (2015). How big data will change accounting. *Accounting horizons*, *29*(2), 397–407. https://doi.org/10.2308/acch-51069

[9] Chase, C. W. (2013). *Demand-driven forecasting: A structured approach to forecasting*. John Wiley & Sons. https://doi.org/10.1002/9781118691861

[10] Hang, P., Lv, C., Xing, Y., Huang, C., & Hu, Z. (2021). Human-like decision making for autonomous driving: A noncooperative game theoretic approach. *IEEE transactions on intelligent transportation systems*, *22*(4), 2076–2087. https://doi.org/10.1109/TITS.2020.3036984

[11] Shmueli, G., Bruce, P. C., Stephens, M. L., & Patel, N. R. (2016). *Data mining for business analytics: Concepts, techniques, and applications with JMP Pro*. John Wiley & Sons. https://content.e-bookshelf.de/media/reading/L-7771267-0e2ce5cf22.pdf