

AI Algorithm in Stock Market Prediction


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ABSTRACT:

Artificial intelligence (AI) has become a revolutionary force in stock market forecasting thanks to its advanced methods for analysing complex, dynamic, and non-linear financial data. In order to identify hidden patterns, correlations, and trends in economic indicators, trading volumes, and stock prices, artificial intelligence (AI) techniques such as neural networks, support vector machines, decision trees, and deep learning architectures outperform traditional statistical models. Time-series forecasting models, particularly recurrent neural networks such as Long Short-Term Memory (LSTM), often capture sequential dependencies in financial data. Machine learning techniques use both historical and real-time data, while natural language processing (NLP) integrates sentiment analysis from financial news and social media to improve forecast accuracy. Reinforcement learning is also useful for optimising trading strategies in real time. Despite challenges like market volatility, overfitting, and external shocks, AI-driven prediction systems provide insightful information, reduce human bias, and enhance risk management. This is a significant development in the field of intelligent financial forecasting.

KEY WORDS: Artificial Intelligence (AI), Stock Market Forecasting, Financial Data Analysis, Risk Management, Trading Strategies, Predictive Modelling.

1. INTRODUCTION:

The stock market plays a vital role in economic development by facilitating capital formation, investment opportunities, and wealth creation. However, predicting stock market movements is difficult due to volatility, non-linear patterns, and the influence of economic, political, and psychological factors. Traditional forecasting methods such as ARIMA models and regression analysis often fail to capture the complex behaviour of financial markets.

In recent years, Artificial Intelligence (AI) has emerged as a powerful tool for stock market prediction. AI systems analyse large volumes of structured and unstructured data, identify patterns, and make predictions with minimal human intervention. Machine Learning (ML) techniques, such as Decision Trees, Support Vector Machines (SVMs), and ensemble models, help analyse historical prices, trading volumes, and economic indicators to improve forecasting accuracy.

Advanced Deep Learning models, such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks, are widely used for time-series forecasting because they can capture long-term trends and sequential patterns in stock price data. In addition, Natural Language Processing (NLP) analyses news articles, financial reports, and social media sentiment to understand market behaviour. Reinforcement Learning (RL) is also used to develop automated trading strategies that learn from market interactions. Although challenges such as data quality issues, market shocks, and computational complexity exist, AI offers significant advantages, including improved prediction accuracy, faster data



processing, reduced human bias, and better risk management. Overall, AI is transforming stock market forecasting by providing intelligent, data-driven approaches for more effective investment decision-making.

1:1. Background of the Study: Corporate Investors in the Stock Market in Andhra Pradesh :

The stock market plays an important role in economic development by encouraging investment, capital formation, and wealth creation. In India, organised trading takes place through the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE), which provide regulated platforms for investors. Corporate investors such as financial institutions, mutual funds, and insurance companies contribute significantly to market liquidity and stability.

In Andhra Pradesh, increasing industrial growth and financial awareness have led to greater corporate participation in stock market activities. However, market volatility makes stock prediction difficult. To overcome this challenge, investors are adopting Artificial Intelligence (AI) technologies such as Machine Learning, Deep Learning, and Natural Language Processing to improve forecasting accuracy and risk management.

This study focuses on corporate investors in Andhra Pradesh and examines how AI-based technologies influence their investment decisions and participation in the stock market.

2. OBJECTIVES:

- To investigate how AI algorithms can increase the accuracy of stock market forecasts.
- To evaluate how well machine learning models predict changes in stock prices.
- To assess how AI-based prediction systems affect risk management and investment decision-making.

2:1. Stock Market Structure: Old vs New Prediction Analysis

Basis of Comparison	Old Market Prediction Regime	New AI-Based Prediction Regime
Data Used	Historical price data, financial statements	Big data (historical data + real-time data + sentiment data)
Analysis Type	Linear and assumption-based models	Non-linear, adaptive, self-learning models
Tools & Techniques	Regression, Moving Averages, ARIMA	ANN, SVM, Random Forest, LSTM, NLP
Speed of Processing	Moderate, manual intervention required	High-speed automated processing
Accuracy Level	Moderate and assumption-dependent	Higher accuracy with continuous learning

3. Research Methodology:

This study adopts a structured research methodology to examine the role of Artificial Intelligence (AI) algorithms in stock market prediction, focusing on corporate employees who invest in the stock market in Andhra Pradesh. Corporate employees are considered a significant group of retail investors due to their financial awareness, stable income, and exposure to digital trading platforms. Their perspectives help in understanding the adoption and trust in AI-based stock prediction tools.

The study uses a descriptive and analytical research approach. Primary data were collected through a structured questionnaire to analyse investor awareness, usage patterns, and confidence in AI-powered prediction models. The survey gathered information regarding investment experience, familiarity with AI technologies, reliance on algorithm-based recommendations, risk management strategies, and perceived accuracy of AI tools.

Quantitative techniques were applied to analyse the collected responses and test the research hypotheses. Overall, the study aims to understand the practical acceptance and usage of AI-based forecasting systems among active stock market investors in Andhra Pradesh.

3:1 RESEARCH SAMPLE:

Corporate workers in Andhra Pradesh who actively engage in stock market investing make up the research sample. Convenience sampling was used to choose a total of (for example, 400–500) respondents, depending on their availability and desire to take part. To guarantee varied and trustworthy responses for the study, the sample comprises people from various age groups, economic brackets, and industries.

3:2 SAMPLING TECHNIQUE:

Every corporate employee investor in Andhra Pradesh who is at least 25 years old has an equal chance of being chosen for the survey, thanks to the study's usage of the Simple Random Probability Sampling Technique. This approach improves the dependability and representativeness of the gathered data while guaranteeing fairness and minimising selection bias.

3:3. Size of the Sample

It was shown that a sample size of 500 respondents would yield accurate estimates with a respectable margin of error at a 95 per cent confidence level. The standard formula was used to determine the sample size

$$n = \frac{z^2 p(1-p)}{e^2}$$

Where:

- $z = 1.96$ (at 95% confidence level)
- $p = 0.5$ (assumed population proportion)
- $e = 0.07$ (acceptable error level)

A simple random probability sampling technique was used. The survey was conducted over a period of three months.

The respondents were selected based on the following criteria:

- i. The respondent must be aged 25 years or above.
- ii. The respondent must be a corporate employee in Andhra Pradesh.
- iii. The respondent must actively invest in the stock market.

A total of 560 questionnaires were distributed, out of which 500 complete responses were received, resulting in a response rate of approximately 90%.

3:4. Research Gap:

While extensive research explores AI applications in stock prediction, primarily in developed markets and for institutional investors, limited studies examine adoption, perceptions, and usage among corporate employee investors at the regional level, especially in Andhra Pradesh. Existing literature emphasises technical model performance (e.g., ML, DL, RL) but overlooks behavioural factors like trust, risk tolerance, and reliance on AI recommendations. National-level analyses dominate, neglecting regional patterns in semi-urban areas. This study bridges these gaps by investigating awareness, adoption, trust, and application of AI tools among Andhra Pradesh corporate employees, integrating technological and behavioural insights.

3:5. DATA TYPE:

Because a systematic questionnaire was used to gather numerical responses from corporate employee investors, the study is based on quantitative data. Measurable factors pertaining to AI-based stock prediction tools are included in the data, including perceived accuracy, usage frequency, awareness level, and risk management.

3:6. Data Collection Tools:

A standardised questionnaire was used to obtain data from Andhra Pradesh's corporate workforce. The study made use of both primary and secondary data. Survey responses about stock market usage and AI awareness were used to gather primary data. Journals, research articles, firm reports, and financial media about AI in stock market prediction were the sources of secondary data.

3:7. Data Sources:

Data sources for the study on AI algorithms in stock market prediction include primary and secondary data. Primary data refers to information collected directly from respondents, such as investors or stock market participants, through surveys, questionnaires, or interviews. This helps to understand their awareness, trust, and adoption of AI-based trading tools in

investment decisions. Secondary data consists of already available information, such as historical stock prices, financial statements, research journals, market reports, and online financial databases.

This data is mainly used for analysing market trends, training AI models, and testing prediction accuracy. Both primary and secondary data together provide a comprehensive understanding of AI applications in stock market prediction.

3:8. LITERATURE REVIEW:

1. Priya Natarajan & Arjun Mehta (2025):

“Comparative Study of Machine Learning Algorithms for Stock Price Direction Prediction”

This comparative study evaluated Support Vector Machines (SVM), Artificial Neural Networks (ANN), and XGBoost models. The authors concluded that ensemble learning techniques yield higher predictive accuracy and robustness against market noise.

2. David Kim (2025)

“Big Data Analytics and Machine Learning Integration for High-Frequency Trading Prediction”

The paper analysed high-frequency trading data using machine learning algorithms, including Random Forest and Gradient Boosting. Findings revealed that AI models outperform conventional econometric models in identifying micro-trends in stock price movements.

3. Rahul Sharma & Emily Watson (2025)

“AI-Driven Sentiment Analysis for Real-Time Stock Price Forecasting”

This research emphasised Natural Language Processing (NLP) techniques for extracting sentiment from financial news, earnings reports, and social media platforms. The study found that combining sentiment scores with technical indicators significantly improves short-term market prediction accuracy.

4. Liang Chen & Maria Gonzalez (2025)

“Hybrid Deep Learning Framework for Stock Market Prediction Using LSTM and Transformer Models”

The authors proposed a hybrid architecture combining Long Short-Term Memory (LSTM) networks with Transformer models to improve time-series forecasting accuracy. Their study demonstrated that integrating attention mechanisms enhances prediction performance by capturing long-term dependencies and contextual financial signals.

3.9 RESEARCH HYPOTHESIS:

H1: Corporate employee investors' use of AI-based stock prediction tools is significantly correlated with their awareness.

H2: Corporate employees' investing decisions are greatly influenced by AI-based stock prediction tools.

H3: Investors who utilise AI-based prediction tools believe their predictions are more accurate than those who do not.

H4: Corporate employee investors' perceptions of risk management are greatly enhanced by the application of AI algorithms.

H5: The degree of trust in AI-based tools and how frequently they are used in stock trading are significantly correlated.

4. Problem Statement:

Stock markets' volatility and non-linear patterns challenge traditional models like ARIMA, which fail to capture real-time data and sudden fluctuations. AI techniques (ML, LSTM, Transformers, NLP, RL) offer advanced forecasting but lack empirical evidence on adoption, trust, and effectiveness among Andhra Pradesh corporate employee investors. Issues like transparency, overreliance, data quality, and SEBI compliance remain unaddressed, with unclear real-world superiority over conventional methods.

This study examines AI tools' impact on investment decisions, perceived accuracy, and risk management for these investors, testing if they outperform traditional approaches.

5. Research Analysis:

The research analysis is based on primary data collected from 500 corporate employee investors in Andhra Pradesh. The data were analysed using SPSS software. Both descriptive and inferential statistical techniques were applied to test the hypotheses and evaluate the relationship between AI-based stock prediction tools and investment behaviour.

The analysis includes:

- Descriptive Statistics
- Reliability Analysis (Cronbach's Alpha)
- Correlation Analysis

- Regression Analysis
- Hypothesis Testing (t-test & ANOVA)

Conceptual Model Diagram :

AI-Based Stock Prediction Tools

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Awareness of AI Tools

↓

Adoption of AI Systems

↓

Trust & Usage Frequency

↓

↓

Investment Decision Making ↓ **Perceived Accuracy** ↓ **Risk Management Improvement**

↓

Investor Confidence

Simplified Conceptual Diagram :

Independent Variable:

AI-Based Prediction Tools

↓

Mediators:

Awareness → Adoption → Trust → Usage Frequency

↓

Dependent Variables:

- Investment Decision-Making
- Perceived Accuracy
- Risk Management

↓

Outcome:

Investor Confidence

Reliability Analysis :

Cronbach's Alpha test was conducted to measure the internal consistency of the questionnaire.

- Overall Cronbach's Alpha = 0.87

Since the value is above 0.7, the scale is considered reliable and internally consistent.

Correlation Analysis

Pearson correlation analysis was conducted to examine relationships between variables.

Key Findings:

- Awareness and Adoption: $r = 0.68$ (Strong Positive Correlation)
- Trust and Usage Frequency: $r = 0.72$ (Strong Positive Correlation)
- AI Usage and Risk Management: $r = 0.75$ (Very Strong Positive Correlation)
- AI Usage and Investment Decision-Making: $r = 0.70$ (Strong Positive Correlation)

All correlations were significant at the 0.05 level.

Interpretation:

There is a strong positive relationship between AI adoption and improved investment outcomes.

Regression Analysis

Multiple regression analysis was conducted to measure the impact of AI adoption on investment decision-making and risk management.

Model Summary:

- $R^2 = 0.64$
- Significance Level (p-value) < 0.05

This indicates that 64% of the variation in investment decision-making is explained by AI adoption, trust, and usage frequency.

Key Regression Findings:

- AI Adoption significantly influences investment decisions ($p < 0.05$)
- Trust significantly predicts usage frequency ($p < 0.01$)
- AI usage significantly improves risk management ($p < 0.05$)

Demographic Profile of Respondents

- The majority of respondents were aged between 25 and 40 years.
- Most respondents possessed postgraduate qualifications.
- A significant percentage had 3–7 years of stock market experience.
- More than 65% reported using AI-based trading platforms.

This indicates that educated and financially aware corporate employees are more inclined toward AI adoption.

Behavioural Impact Analysis

The study identified key behavioural changes among AI users:

- Reduced emotional trading
- Increased analytical decision-making
- Better stop-loss management
- Improved portfolio diversification
- Higher financial confidence

However, 12% of respondents showed slight overreliance on AI recommendations.

Conclusion:

The current study looked at how business workers in Andhra Pradesh used artificial intelligence (AI) algorithms to predict the stock market. The results show that investors' perceived accuracy, risk management skills, and ability to make investment decisions are all greatly improved by AI-based prediction tools. Both awareness and adoption of AI technologies, as well as trust in AI systems and usage frequency, were found to be strongly positively correlated. In order to support data-driven and less emotionally biased investment decisions, corporate employees are depending more and more on machine learning and deep learning-based platforms.

The study also shows how AI-driven systems perform better than conventional statistical models in terms of speed, flexibility, and capacity to handle massive amounts of both organised and unstructured data. Nonetheless, problems including an excessive dependence on automated suggestions, issues with data quality, and market volatility continue to be significant obstacles. To guarantee accountability, transparency, and investor safety in AI-based trading settings, regulatory oversight by organisations like the Securities and Exchange Board of India is crucial.

All things considered, the study comes to the conclusion that AI algorithms are a revolutionary advancement in intelligent financial forecasting. AI-based stock prediction tools can greatly increase financial performance and business personnel's educated investment behaviour when they are backed by appropriate knowledge, ethical governance, and efficient risk management techniques.



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