

Predicting Stock Prices Using Artificial Intelligence

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Abstract:

The quick evolution of financial markets has increased the complexity of predicting stock prices, which makes traditional methods less effective. In this context, artificial intelligence and machine learning techniques have emerged as powerful tools and alternatives for financial prediction. This study examines the effectiveness of AI-based models in forecasting stock prices compared to traditional statistical approaches. Using historical stock market data collected from reliable and verified financial databases, this research applies quantitative methods to analyze patterns, relationships and directions within the data. Machine learning algorithms are also used to identify hidden structures that are often missed by traditional models.

The findings suggest that AI-based models can improve prediction accuracy in today's world, but under certain conditions especially when large datasets are available. However, results also highlight some limitations related to market volatility, trends and the unpredictability of external factors. The study shows that AI should be used as a complementary tool rather than a replacement for traditional financial analysis. These findings provide valuable insights, especially for investors and financial analysts who are seeking to improve their decision-making amidst uncertain market factors..

Keywords:

Artificial intelligence, stock price prediction, machine learning, financial markets, forecasting accuracy.

Introduction: "The What & Why"

Financial markets in today's world have become increasingly complex and highly sensitive to economic news and global events, especially disruptions.

As a result, predicting stock prices has become one of the most challenging problems in the financial world. Traditional methods based on historical averages and statistical calculations struggle to capture the dynamic behavior of stock markets.

However, AI is capable of transforming how financial data is analyzed and how investment decisions are supported.

As previously mentioned, stock prices are highly influenced by a wide range of factors including macroeconomic indicators, market expectations and investor patterns.

Artificial intelligence, specifically machine learning techniques, offers a data-driven approach that can automatically understand and learn complex patterns from large datasets without needing prior assumptions about the relationship between variables.

By analyzing historical price series from the past few years and related financial indicators, AI systems are able to detect hidden structures that cannot be seen by the human eye and are difficult to identify using traditional methods.

AI-based prediction models have attracted significant attention from researchers, financial institutions and investors who seek to improve their accuracy and enhance decision-making under uncertainty. Despite these promising recent developments (BEAINY & KAMEL, 2023), the application of AI to stock price prediction raises important questions. The results must be carefully evaluated in terms of reliability and real-world usefulness.

It remains necessary to examine whether these advanced algorithms can consistently outperform traditional approaches when applied to real market data, particularly in emerging financial environments.

Therefore, this study aims to investigate the effectiveness of artificial intelligence techniques in predicting stock prices and to assess whether their practical value for financial analysis is beneficial. The central research question of this project is whether AI-based models can improve the accuracy of stock price forecasts compared to traditional statistical approaches, and to what extent such models can contribute to better understanding of the market behavior in today's world.

Literature Review: "The story so far "

Theoretical framework

A- Efficient Market Hypothesis (EMH)

According to Fama (1970), financial markets are efficient which means that all available information is already reflected in the stock prices.

This suggests that predicting stock prices is extremely difficult. However, the emergence and integration of AI challenges Fama's theory by proposing that hidden patterns may still exist within large datasets.

B- Machine learning in finance

Machine learning is a subset of artificial intelligence that enables systems to learn from data by improving their performance over time without explicit programming. Studies such as Chen et al. (2015) show that machine learning can outperform traditional statistical models in predicting stock

prices and trends due to its ability to process large volumes of data and identify nonlinear relationships.

C- Behavioral finance perspective

Behavioral finance suggests that investor behavior and psychological factors available can influence market prices (Shiller, 2003).

AI models can incorporate behavioral indicators, allowing for more comprehensive and realistic predictions compared to traditional models that rely only on numerical data.

Previous studies

Previous research has explored the effectiveness of AI in financial forecasting and predicting stock prices. For example, Zhang et al. (2017) found that neural networks can improve the prediction accuracy compared to linear regression models.

However, other studies have highlighted many limitations. Kim (2003) stated that machine learning models may suffer from overfitting, which may reduce their effectiveness in real-world applications. Moreover, since volatility and unexpected global events remain very difficult to predict (KHALIFE ET AL., 2024), we may miss market trends even with advanced algorithms.

These challenges show that AI models are not always useful in all market conditions and trends.

Furthermore, recent studies have shown the importance of combining AI with traditional financial analysis to improve the overall performance of portfolios.

This hybrid approach allows researchers to fully benefit from both data-driven insights and economic fundamentals.

This study contributes by comparing the AI-based models with the traditional approaches and techniques and evaluating their usefulness in modern financial markets.

Methodology: "The how we did it "

For this study, data was collected from public financial sources, such as Yahoo Finance, covering the period of 2015-2025. This dataset includes daily stock prices, trading volumes, trends and different financial indicators.

To analyze stock price behavior and evaluate prediction models, this research adopts a quantitative approach.

Data processing and analysis were conducted using Python, which is a widely used programming for financial analytics.

This study utilizes both traditional statistical methods and AI-based models. Mean, standard deviation and variance were all used to understand the basic characteristics of the data. Moreover, correlation analysis was applied to examine the relationships between variables.

Machine learning models, such as linear regression and artificial neural networks were implemented for prediction purposes.

These models were trained using the historical data and tested on unseen data to evaluate their accuracy.

Model performance was assessed using standard evaluation metrics and prediction accuracy. Finally, a comparison was made between traditional models and AI-based models to determine their effectiveness.

Results: "The facts "

Table 1: comparison between the performance of traditional statistical models and artificial intelligence-based models at predicting stock prices

Model	Mean Squared Error	Accuracy	Model
Linear Regression	0.025	68%	Linear Regression
Neural Network	0.012	82%	Neural Network

Note: Predicting Stock Prices Using Artificial Intelligence 2026

The results indicate that AI-based models outperform traditional statistical methods at predicting stock prices in the market. The artificial neural network model achieved a lower mean squared error and higher accuracy compared to linear regression.

Additionally, the results show that AI models are more effective at capturing nonlinear patterns in the available data.

However, prediction accuracy decreases during periods of market volatility, which highlights the limitations of AI models in uncertain conditions

Discussion and conclusion: "The so what ? "

In conclusion this study examined the effectiveness of artificial intelligence techniques in predicting stock prices compared to traditional statistical methods.

The findings suggest that AI-based models, particularly machine learning algorithms, provide better accuracy and better capture the complexity of the market patterns.

However, the results also confirmed that AI models are not perfect.

Their performance can be easily affected by data quality and sudden market changes, such as global events and trends.

Therefore, AI should not be considered a replacement for traditional financial analysis but rather a complementary and helpful tool for financial analysts and investors.

Key conclusions include:

- 1- AI models can outperform traditional methods in prediction accuracy.
- 2- Machine learning techniques are effective in identifying complex nonlinear patterns.
- 3- Market volatility is a major challenge for all prediction models in the stock market.
- 4- AI models should be used as a complementary tool for better decision-making.

For investors and financial analysts, these findings highlight the importance of combining AI technologies with traditional tools.

Future research could focus on combining real-time data and macroeconomic indicators to further improve prediction models.

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