

# Machine Learning-based Stock Market Price Prediction

Ashish Awate<sup>1</sup>, G.K. Kale<sup>2</sup>, Aaisha Pinjari<sup>3</sup>, Prajakta Baviskar<sup>4</sup> and Divya Desale<sup>5</sup>

<sup>1-5</sup>SVKM's Institute of Technology, Dhule, India.

Email: ashish.awate@svkm.ac.in, gkkale15@gmail.com, aaishapinjari2406@gmail.com, prajaktab1442003@gmail.com, divyadesale985@gmail.com

**Abstract**— Prediction of stock market price is a difficult and complex endeavour since stock prices are very unpredictable and change regularly. To make educated judgments, investors and businesses require precise forecasts. However, it is still quite challenging to use extracted criteria to forecast future stock values with high accuracy. Traditional strategies sometimes fail to appropriately meet the market's changing nature. In this research, we offer a system that uses machine learning methods like ARIMA, Linear Regression and LSTM networks to enhance accuracy in stock prices prediction. By combining these techniques, our strategy seeks to meet the needs of a constantly changing commercial and industrial environment while improving the accuracy and reliability of stock market predictions.

**Index Terms**— Stock market, Machine learning algorithm, Company Stock Prediction, Accuracy, LSTM, ARIMA.

## I. INTRODUCTION

The stock market has long fascinated investors and academics because of its complexity, volatility, and quick change, all of which make it challenging to make accurate predictions. The technique of predicting the future worth of stock in a company or financial instrument listed on a stock exchange is referred to as stock market forecasting. Accurate predictions can yield significant profits. Machine learning approaches suggest that price increases not based on newly revealed data are intrinsically unexpected since stock prices represent all available information. However, investors employ various tools and techniques to interpret future expenses. Forecasting stock prices is difficult due to the global stock market's inherent volatility and factors such as announcements, quarterly results, irrational and rational behaviours. Machine learning techniques uncover patterns and insights that traditional calculations may overlook, enabling precise forecasts.

## II. LITERATURE REVIEW

Stock market research remains crucial due to its non-linear and volatile nature. Investors use forecasts to make decisions aiming to maximize profits while minimizing risks. Traditional methods like technical and fundamental analysis often lack predictive reliability.

Studies have shown:

- ANN and RF models effectively predict stock closing prices, with ANN yielding lower error values [1].
- Combining different ML methodologies can enhance prediction accuracy [2].
- Random Forest outperforms logistic regression in variance scores and mean absolute errors [4].
- Hybrid CNN-RNN architectures in deep learning show promise for stock prediction [6].

Although machine learning approaches have potential, no single strategy produces consistently accurate predictions. Hybrid approaches can mitigate individual drawbacks, but complexity and generalizability remain challenges.

### III. METHODOLOGY

#### A. LSTM

Long Short-Term Memory (LSTM) models are advanced data mining methods for deciphering intricate patterns in unstructured data. An LSTM network comprises units with a cell state, input gate, forget gate, and output gate to incorporate aspects like past stock prices and market indicators efficiently.

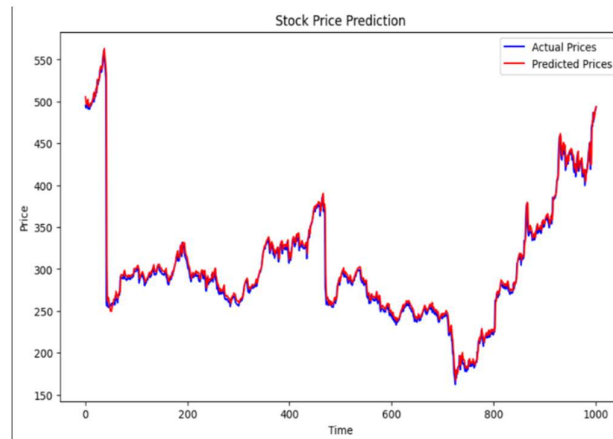


Fig. 1. LSTM Model Stock Price Prediction Results

#### B. ARIMA

The ARIMA model, introduced by Box and Jenkins (1970), uses time series data for forecasting finances. It produces accurate short-term forecasts by modelling a variable's future value as a linear combination of its past values and errors.

Benefits: Strong financial time series forecasting with low standard error.

Drawbacks: Suitable only for short-term forecasts.

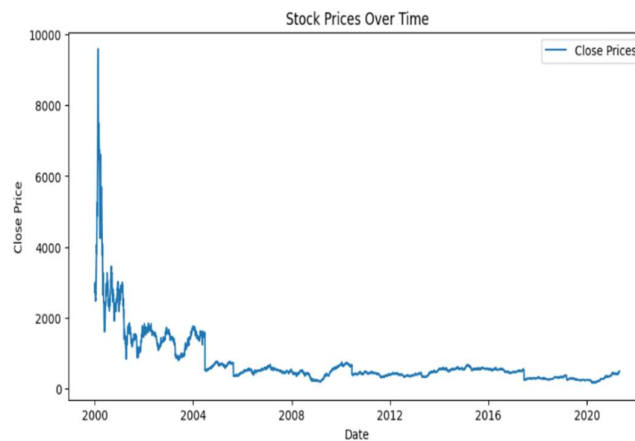


Fig. 2. ARIMA Model Stock Price Prediction Results

#### C. Linear Regression

Linear regression models the relationship between independent and dependent variables to predict stock prices. Previous research has demonstrated accuracy improvements up to 85% using ensemble regression techniques and candlestick pattern identification.

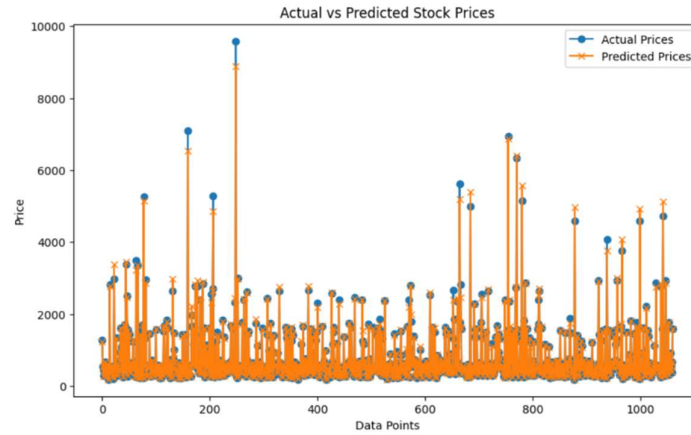


Fig. 3. LINEAR REGRESSION Model Stock Price Prediction Results

The dataset used for this research includes historical stock data obtained from Yahoo Finance. Table II summarises the dataset details used for model training and prediction.

TABLE I. DATASET SUMMARY

| Company   | Data Range          | Records | Features Used                  |
|-----------|---------------------|---------|--------------------------------|
| Wipro     | Jan 2010 – Dec 2023 | ~3500   | Open, High, Low, Close, Volume |
| Apple     | Jan 2010 – Dec 2023 | ~3500   | Open, High, Low, Close, Volume |
| Amazon    | Jan 2010 – Dec 2023 | ~3500   | Open, High, Low, Close, Volume |
| Microsoft | Jan 2010 – Dec 2023 | ~3500   | Open, High, Low, Close, Volume |
| Google    | Jan 2010 – Dec 2023 | ~3500   | Open, High, Low, Close, Volume |

#### IV. CONCLUSION AND FUTURE SCOPE

Machine learning has significantly enhanced the speed and precision of stock market predictions through algorithms that analyse complex datasets. Incorporating sentiment analysis adds further insights by studying the impact of news headlines and social media on stock performance. This study explored linear regression, ARIMA, and LSTM models using historical data from platforms like Yahoo Finance.

While LSTM is a suitable choice for short-term forecasts, financial markets remain unpredictable, indicating the need for continuous improvements and hybrid model experimentation to achieve robust predictive systems.

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