Stock Price Prediction Using Machine Learning in Aramco Market

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Abstract

Accurate stock price predictions are crucial for improving investment strategies and managing risk. This project aims to study and analyze the stock prices of Saudi Aramco using machine learning techniques, particularly Long Short-Term Memory (LSTM) networks, which are effective in handling time series data. Historical stock data was collected, and a set of financial indicators and analytical techniques were used to build a predictive model. The results demonstrated a reasonable accuracy in predicting stock prices, emphasizing the importance of applying machine learning in financial analysis.

Keywords: Stock price prediction, machine learning, LSTM, time series data, Aramco

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1 Introduction

Stock price prediction has become an essential part of financial research as accurate predictions can help investors make better decisions and achieve higher returns. This project focuses on analyzing the stock prices of Saudi Aramco using machine learning techniques to predict future prices based on historical data. Stock markets are complex and volatile, making predictive algorithms a powerful tool to provide accurate insights to investors. The main goal of this research is to explore and apply an efficient machine learning model for predicting Saudi Aramco stock prices.

2 Background

Machine learning techniques have proven to be a powerful tool for analyzing financial data, particularly time series data. These techniques rely on advanced models such as Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM) networks, which have demonstrated their efficiency in handling sequential data such as stock prices. Additionally, financial indicators and historical data such as daily prices and trading volumes play a significant role in improving the accuracy of predictive models.

3 Methodology

3.1 Data Collection

Historical stock data of Saudi Aramco was obtained from reliable sources such as the Saudi Open Data Platform and Saudi Aramco. The data includes opening and closing prices, highest and lowest prices, and trading volume

3.2 Data Preprocessing

Before training the model, the data was cleaned by removing any missing or outlier values that could affect the prediction accuracy. The time series data was then formatted in a way that the model could handle.

3.3 Model Selection

The LSTM model was selected for its ability to retain long-term temporal dependencies and analyze time patterns effectively. LSTM is a type of Recurrent Neural Network that excels at handling sequential data with long-term dependencies.

3.4 Model Building

The model was trained using the historical stock price data. The architecture consisted of multiple LSTM layers with fully connected layers at the end, utilizing the ReLU activation function to enhance performance.

3.5 Model Evaluation

The data was split into training and testing sets. Performance metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) were used to evaluate the model's performance.

4 Results

After training the model, it showed promising results in predicting Saudi Aramco stock prices based on historical data. The Mean Absolute Error was relatively low, indicating high accuracy in the predictions. Additionally, the results showed that using LSTM allows the model to effectively understand time patterns, making it superior to traditional models.

figure

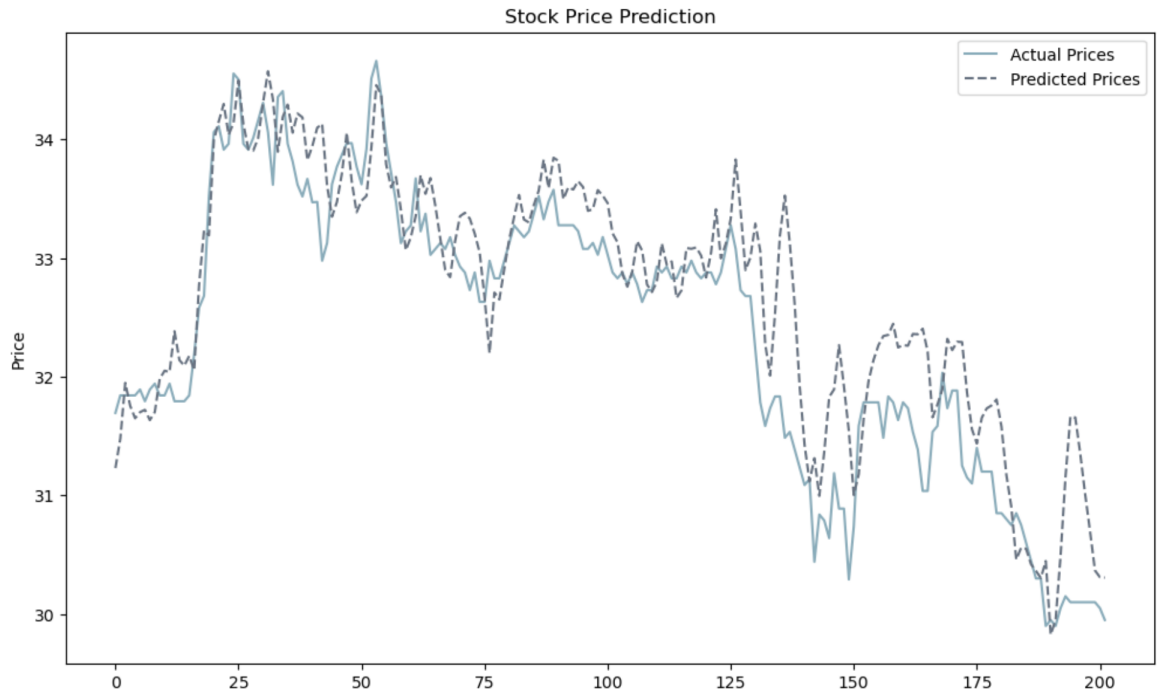

Figure 1: Stock Price Prediction: A visual representation of the predicted and actual stock prices of Saudi Aramco

5 Discussion

This project highlights the importance of using machine learning techniques in financial data analysis. Recurrent Neural Networks, specifically LSTM, are particularly suited for analyzing stock prices due to their ability to account for long-term temporal dependencies. However, some challenges should be considered, such as the heavy reliance on data quality and its coverage of market fluctuations.While the model showed promising results, further performance improvement can be achieved by adding more features such as external economic indicators and experimenting with other models.

6 Conclusion

This research demonstrates that machine learning techniques, particularly LSTM models, can be an effective tool for predicting stock prices. The positive results obtained in this research suggest the potential of using such models to enhance investment strategies and manage risks in financial markets.

7 References

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