Unlocking Safaricom's Future

Predicting the Stock Price of Kenya's Telecom Giant

Business Overview

Safaricom, Kenya's leading telecommunications provider, entered the public market in June 2008, marking a significant milestone in its growth journey. This presentation explores the company's dynamic history, from its IPO success to subsequent challenges and its resilience in the face of evolving market dynamics.

Through this comprehensive analysis, we aim to provide valuable insights for stakeholders, enabling strategic decision-making in the dynamic landscape of Safaricom's financial journey.

Problem Statement

- Safaricom's stock price movements are inherently unpredictable, posing a significant challenge for stakeholders. The complexities of market dynamics and external factors contribute to the uncertainty surrounding Safaricom's stock behavior.
- Our aim is to construct a predictive model that provides stakeholders with dependable forecasts of Safaricom's future stock prices.
- Through advanced time-series analysis, we seek to identify and leverage critical patterns in Safaricom's historical data to enhance the accuracy and reliability of our forecasting model.

Project Objectives and Success Criteria

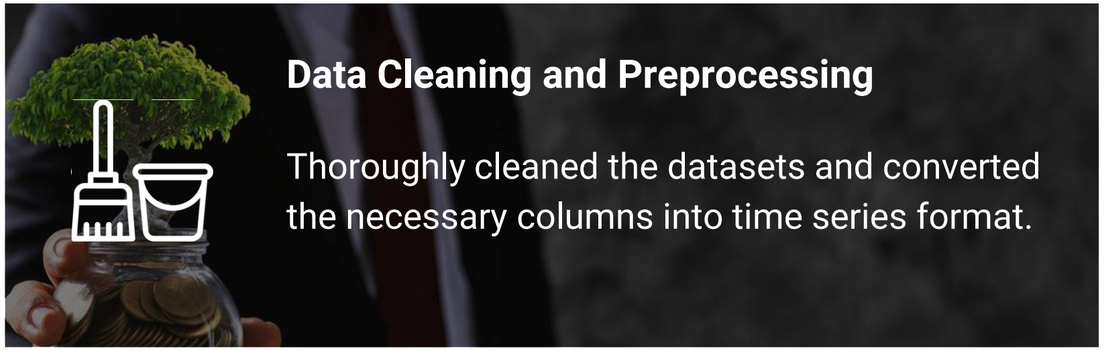
Objectives

- Determine optimal entry and exit points into Safaricom stocks for stakeholders by discerning whether to buy or sell based on prevailing market conditions.
- Integrate the analysis of macroeconomic factors and engineer key technical indicators and quantifying their influence on Safaricom stock prices.
- Conduct comparison analysis and assess how different combinations of macroeconomic factors and technical indicators affect the performance of stock price predictions and identify the factors that best contribute to accurate forecasting

Success Metric

- Root Mean Squared Error(RMSE) close to 0 to evaluate model efficiency

Our Process



Data Cleaning and Preprocessing

Thoroughly cleaned the datasets and converted the necessary columns into time series format.

Exploratory Data Analysis

Conducted some EDA to find any trends within the datasets and drew conclusions from these thereafter.

Modelling

We modeled using different time series models and used RMSE as our basis for model performance

Deployement

After selecting our best performing model, we carried out deployment.

Data Understanding

We used the following datasets in our project:

I. Historical Prices -

- Provides daily historical stock prices and volumes for each stock for a given period of time. The historical price trends are used to indicate the future direction of a stock.

II. Kenya gdp growth rate

- Expresses the difference between GDP values from one period to the next as a proportion of the GDP from the earlier period in percentage form and showing the dates.

III. Central bank interest rates

- Shows the interest rate at which Kenya's central bank charges other domestic banks to borrow funds. This rates changes based on the economic changes of our country.

IV. Dividend Yield

- Shows the financial ratio that tells us the percentage of Safaricom shares price that it pays out in dividends each year.

V. inflation rate

- This dataset measures the average change in prices of safaricom stock paid by customers over a period of time. It shows the percentage at which stock prices increase.

Data Preparation

1

CLEANING

We identified and addressed any missing data points through imputation or deletion based on the importance of the variables to our objectives

2

DATA INTEGRATION

We identified specific columns from each dataset relevant to our modelling and merged them into one dataset

3

FEATURE ENGINEERING

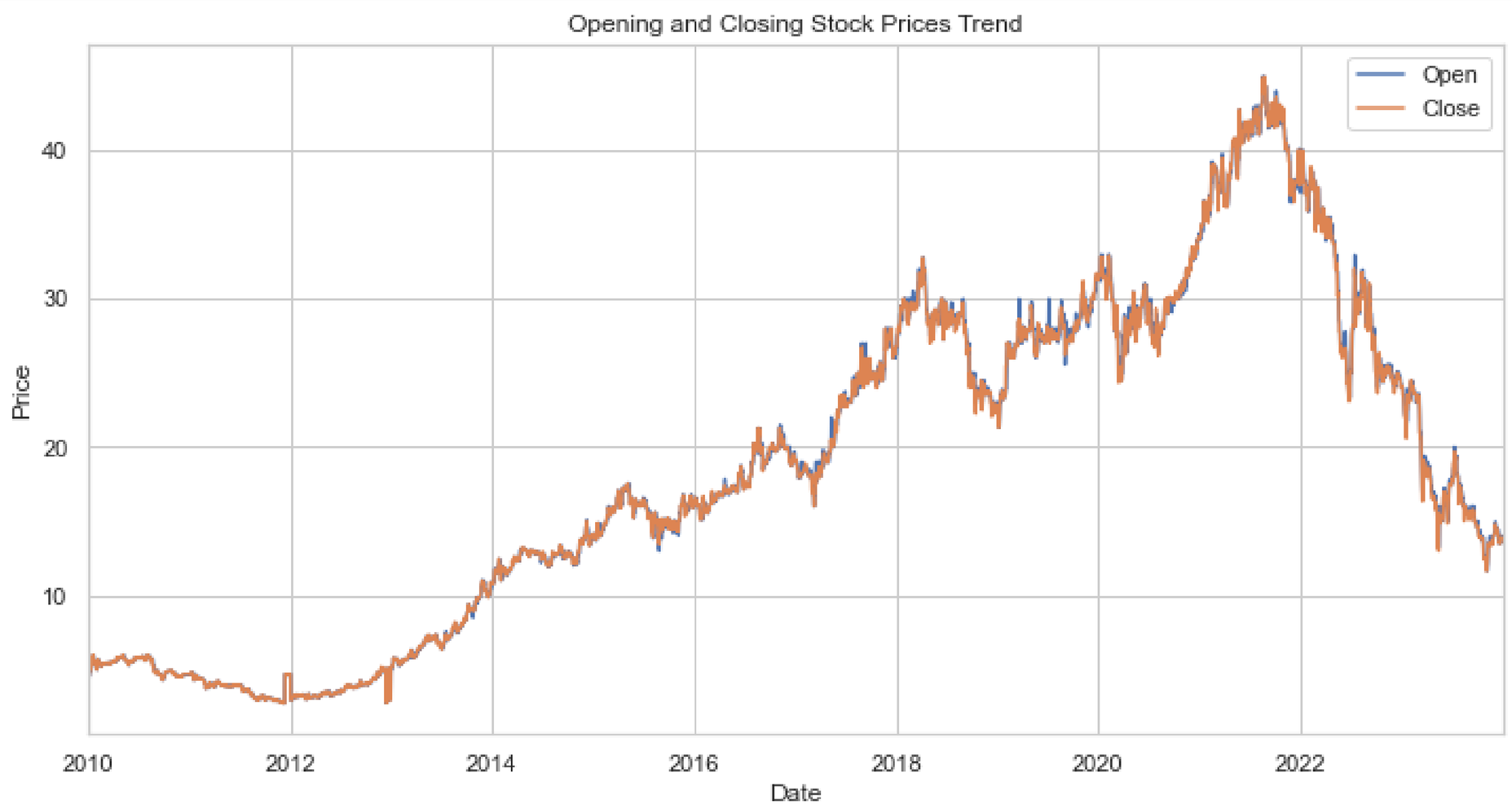
We engineered 2 technical indicators that is Relative Strength Index(RSI) and Moving Average Convergence/Divergence(MACD)

4

DATA TRANSFORMATION

We converted variables into appropriate formats e.g., date/time conversion, and scaled the data before splitting into train and test sets for modelling

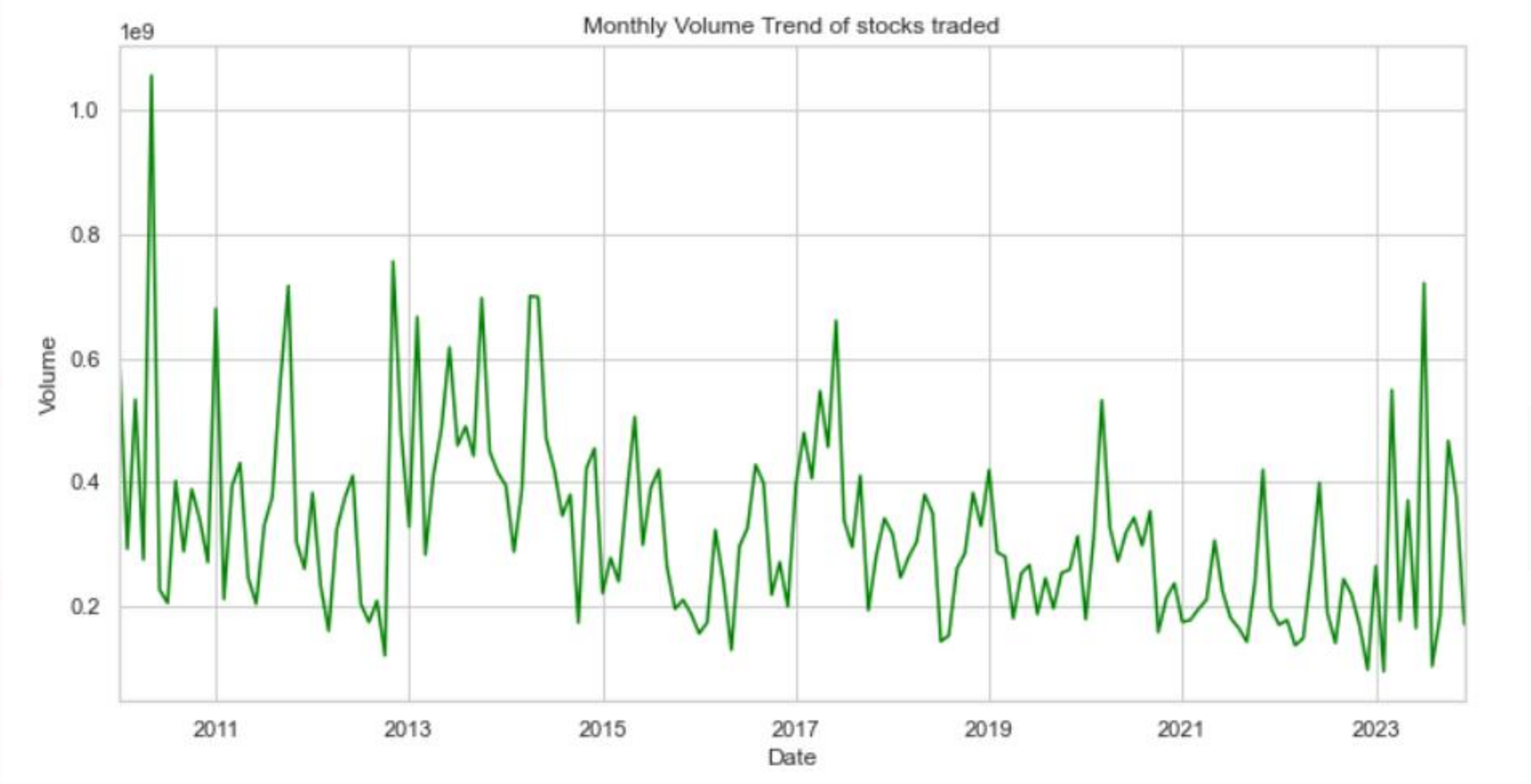
Exploratory Data Analysis



- The opening and closing stock prices exhibit a close proximity and display an exponentially rising trend from 2010 to 2022.
- Post-2022, there appears to be a struggle for a resurgence in the upward direction. This observation suggests a potential shift or change in the stock's performance dynamics during the latter period.

Exploratory Data Analysis

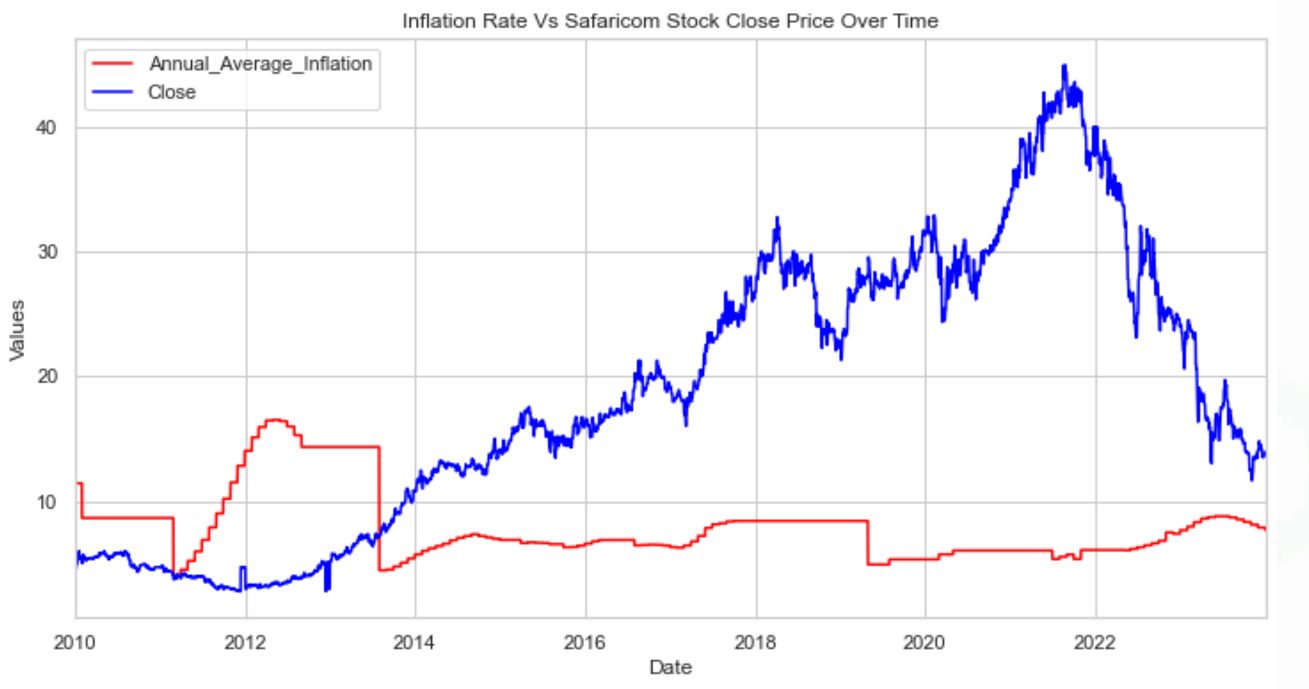
Trading Volumes

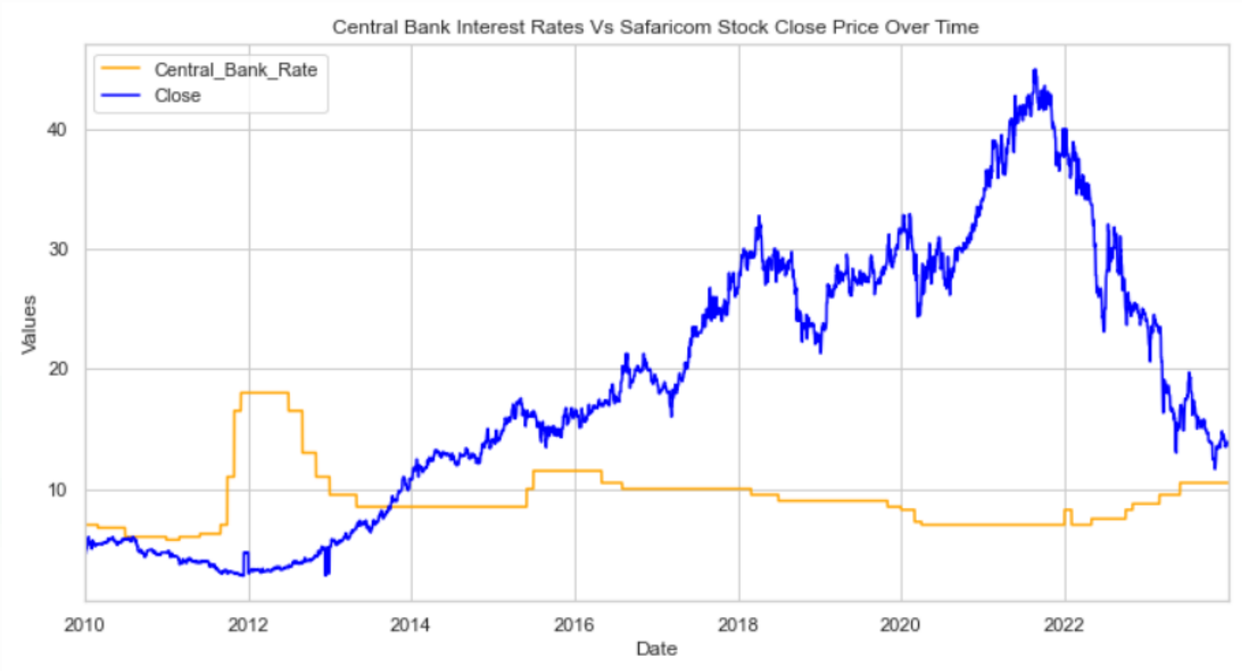


- Safaricom typically experiences high stock trading volumes at the start of the year. However, there has been a gradual decrease in the number of traded stocks over time.

Exploratory Data Analysis

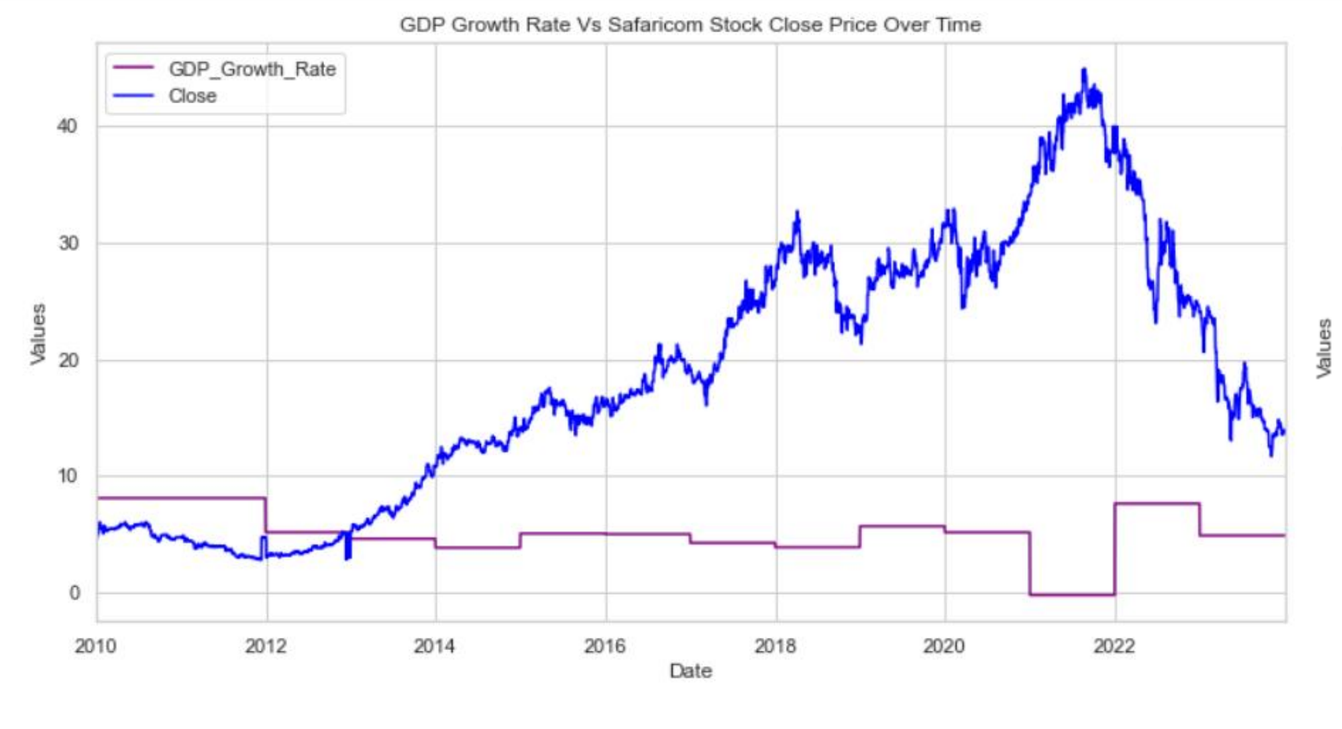
Inflation and Interest Rates

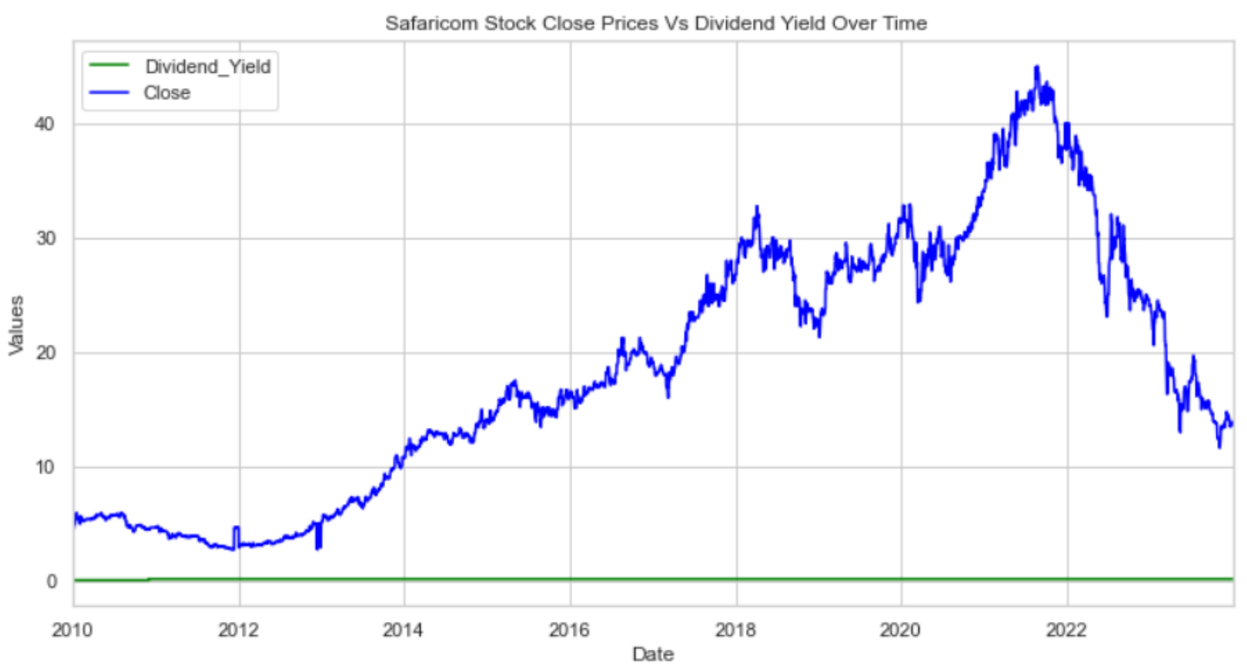




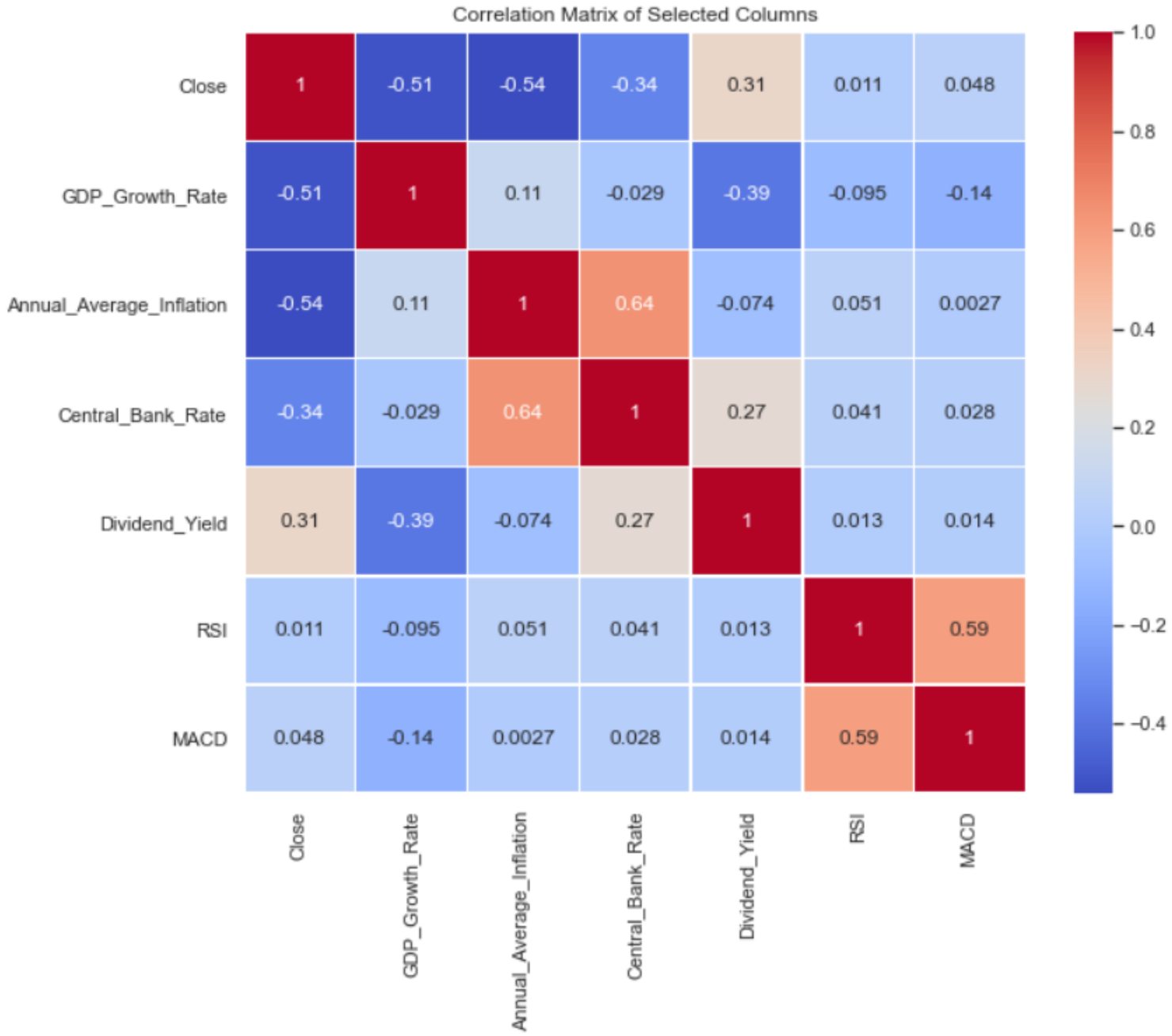
Exploratory Data Analysis

GDP and Dividends





Exploratory Data Analysis



Correlation

- The 'Close' price demonstrates a positive correlation with 'Dividend Yield' (0.31) and a negative correlation with 'GDP Growth Rate' (-0.51).
- 'Annual Average Inflation' and 'Central Bank Rate' exhibit a significant positive correlation (0.64)
- 'RSI' and 'MACD' show a moderate positive correlation (0.59). These insights provide valuable information for understanding potential interdependencies and trends within the dataset.

Our Findings

GDP Impact on Stock Prices

The correlation between Kenya's GDP growth and Safaricom's stock prices is not necessarily negative; rather, it appears to be influenced by various factors, leading to a complex relationship.

Interest Rate Dynamics

Interest rate fluctuations play a crucial role in shaping Safaricom's stock prices. Generally, rising interest rates may lead to higher borrowing costs for businesses, potentially impacting corporate profitability and, subsequently, stock prices.

Inflation's Influence

Inflation's impact on Safaricom's stock prices is nuanced. Moderate inflation can signify a healthy economy, boosting consumer confidence, while high inflation might erode purchasing power, affecting consumer spending and corporate performance.

Interplay of Economic Indicators

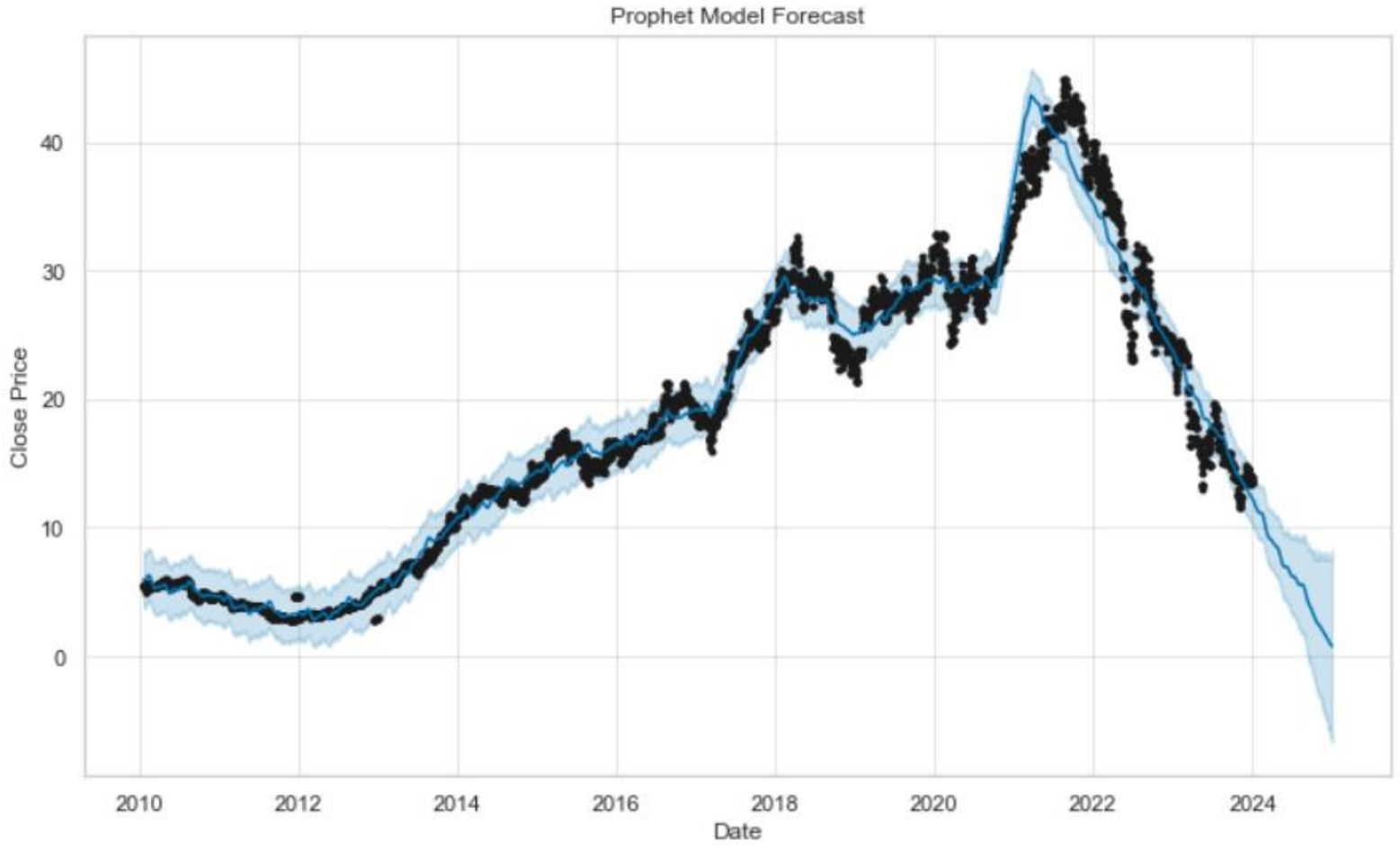
The interdependence of GDP, interest rates, and inflation collectively shapes the environment for Safaricom's stock prices. A comprehensive analysis, considering these economic indicators together, provides a more accurate understanding of the broader economic landscape influencing stock market trends.

RMSE : 1.600005

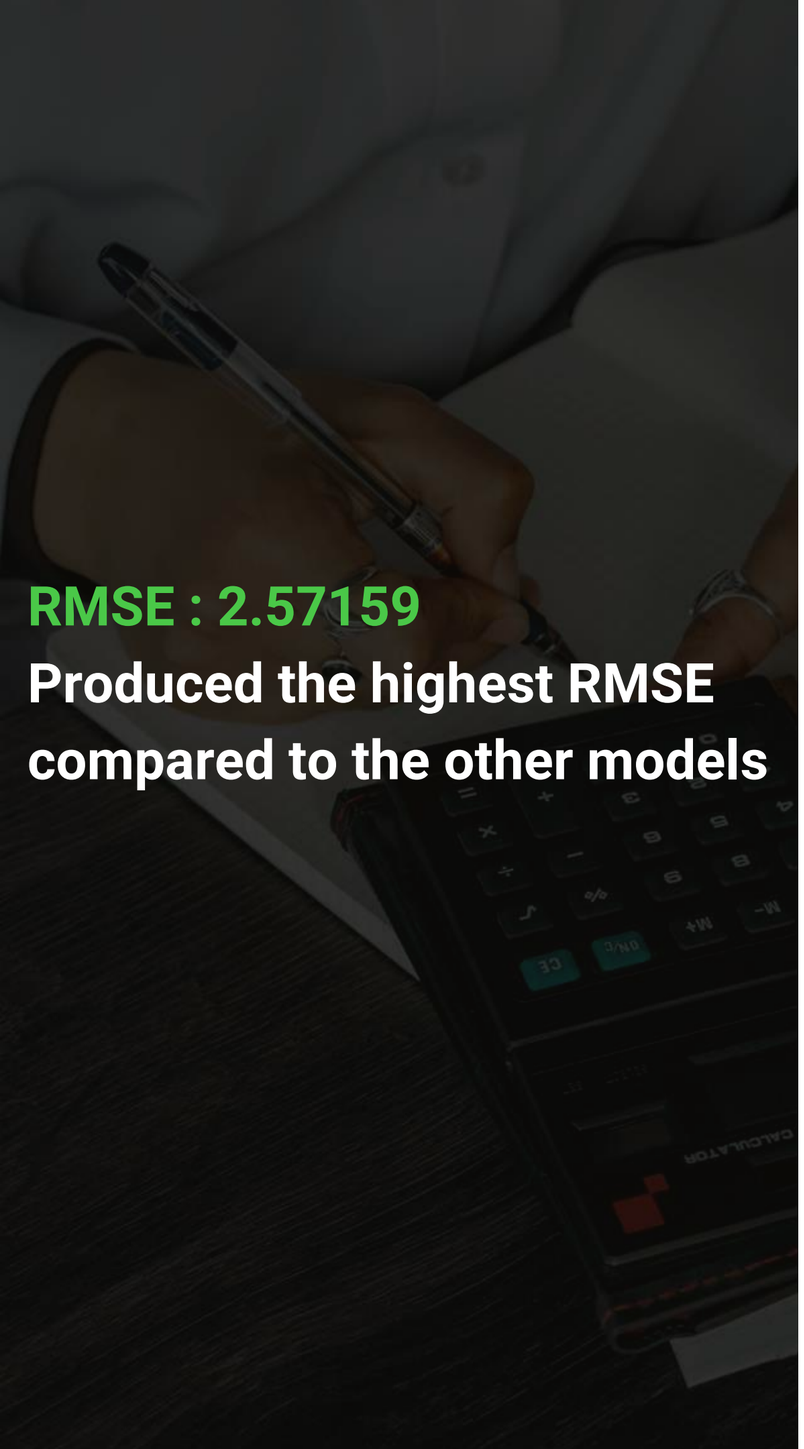
Produced the high RMSE

Modelling

Facebook Prophet Model

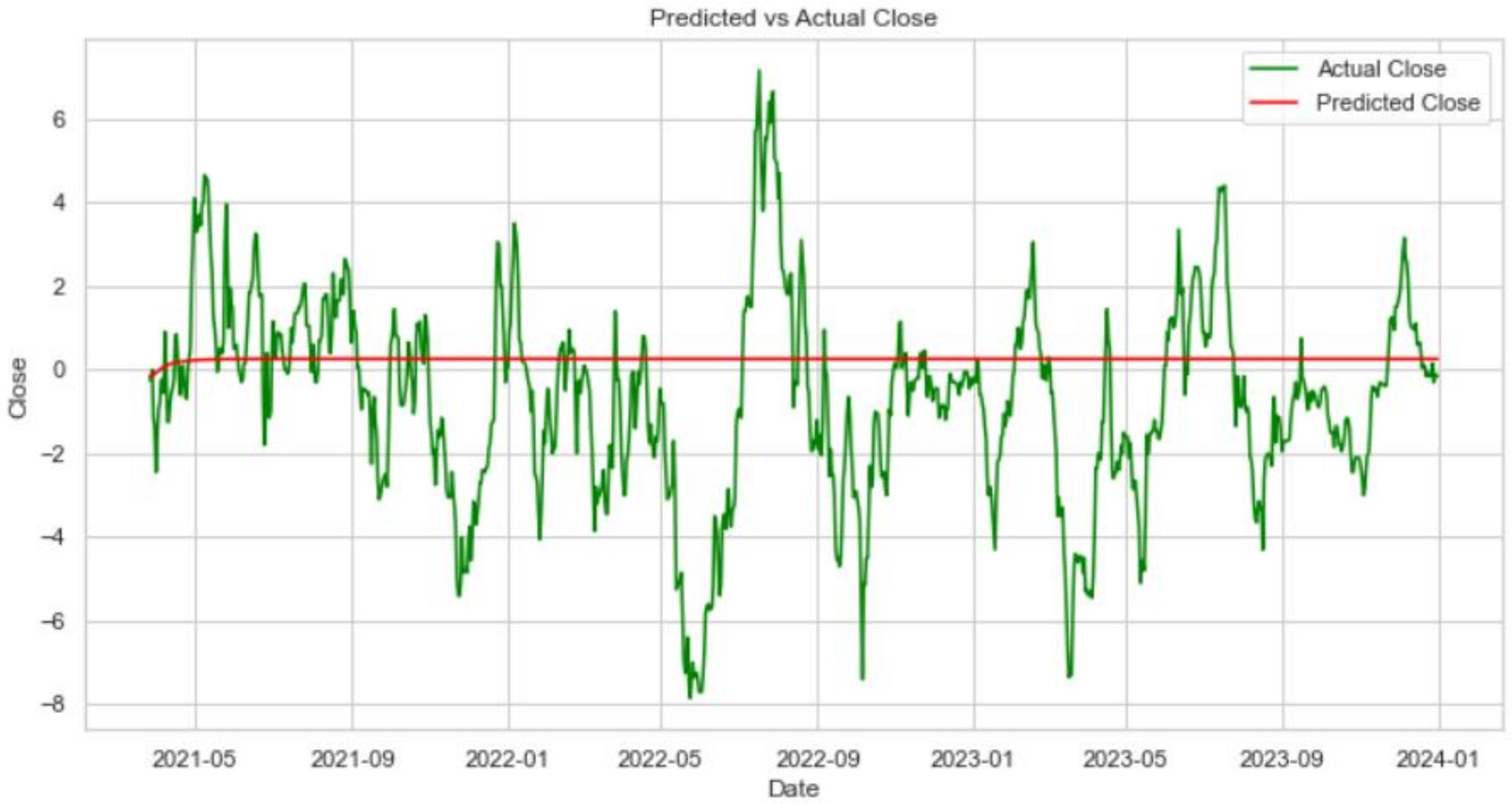


Vector AutoRegression Model



RMSE : 2.57159

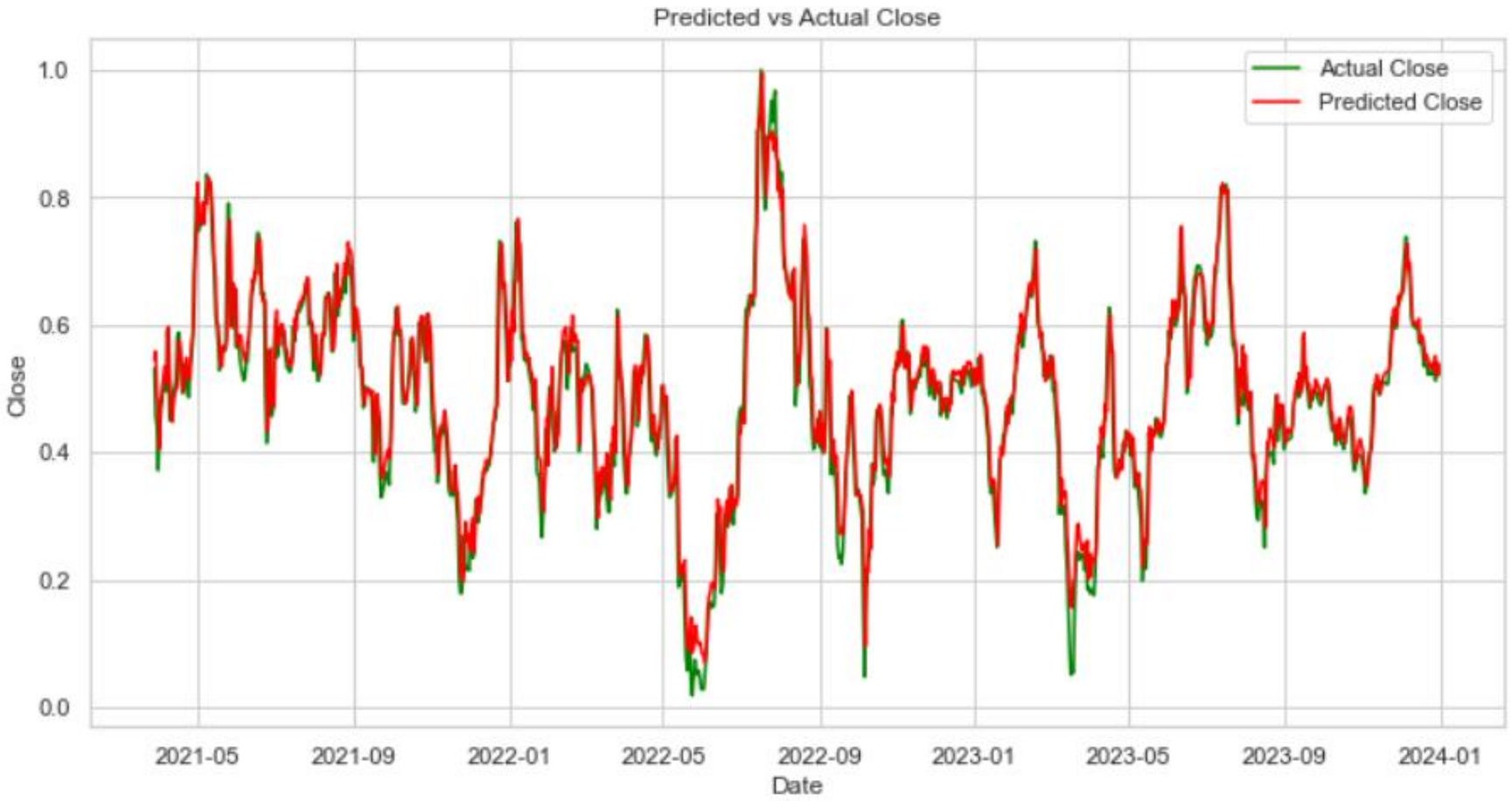
Produced the highest RMSE compared to the other models



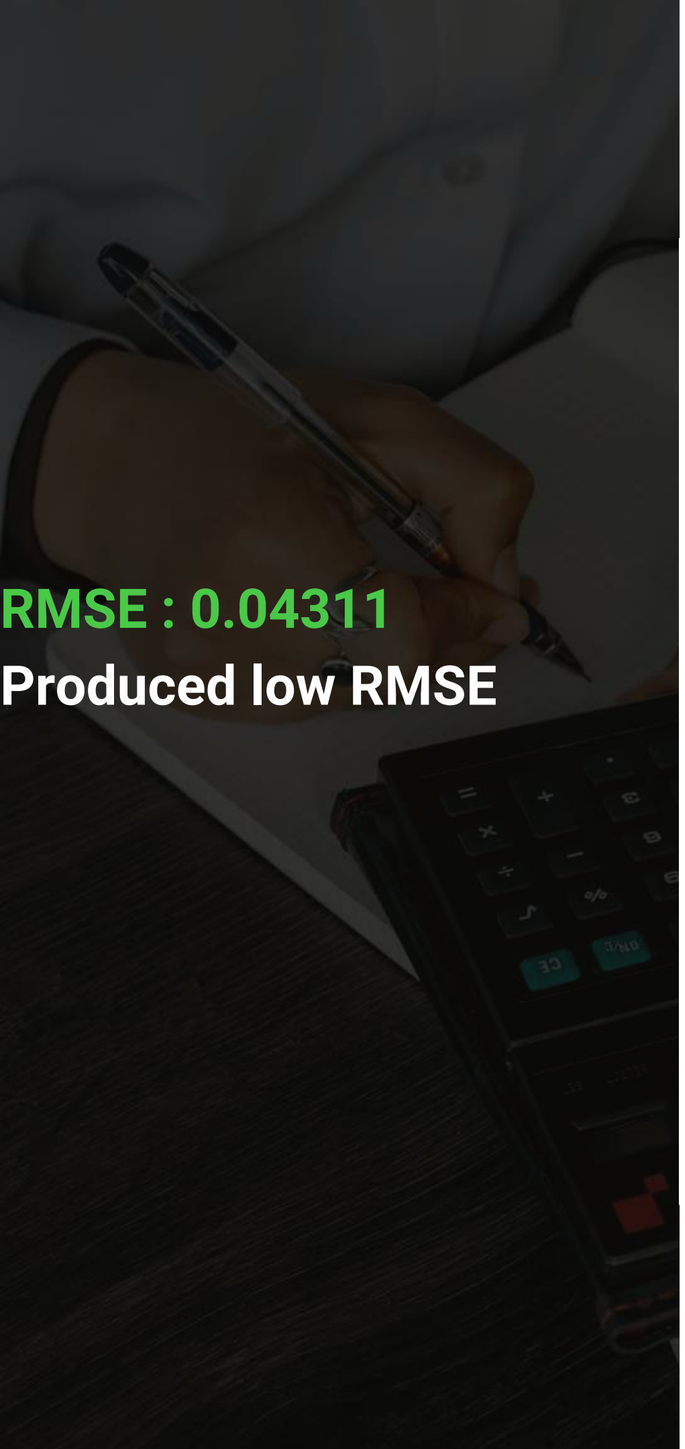
RNN Model

RMSE : 0.052445

Produced low RMSE

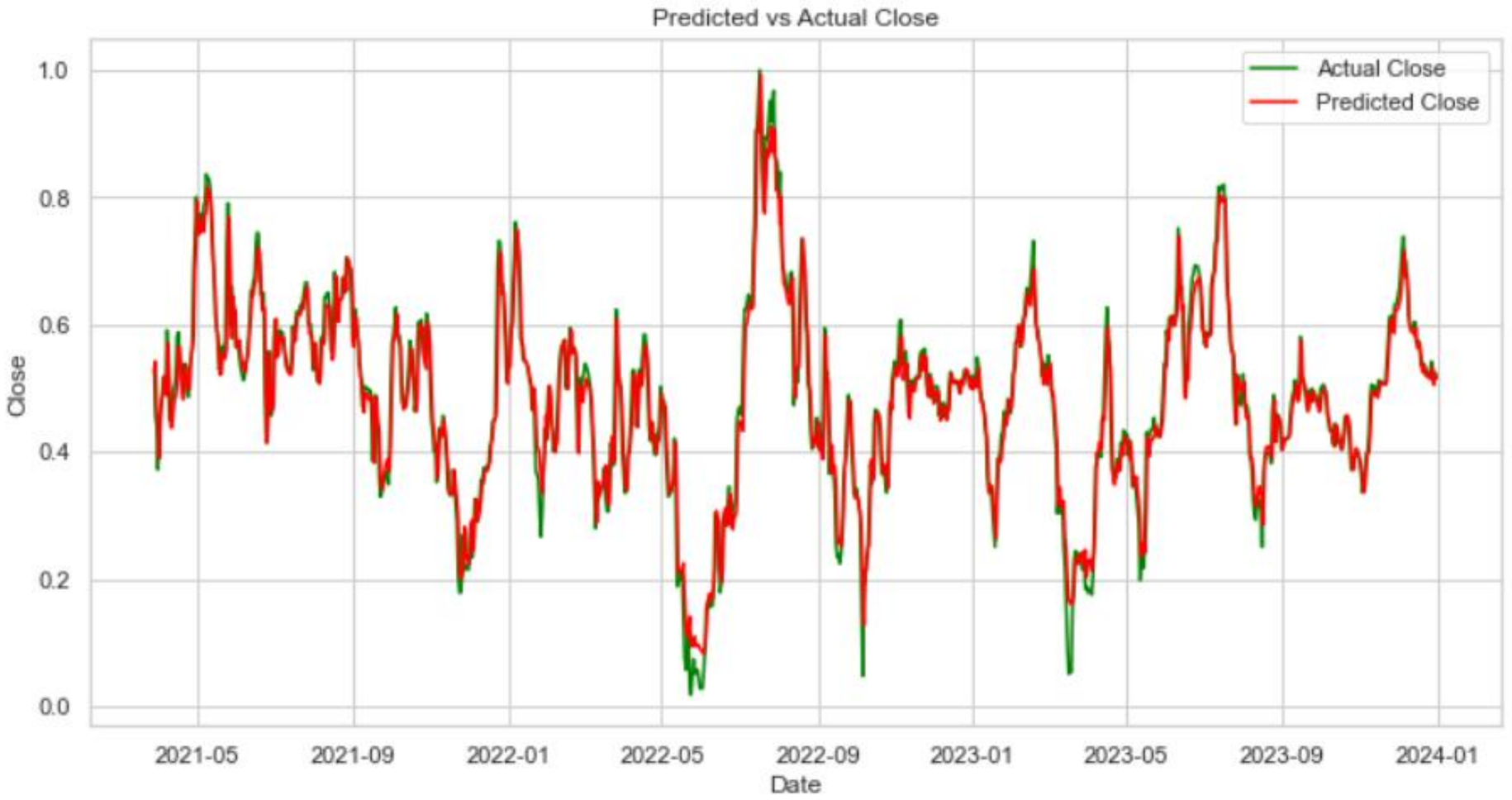


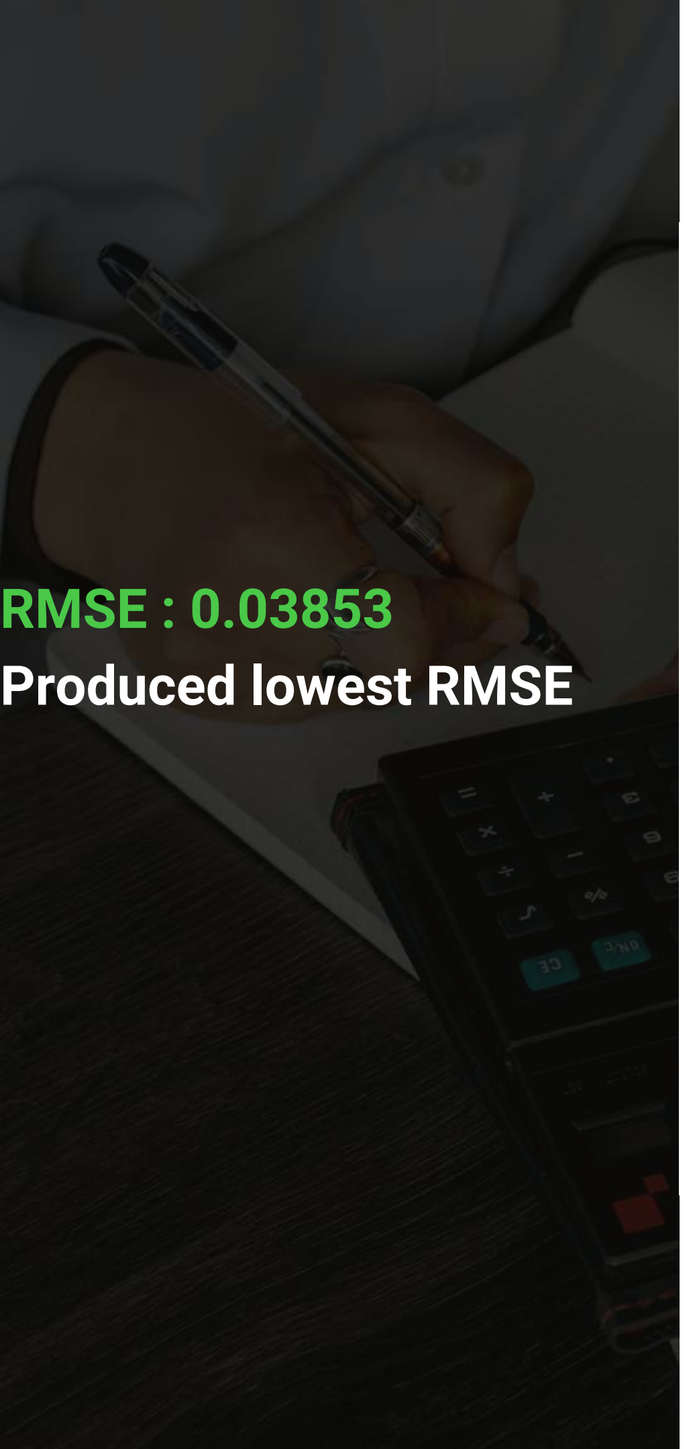
GRU Model



RMSE : 0.04311

Produced low RMSE

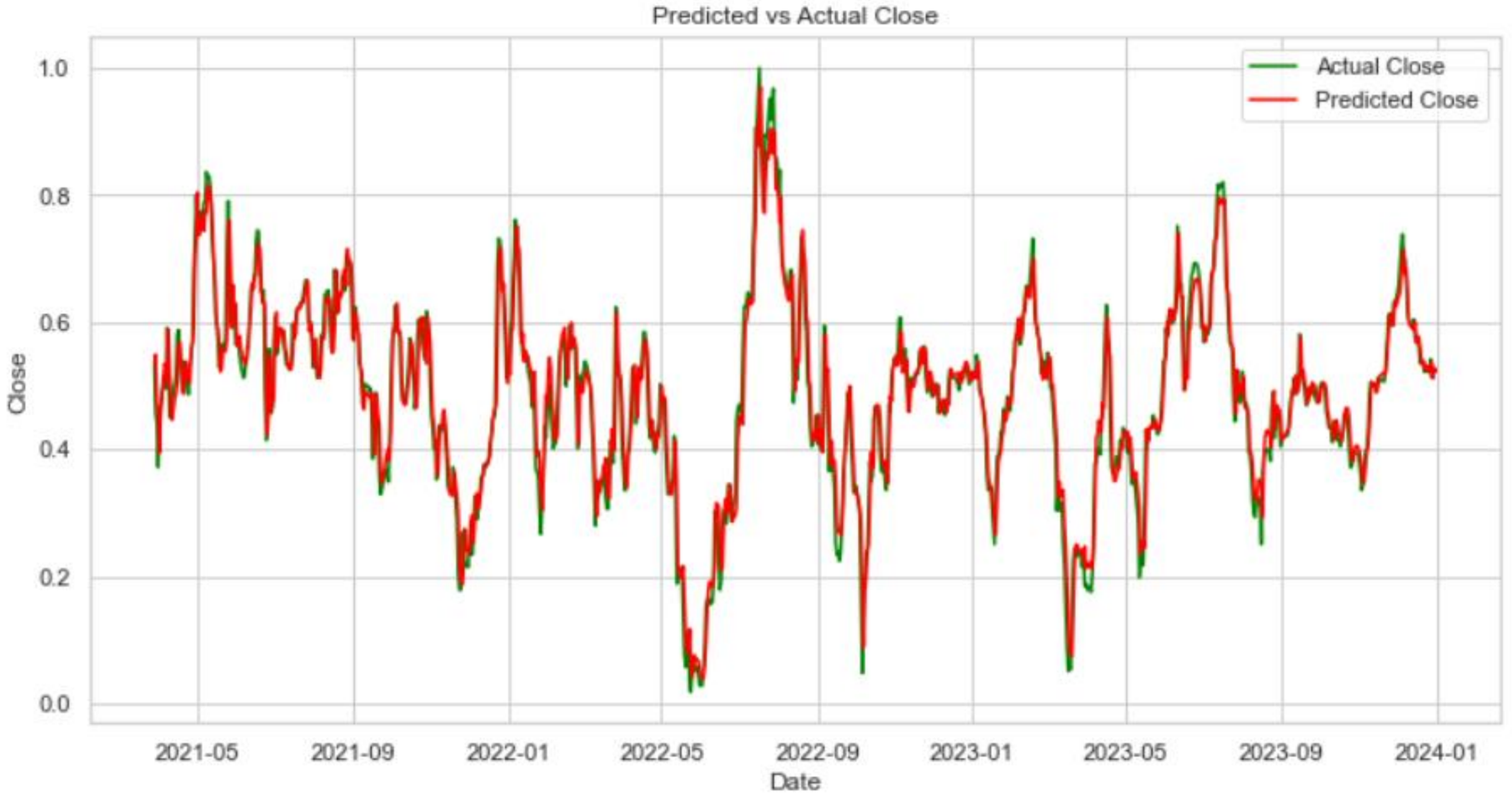




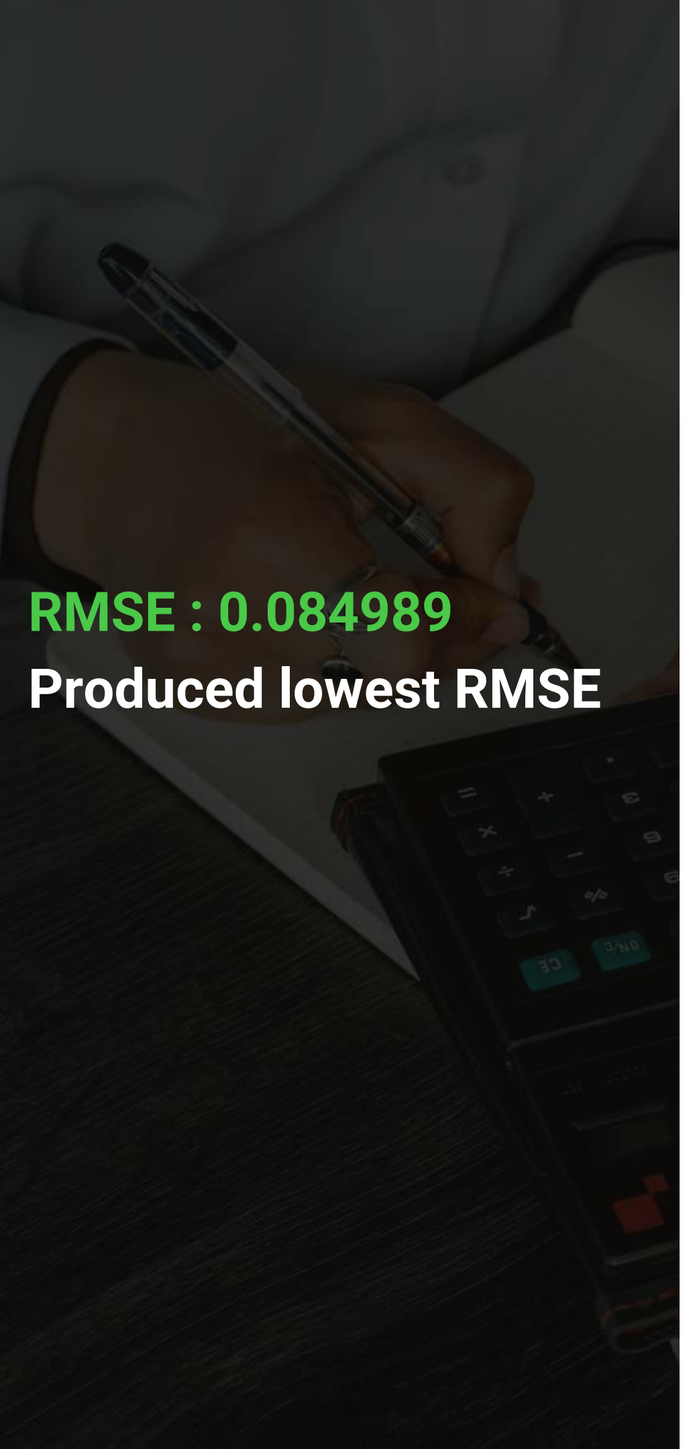
LSTM Model

RMSE : 0.03853

Produced lowest RMSE

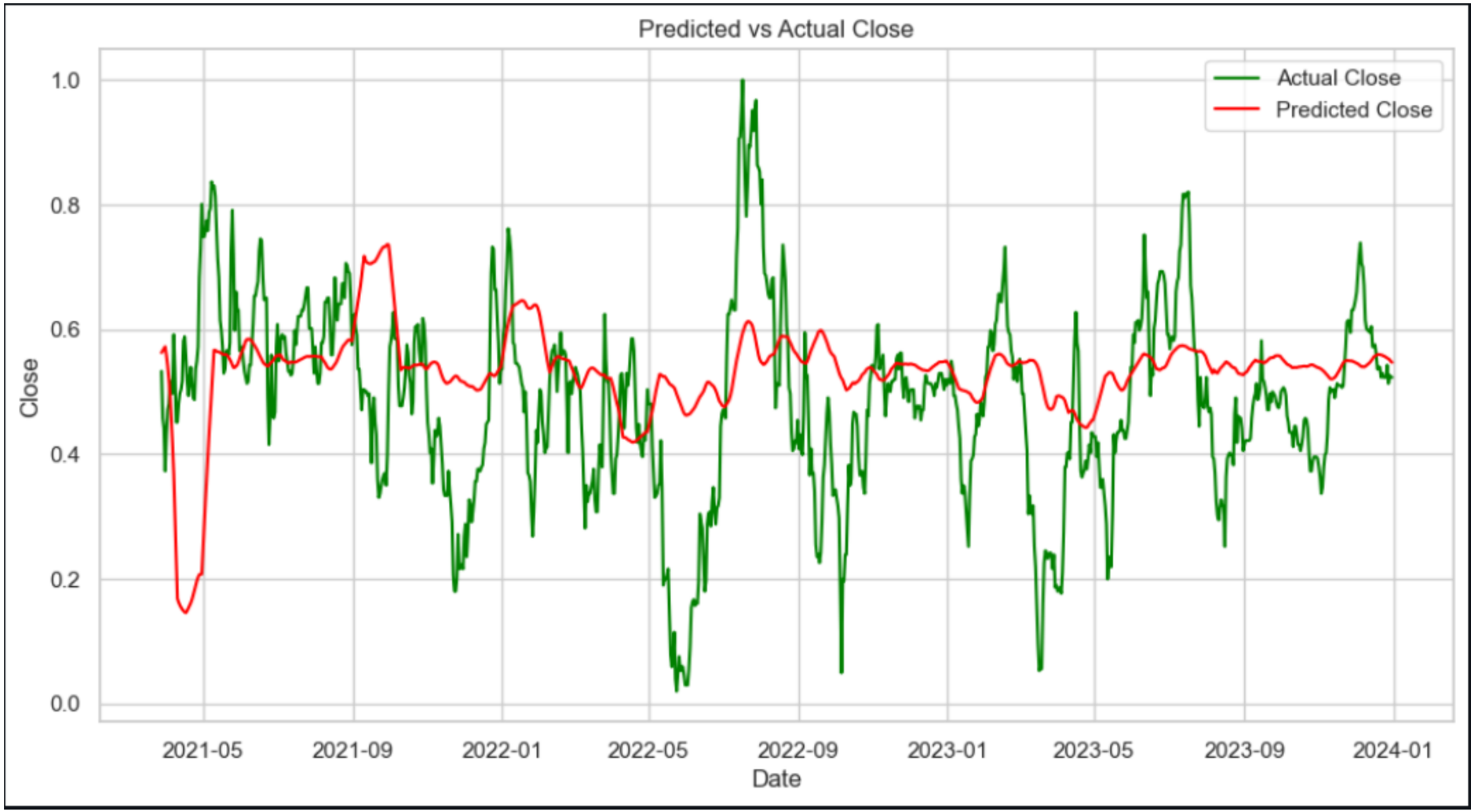


LSTM - Attention



RMSE : 0.084989

Produced lowest RMSE



Conclusion

Understanding opportune times to buy and sell Safaricom Stocks:

- SCOM stocks have experienced a downturn in prices since 2022
- This can be attributed to factors such as management changes and the country's economic slowdown that decreased trading activity

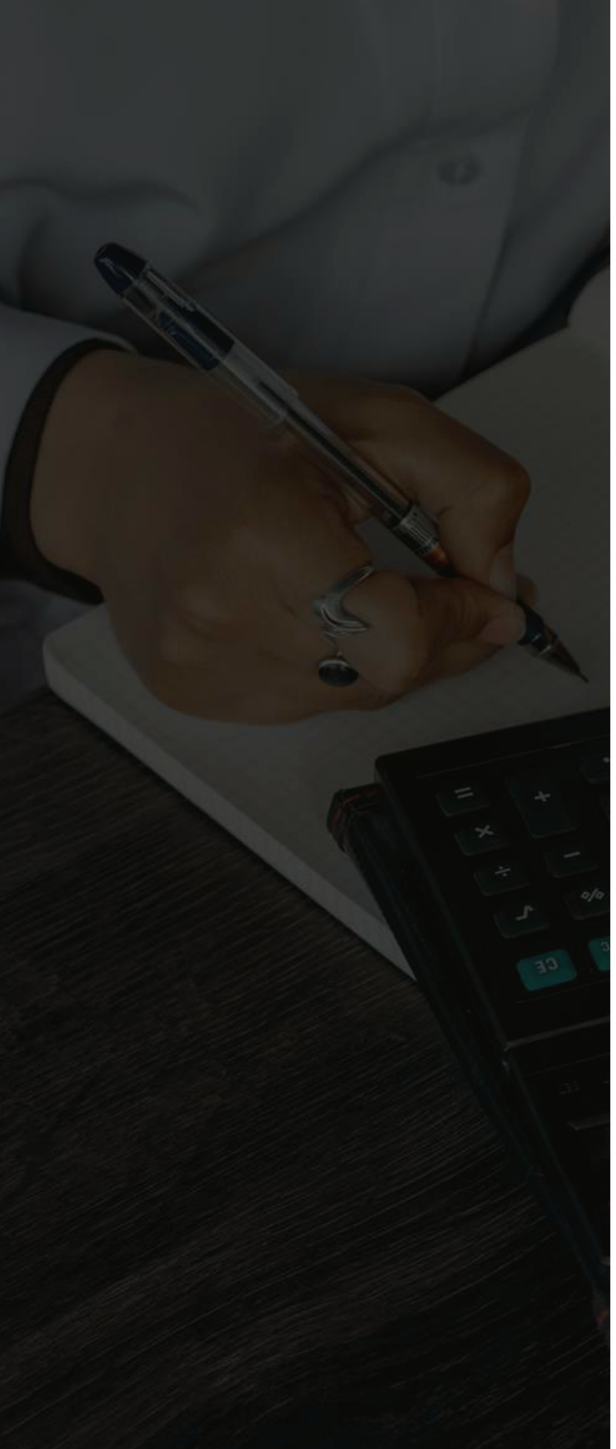
Exploring other factors affecting SCOM prices:

- Our research revealed significant influences on Safaricom (SCOM) stock prices.
- By integrating these variables into our models, we achieved low RMSE scores indicating enhanced predictive accuracy beyond traditional historical price-focused models.

Constructing models with single and multiple variables:

- Utilized multiple variables to successfully build models while evaluating variable performance
- Models effectively captured fluctuating trends and predicted stock prices
- Achieved lowest RMSEs

- The LSTM model achieved the lowest RMSE of 0.03825 compared to Facebook prophet, LSTM, VAR and LSTM-attention models, making it the most suitable model for predicting the short-term movement of SCOM stock.



Limitations

- Stock markets are inherently volatile, influenced by various unpredictable factors such as geopolitical events, economic downturns, and regulatory changes. These fluctuations can affect the accuracy of predictive models and impact investment outcomes.

- While we tried to include several variables, there are many other factors that affect the prices of SCOM stock and they need to be taken into account as well to create a model that truly captures the complexities of stock markets and enhances predictive capabilities.

- While the LSTM model demonstrated superior performance in this study, its effectiveness may vary under different market conditions.

Recommendations

1. **Leverage LSTM Model for Reliable Predictions:**

- Leverage the LSTM model for SCOM stock price predictions, capitalizing on its accuracy and reliability.

2. **Hold Position Amidst Temporary Downturn:**

- Investors should consider holding their SCOM stock position and monitor market performance as the current downturn is still considered to be temporary and the company has potential for a rebound, especially with improvements in the economy.
- Additionally, individuals considering buying SCOM stock may find the current low prices opportune for investment.

3. **Key Factors in Forecasting SCOM Stock Prices:**

- Stakeholders should recognize the significance of factors such as interest and inflation rates, alongside technical indicators, in forecasting SCOM stock prices accurately.

4. **Diversify Portfolio Beyond SCOM Stock:**

- To mitigate risks associated with stock market fluctuations, investors should consider diversifying investment portfolios beyond SCOM stock.

5. **Continuous Monitoring and Model Updating:**

- It is imperative to prioritize the continuous monitoring and updating of the models through regular retraining with fresh data and adjusting parameters based on observed performance.

Deployment

We deployed using streamlit.

Thank You

by

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