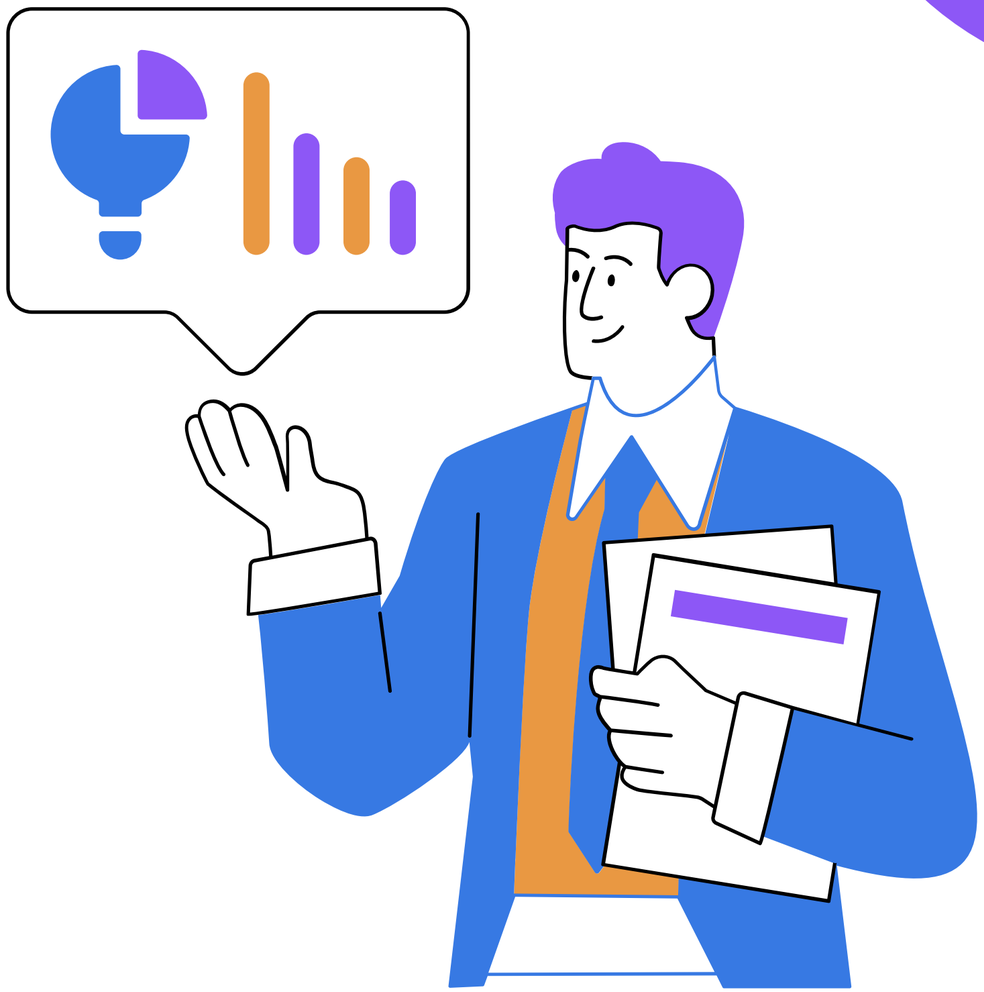
Data Analyst Project | 2025

GOOGLE STOCKPRICE PREDICTION



By: Muhammad Fakhri Azhar

INTRODUCTION

Hi! I’m Muhammad Fakhri Azhar, a physics graduate with a strong passion for data analysis. This project is part of my learning journey in turning data into insights.

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- Data Science Bootcamp @Kelas Work by Kelas.com
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- Ms.Excel Short Class @MySkill
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Project Code Detail on Github:

https://github.com/mfakhriazhar/stock-price-prediction/blob/main/Case_04_Final_Project.ipynb

In the highly dynamic world of finance, stock price prediction is one of the important challenges that can help investors make strategic decisions. The high volatility of the stock market, especially in technology stocks such as Google (Alphabet Inc.), requires a reliable and adaptive predictive approach.

Dataset Link:

https://github.com/mfakhriazhar/stock-price-prediction/blob/main/GoogleStock%20Price.csv

Overview

The urgency of this project lies in the increasing need for a precise prediction system to reduce investment risk and optimally utilize market opportunities. By comparing model performance, this project also provides insight into which deep learning architecture is most effective for historical data-based stock price prediction.

Project Goals

This project aims to build and compare Recurrent Neural Network (RNN)-based deep learning models, namely standard RNN, LSTM, GRU, and BiDirectional LSTM, to predict Google's daily stock price. These models were chosen for their ability to handle time series data and capture both short-term and long-term patterns.

The dataset used includes the daily stock price of Alphabet Inc. (GOOG) from 2013 to January 2024 in USD. Evaluation of model performance is done using the RMSE (Root Mean Square Error) metric to measure prediction accuracy.

Project Flowchart

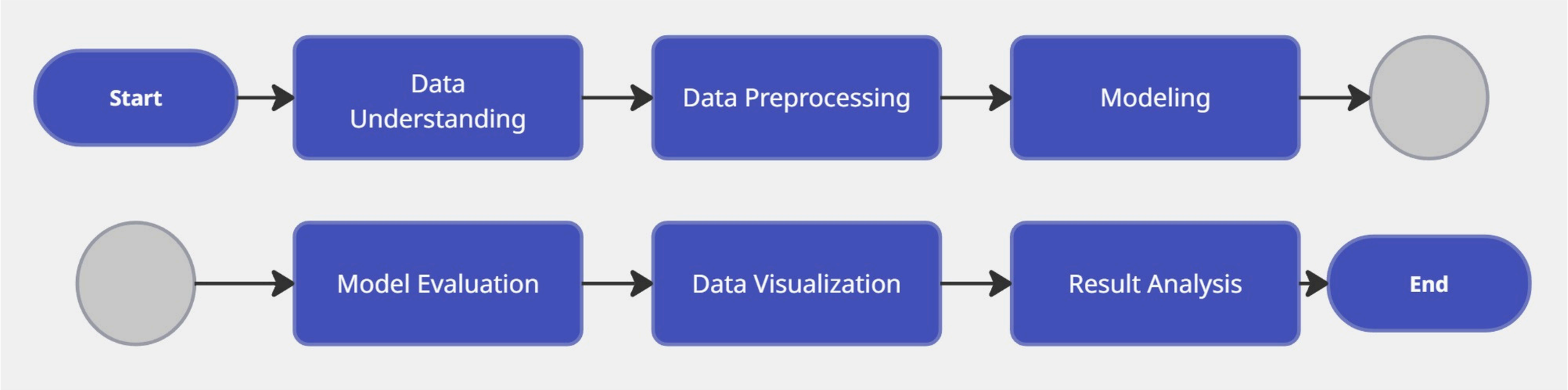
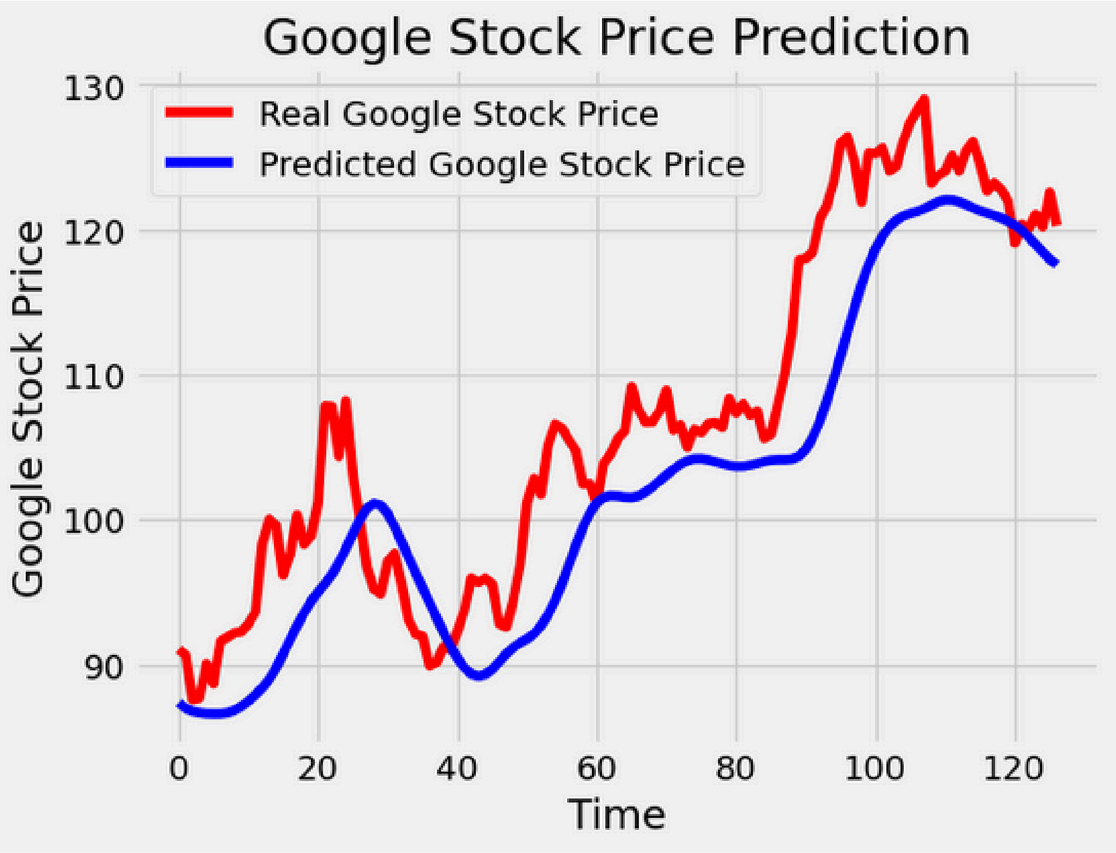


Chart Analysis

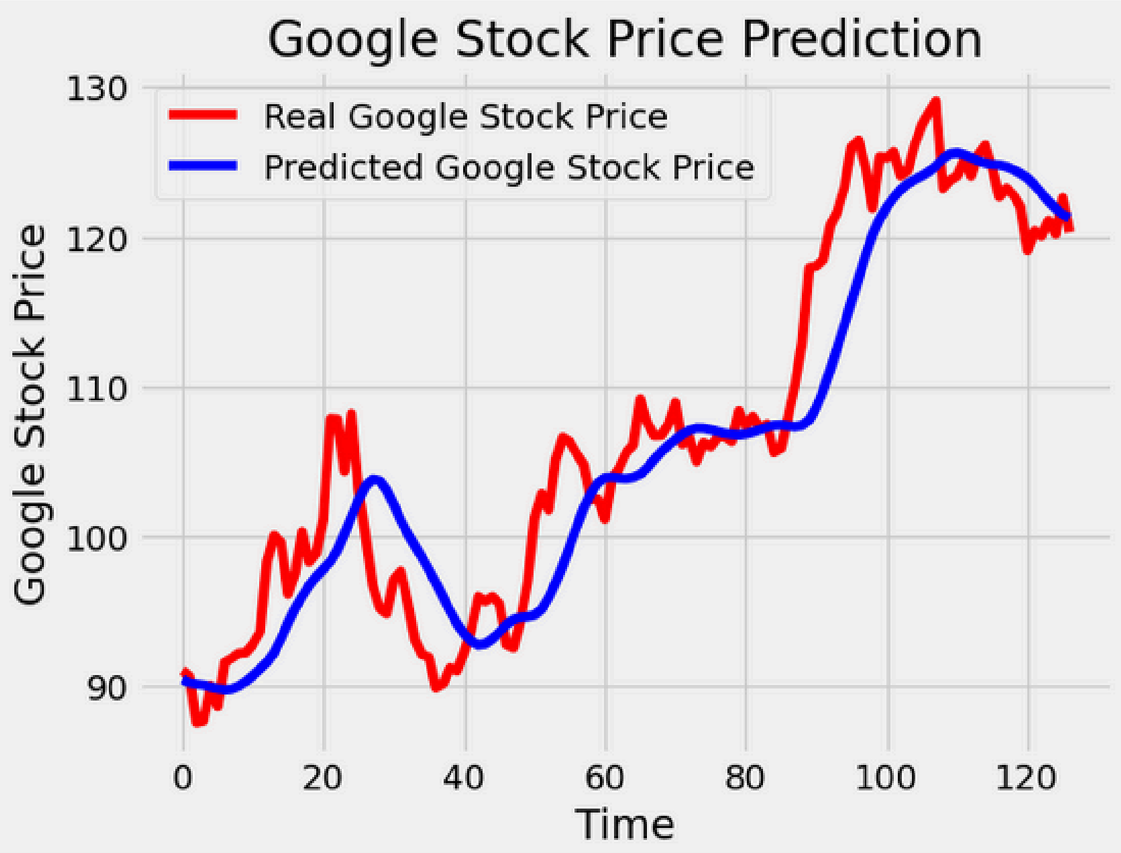
- This chart shows the movement of Google's stock price from 2013 to 2024, with a separation between the training set (before 2022, blue color) and the test set (2023 and above, red color).
- This chart helps in understanding the historical pattern of Google's stock price and testing the accuracy of the prediction model developed in the project.
- The chart shows that Google's stock price increased significantly from 2013 to 2021, and then experienced a sharp decline in 2022 due to market volatility. However, in 2023-2024, the stock started to recover and showed an upward trend again.

LSTM Prediction



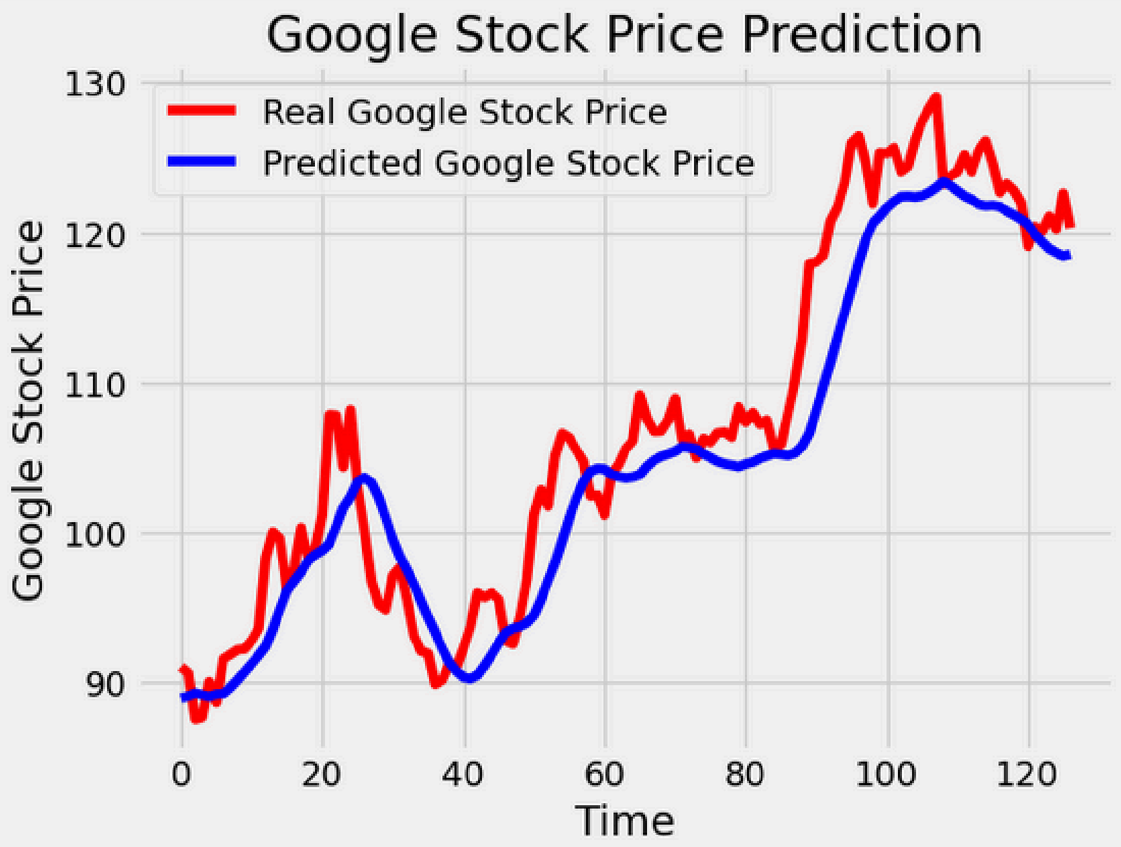
- The predicted price follows the trend pattern of the actual price quite well, which shows that the model is able to capture the main patterns in stock price movements.
- However, there were some deviations, especially during sharp price spikes.
- The LSTM model was able to capture the trend pattern of Google's stock price quite well, but was less responsive to sharp price spikes. With an RMSE of 6.28, there is still a significant difference between the predicted and actual prices.

LSTM-GRU Prediction



- The predicted price is closer to the actual price than the previous LSTM model.
- GRU is able to capture price movement patterns better and produces smaller errors.
- The GRU model is more accurate than LSTM, with a lower RMSE (4.33) and predictions that are closer to actual prices. Its advantages lie in parameter efficiency and its ability to capture price patterns better.

BiDirectional LSTM Prediction



- The predicted price is closer to the actual price than the previous LSTM and GRU models.
- The lower RMSE (4.07) indicates more accurate predictions and better capture of price movement patterns.
- The BiDirectional LSTM model performed best with the lowest RMSE (4.07), resulting in more accurate predictions compared to LSTM and GRU.

Our 2025 Development

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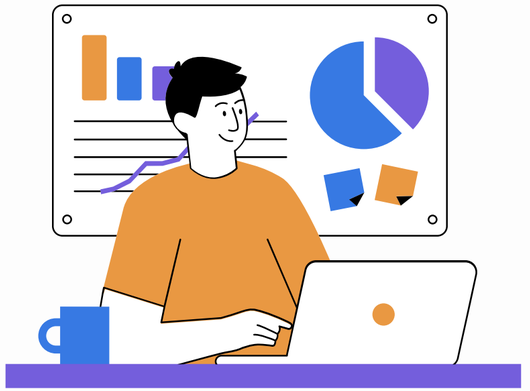

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Conlusion

Model Performance Analysis:

- LSTM has the lowest accuracy, with the highest RMSE (6.28). The model is still able to capture stock price patterns, but lacks precision in following rapid price changes.
- GRU shows improved accuracy over LSTM (RMSE 4.33), with an advantage in computational efficiency as it has fewer parameters.
- Bidirectional LSTM provides the best results, with the lowest RMSE (4.07). This model is able to capture stock price patterns more accurately as it considers information from both time directions (past and future).

Final Result:

- Bidirectional LSTM is the best model in this project, as it has the lowest RMSE and is able to follow stock price patterns more accurately than LSTM and GRU. However, it also has higher complexity and requires longer training time.

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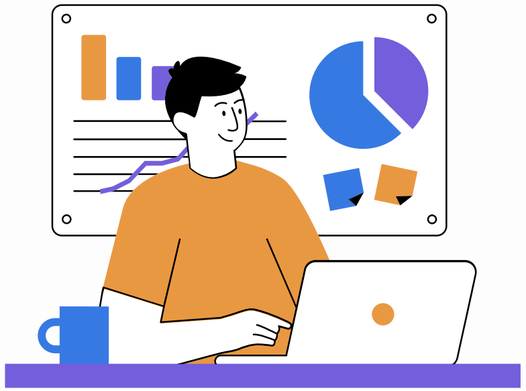

THANK YOU

For Your Attention

Muhammad Fakhri Azhar