Microsoft Stock Price Prediction Using Stacked LSTM

A predictive model analysis (2014-2024)

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Introduction

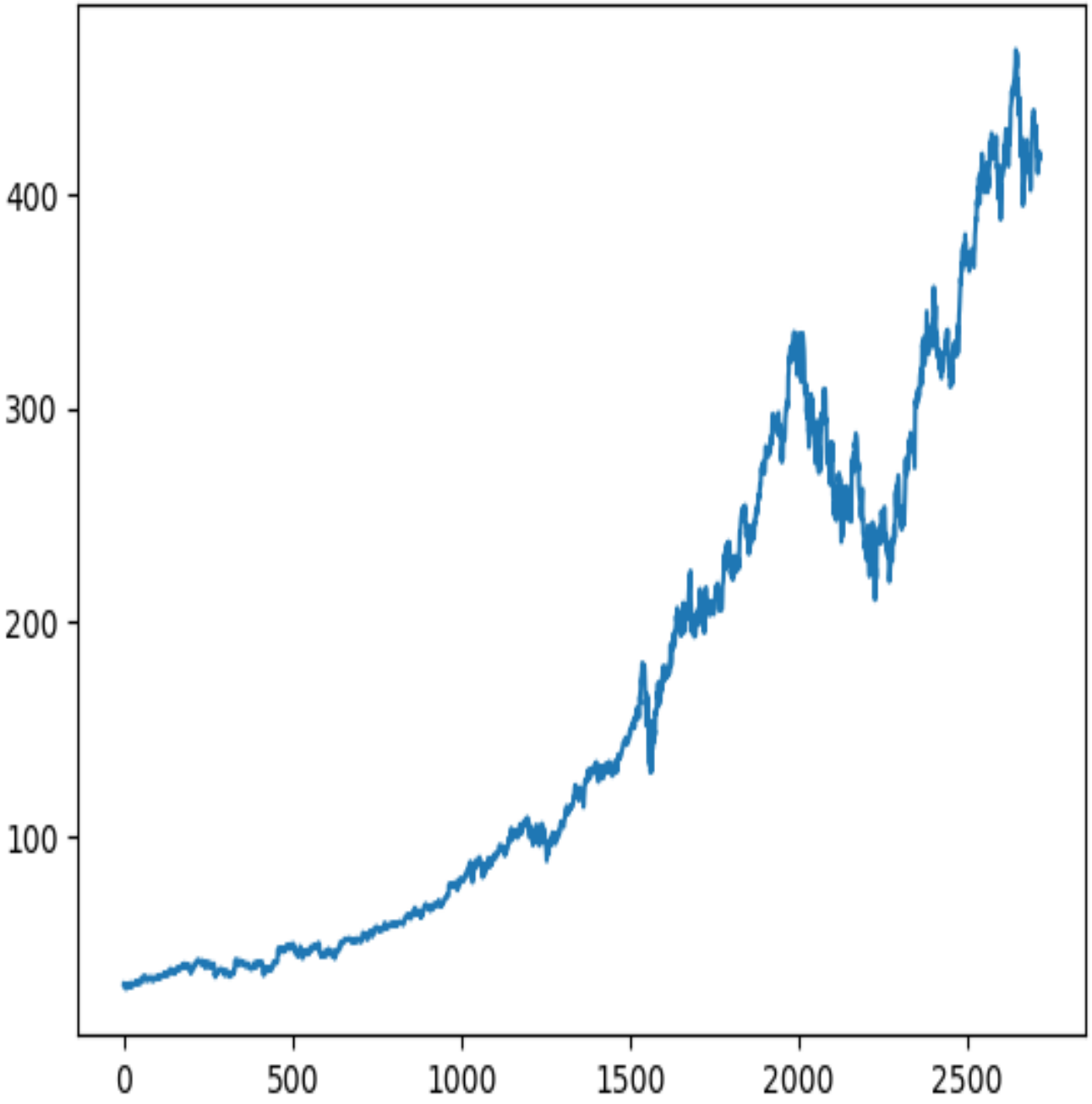
- This project uses a **Stacked Long Short-Term Memory (LSTM)** model to predict the stock price of Microsoft (MSFT) from January 2014 to October 2024, with a forecast for the next 30 days.

- **This is not for investment purpose**

Data Preparation

- **Data Source:** Historical stock prices of MSFT from January 2014 to October 17, 2024 was obtained from yfinance using some snippets code.
- **Feature Selection:** The Close column was selected for analysis and chart plotted
- Data is normalized using MinMaxScaler and split into sequences suitable for LSTM input
- Train-Test split ensures model generalization

MSFT CHART



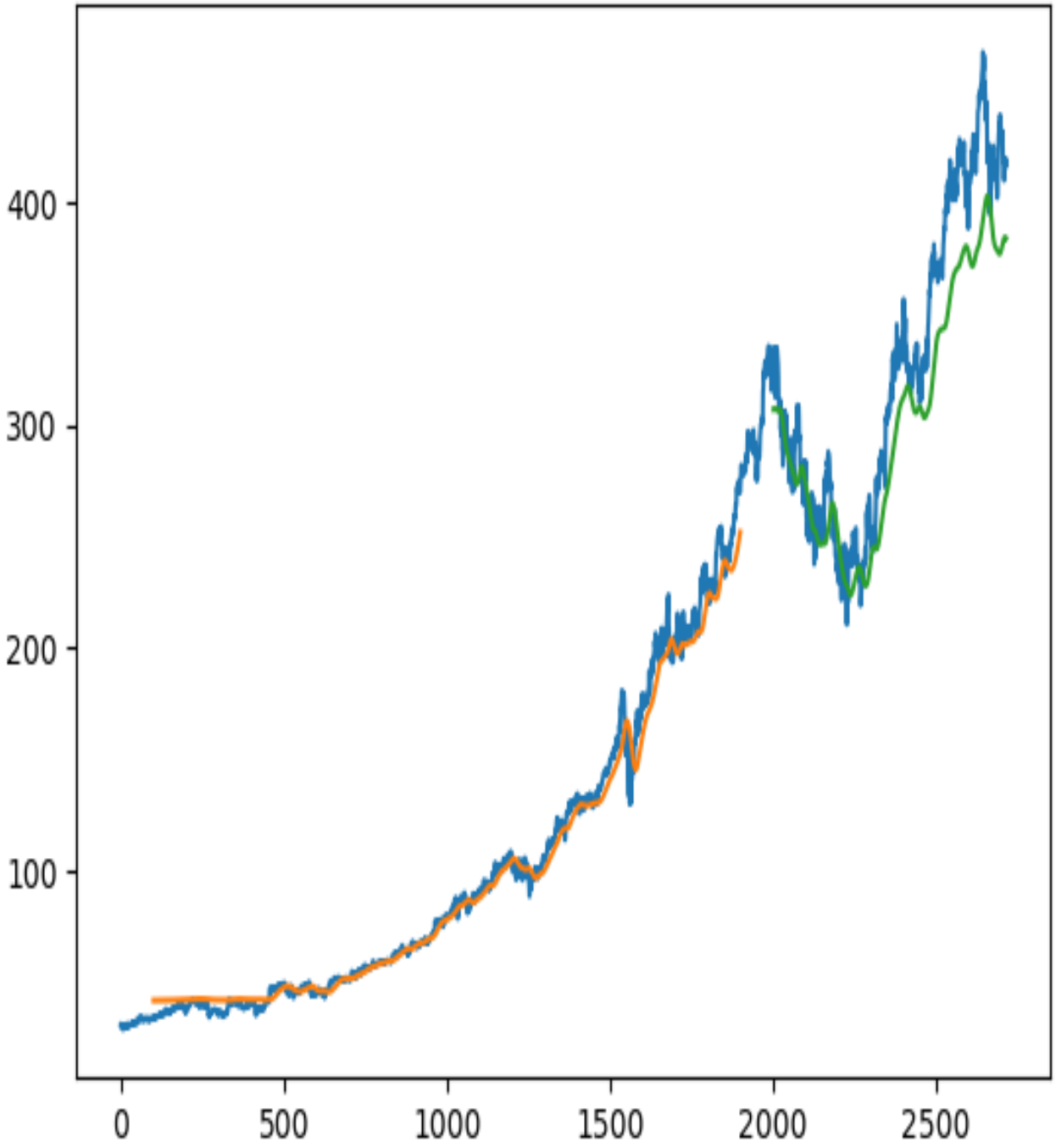
Model Architecture

- Stacked LSTM model with multiple LSTM layers
- Dropout layers added to prevent overfitting
- Reduced learning rate were applied to prevent overfitting.
- Model trained to predict future stock prices based on past trends

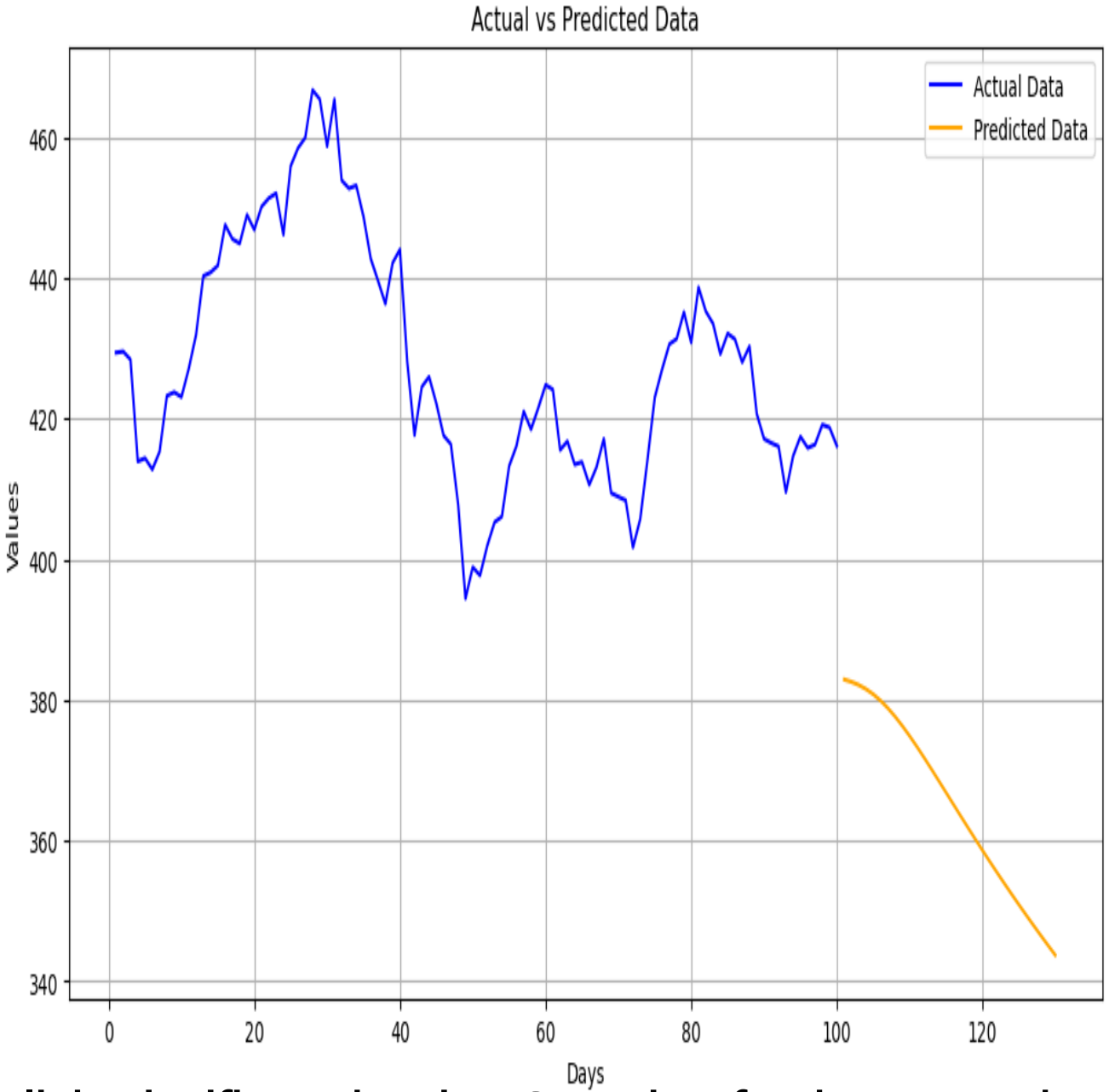
Prediction Results

- RMSE on training data:6.72
- RMSE on testing data: 18.03
- The model predicts a slight drop in MSFT prices for the next 30 days

Train/Test chart

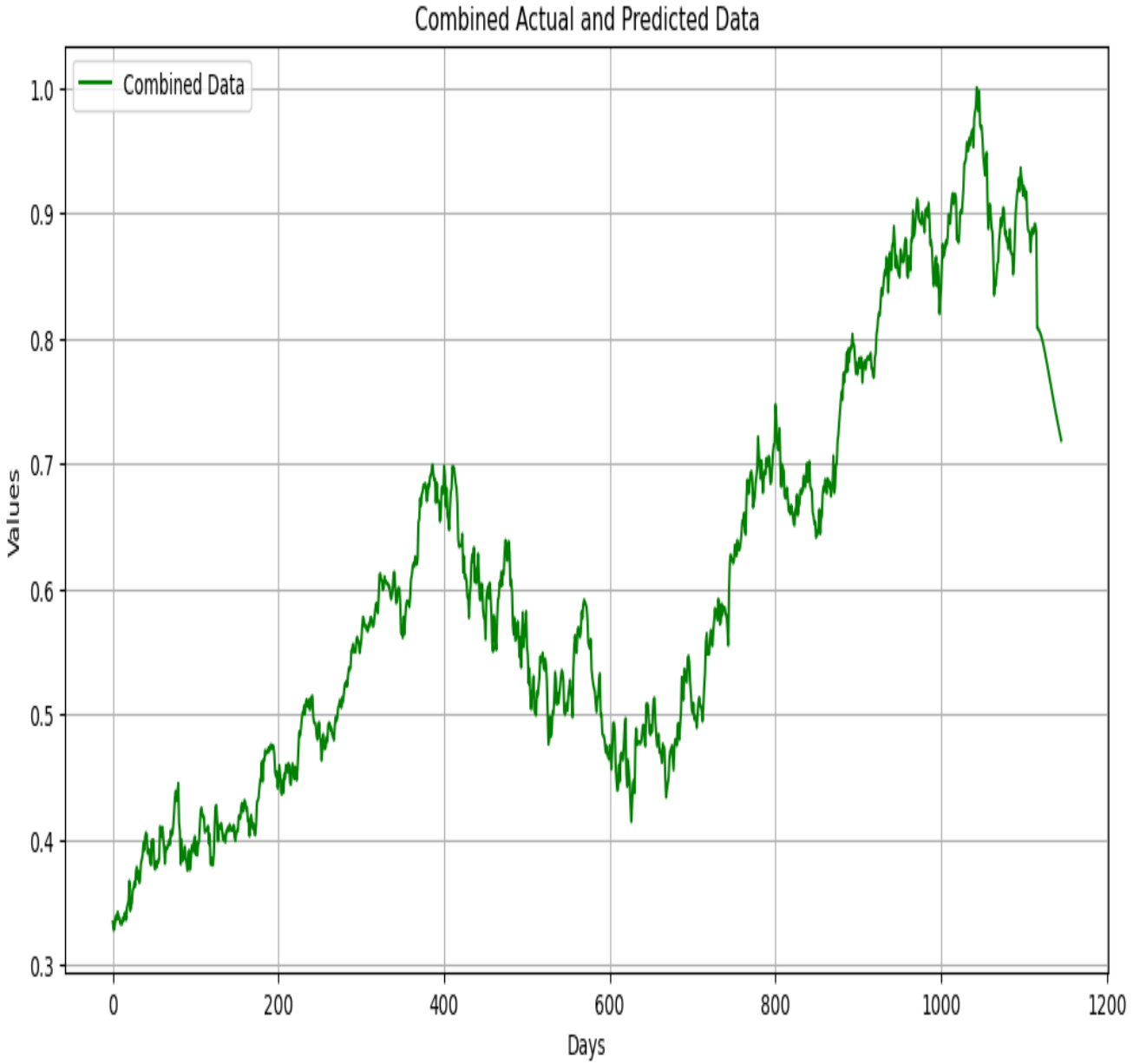


Forecast Sheet



The model predicts a slight significant drop in MSFT prices for the next 30 days

Forecast Chart



The model predicts a slight significant drop in MSFT prices for the next 30 days

Conclusion

- Stacked LSTM models are highly effective in capturing long-term dependencies in time series data.
- Predicts future market trends, with proper regularization to prevent overfitting.
- Next 30 days forecast shows a slight decline in Microsoft stock prices **(October 18, 2024 – November 18, 2024).**

Future Work

- **Model Tuning:** Further hyperparameter optimization can improve the accuracy of the model.
- **Feature Engineering:** Incorporating additional features (e.g., market sentiment, trading volume) could enhance predictive performance.
- **Other Stocks:** Extending this methodology to other stocks or assets can help test the model's versatility.

Thank you.