AAPL Stock Prediction Analysis

Based on Seasonal Financial Report

R.J.

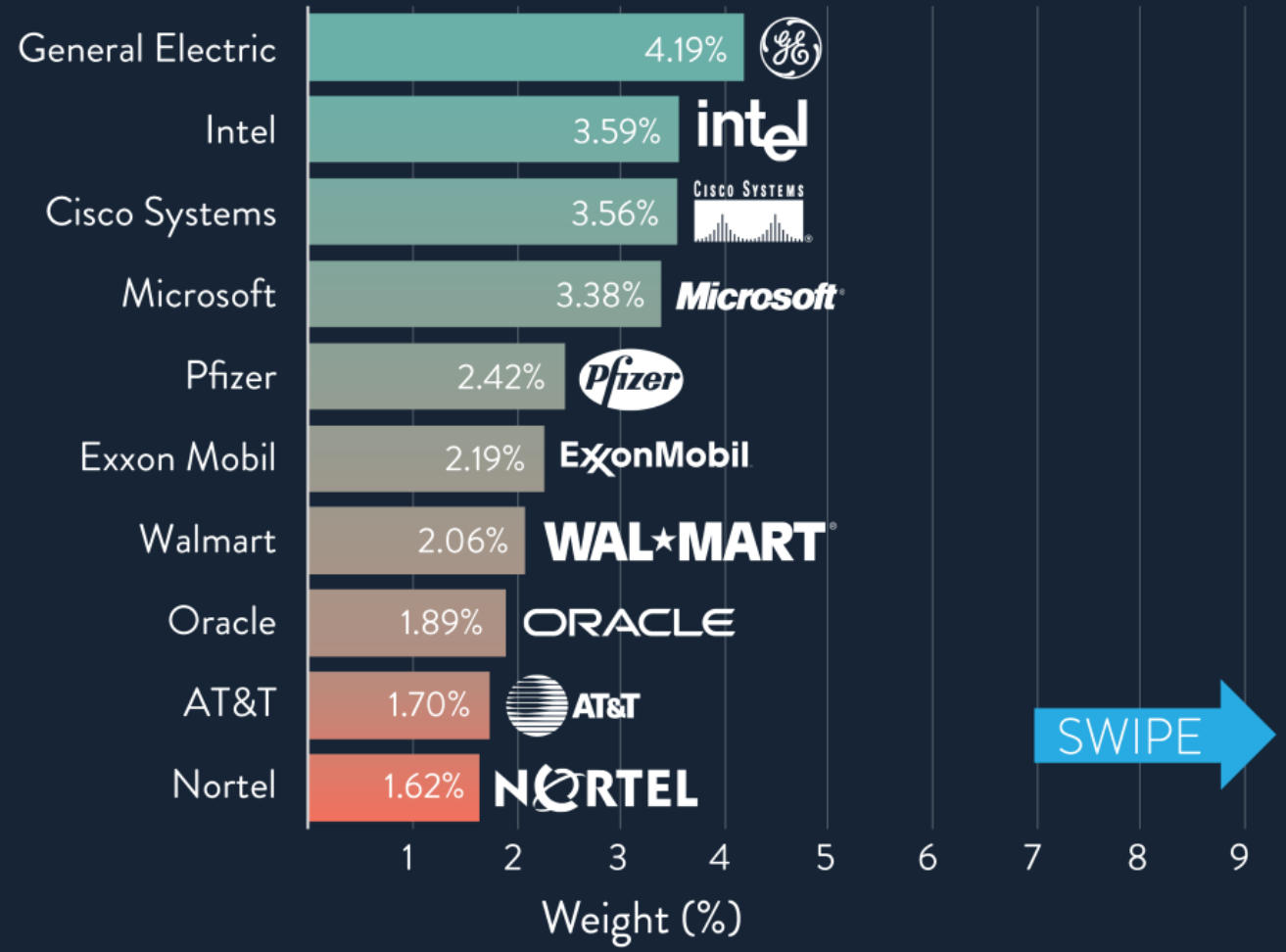
Data Source

https://finviz.com/

https://finance.yahoo.com/

TOP **S&P 500** STOCKS

Here's what the list looked like in **June 2000**.
How many are still in the top 10 today?



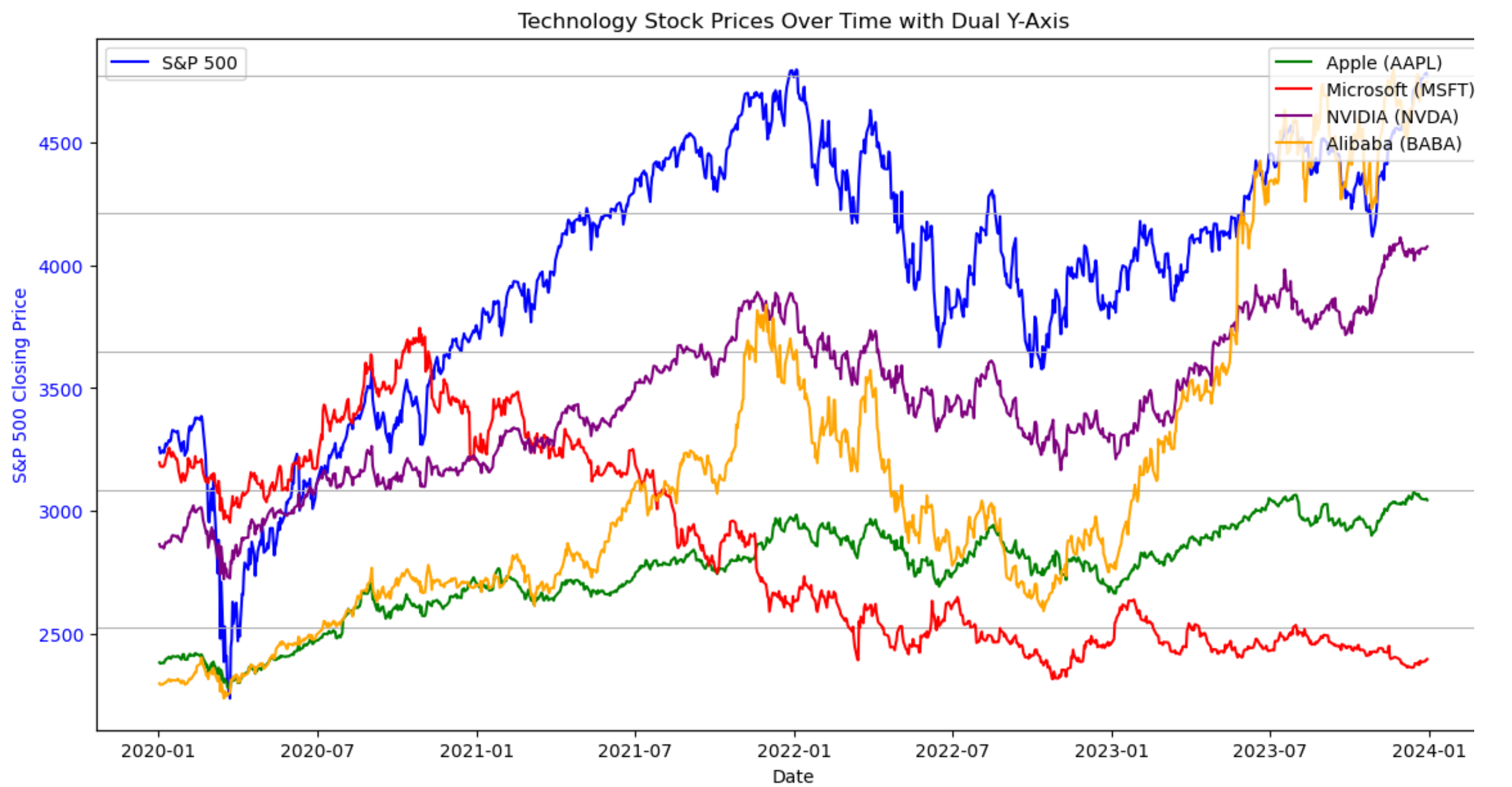
PERSONALFINANCECLUB

AAPL

Microsoft

NVIDIA

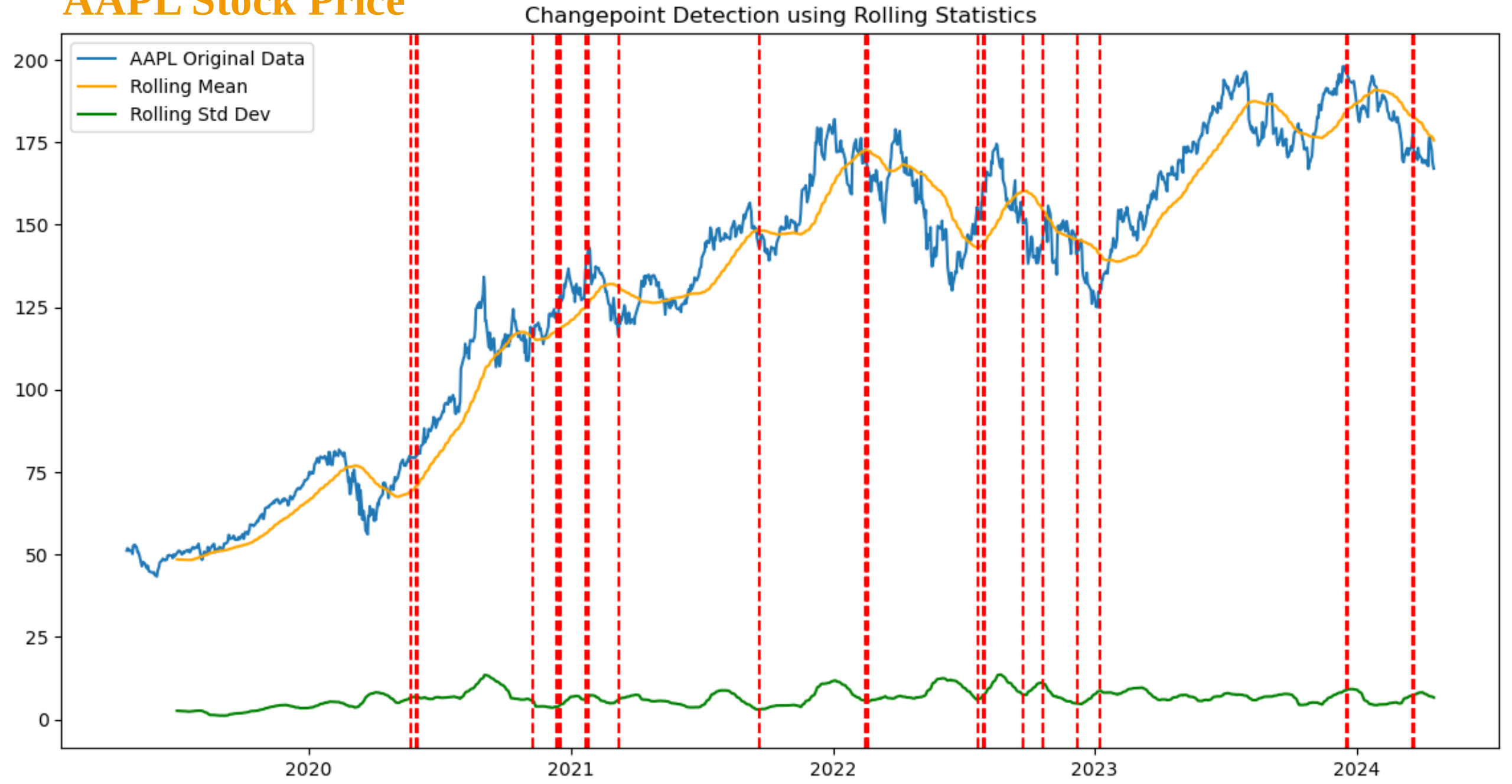
Alibaba.com


Technology Stock Prices Over Time with Dual Y-Axis
S&P 500
Apple (AAPL)
Microsoft (MSFT)
NVIDIA (NVDA)
Alibaba (BABA)
S&P 500 Closing Price
4500
4000
3500
3000
2500
2020-01
2020-07
2021-01
2021-07
2022-01
2022-07
2023-01
2023-07
2024-01
Date

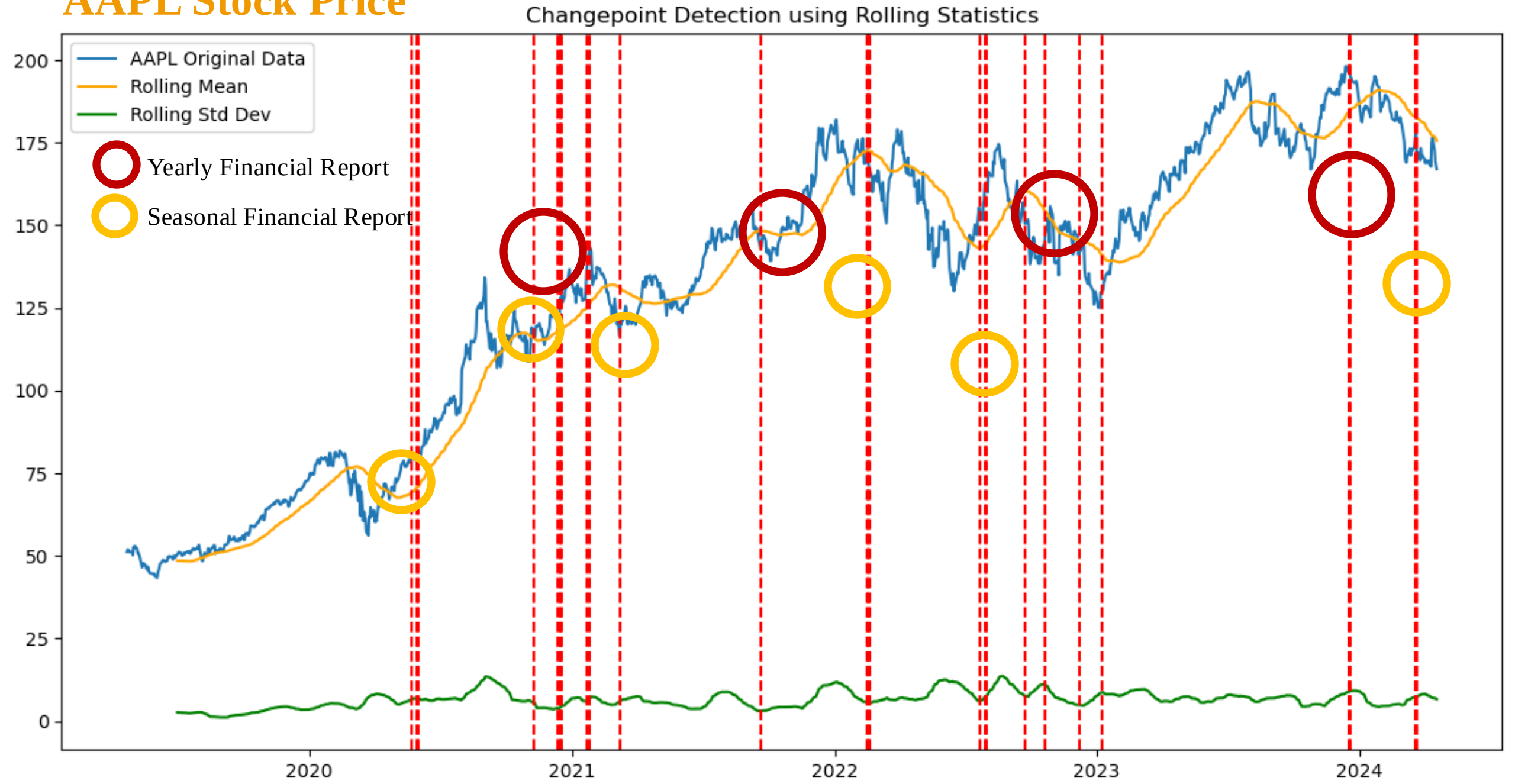
Seasonal Changes?

Changepoint Detection Analysis …

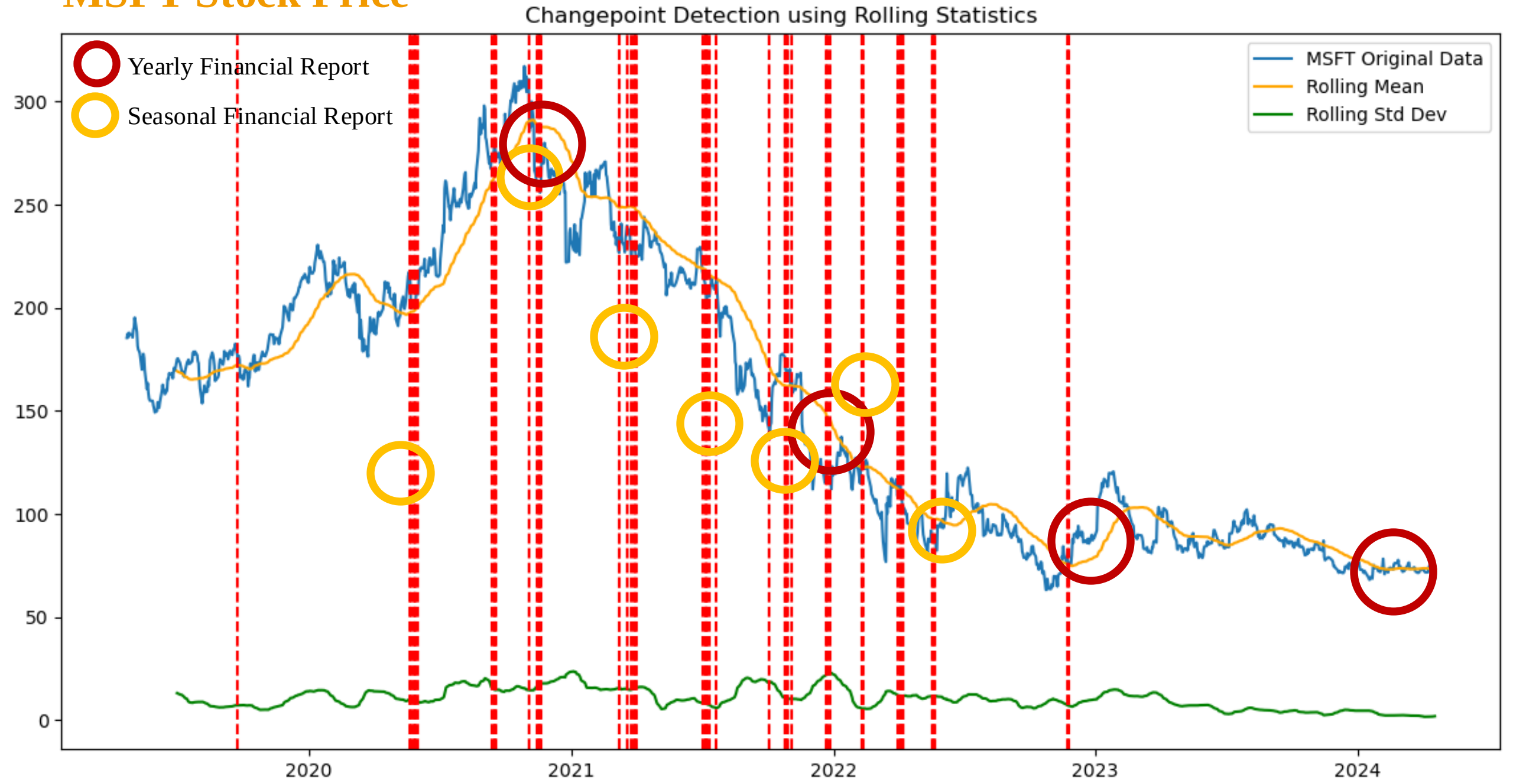
AAPL Stock Price



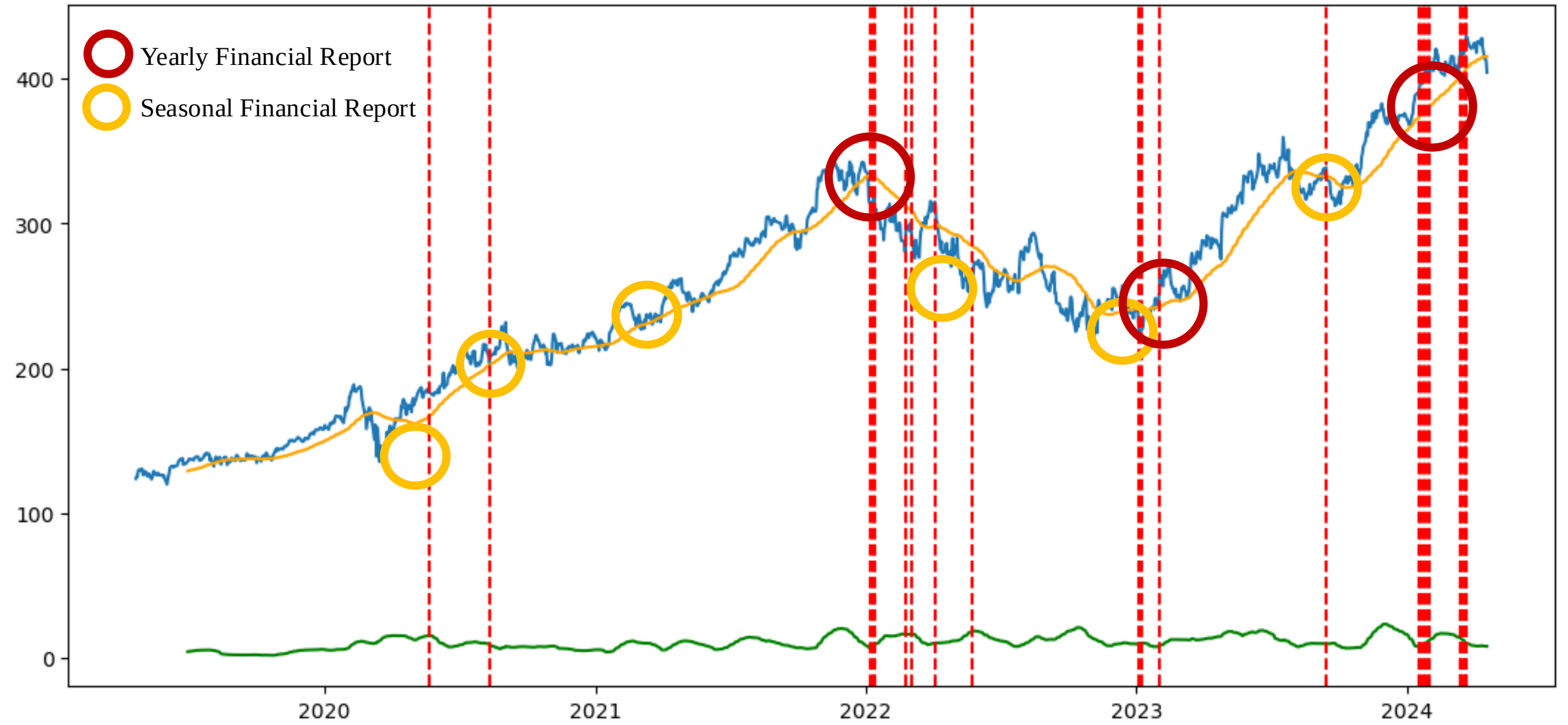
AAPL Stock Price



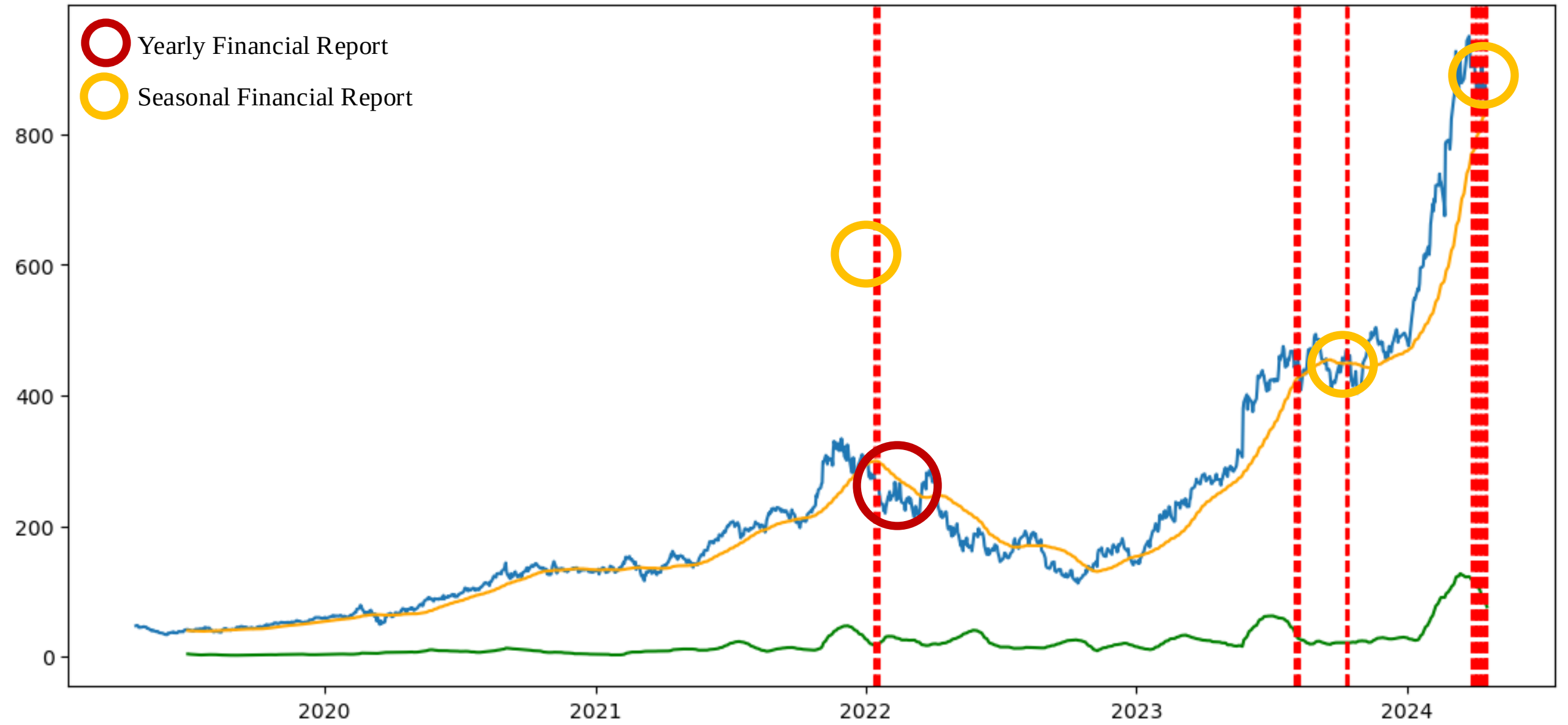
MSFT Stock Price



NVDA Stock Price

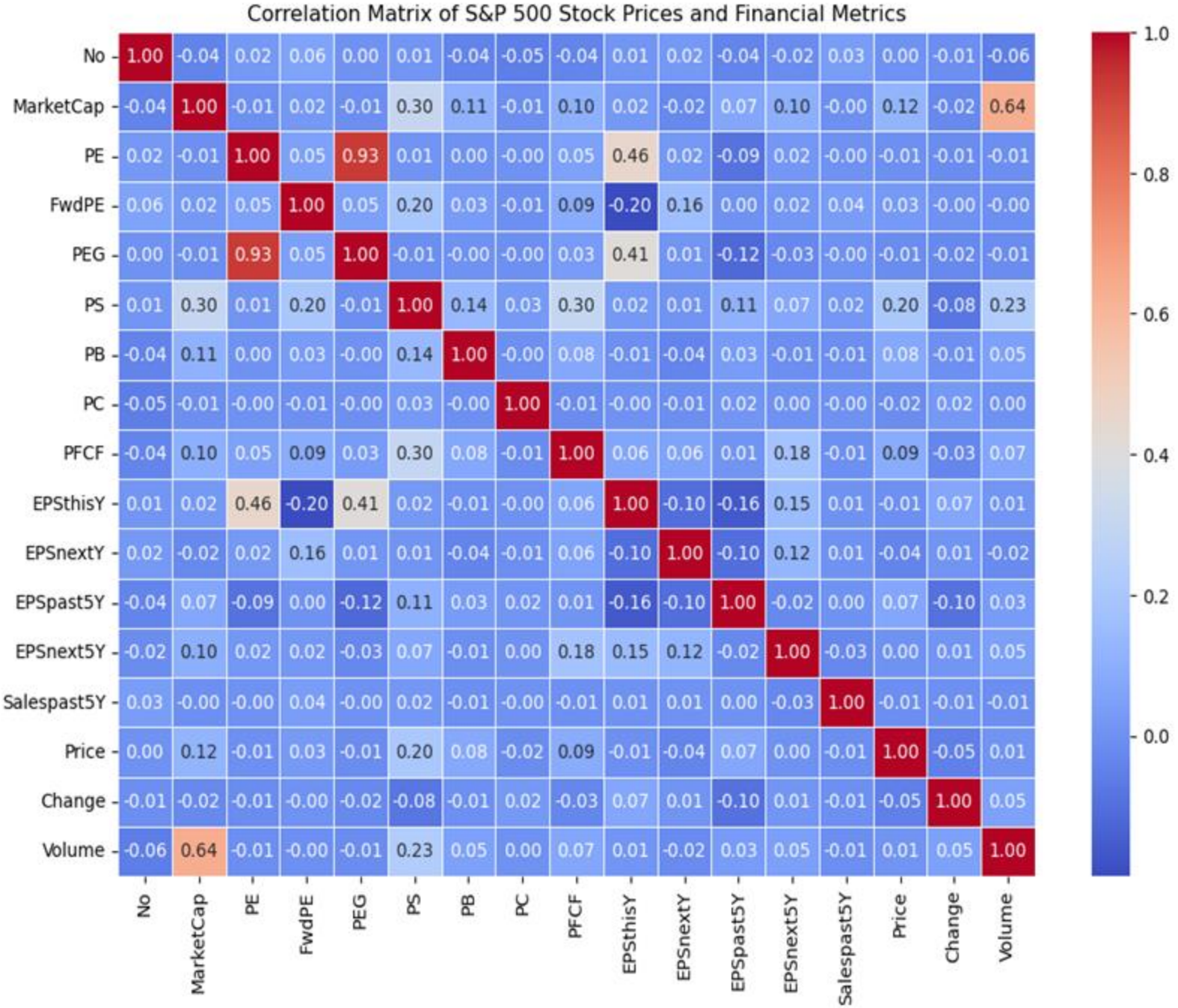


BABA Stock Price



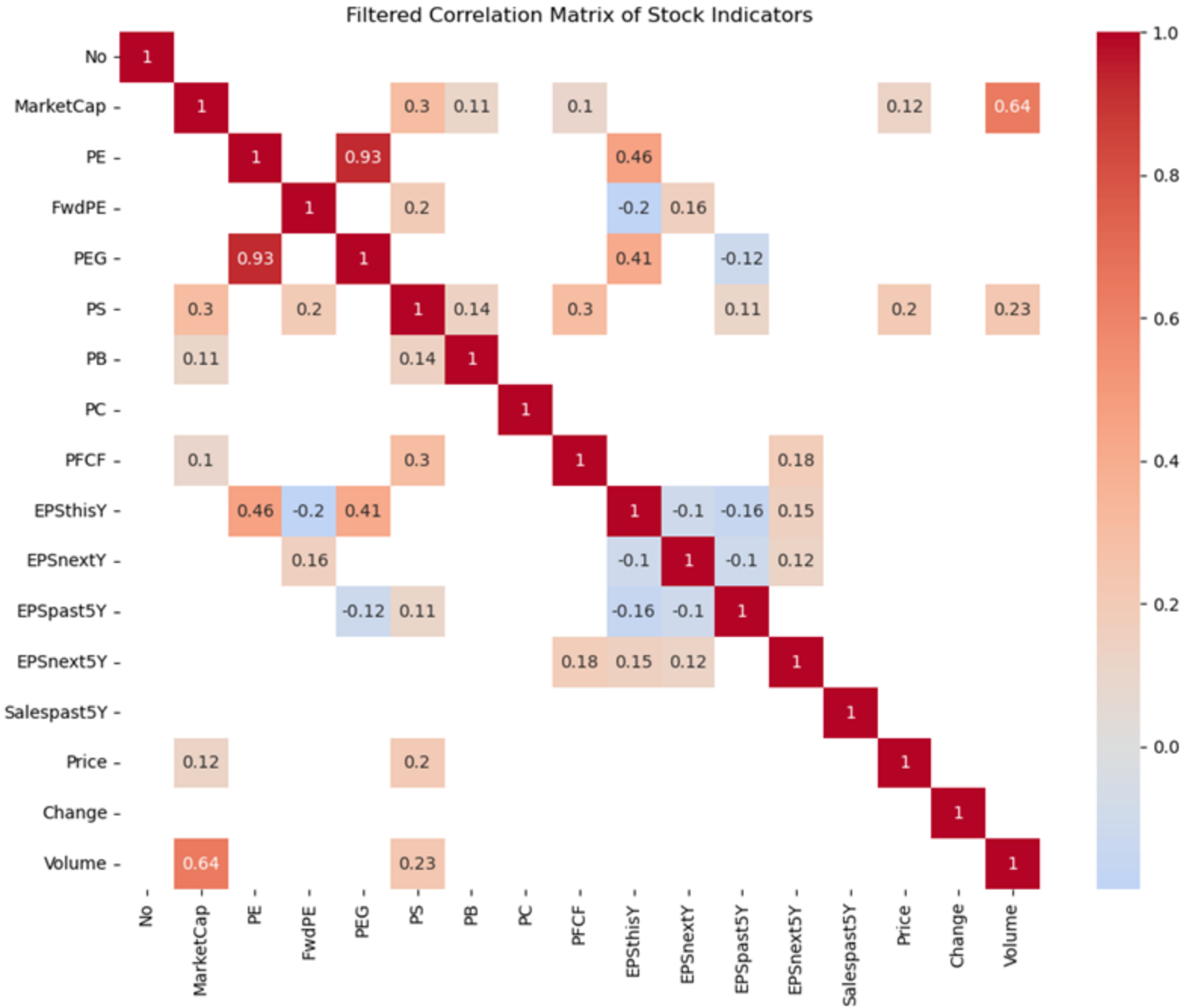
What Financial Factors Matter?

Let’s see what correlation analysis says…



Heatmap of SP500

Too complicated?
Increase the thresholds



Heatmap of SP500

PE and PEG (0.93)

Volumn and MarketCap (0.64)

EPSthisY and PE (0.46)

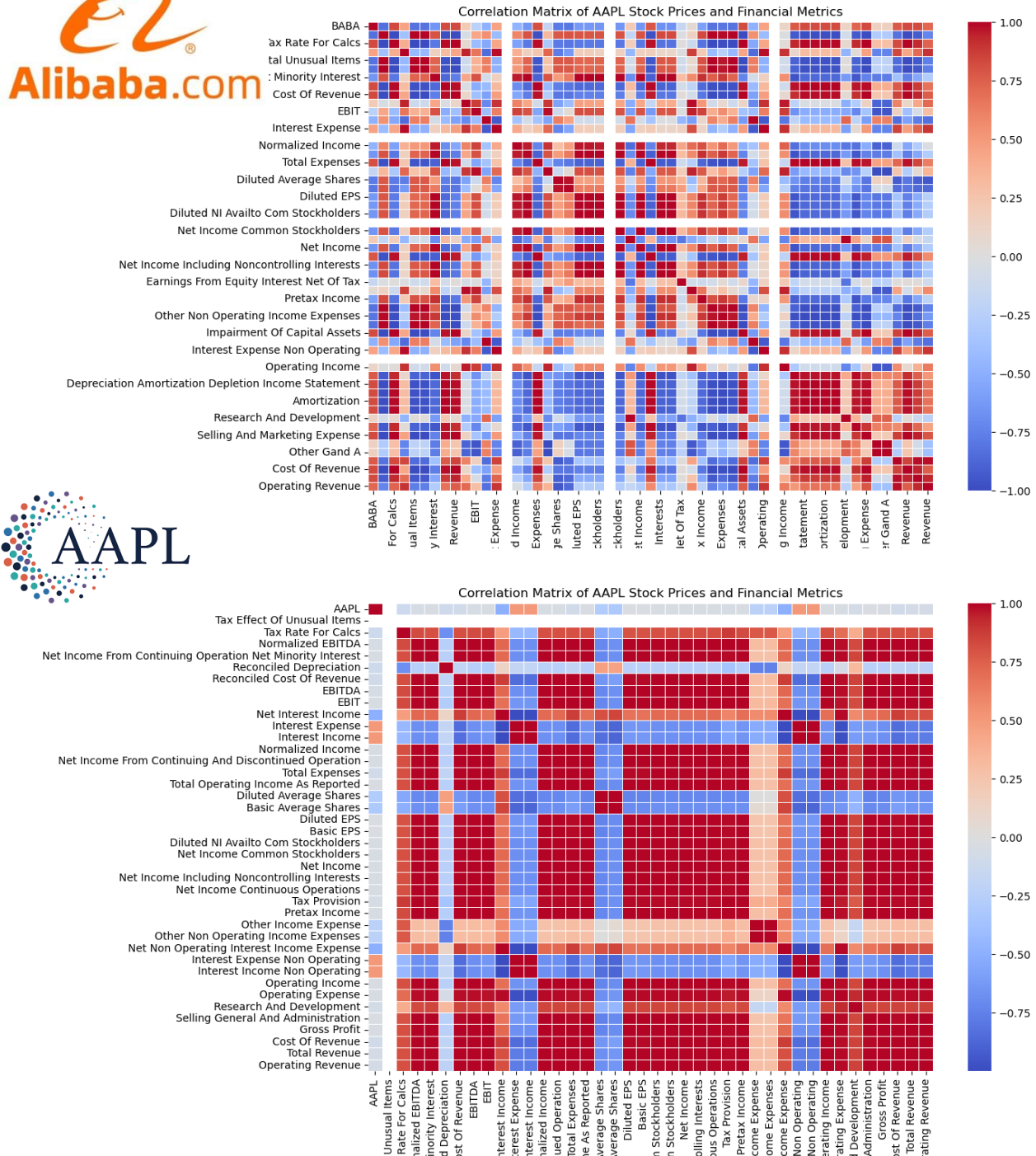
EPSthisY and PEG (0.41)

PFCF and PS (0.3)

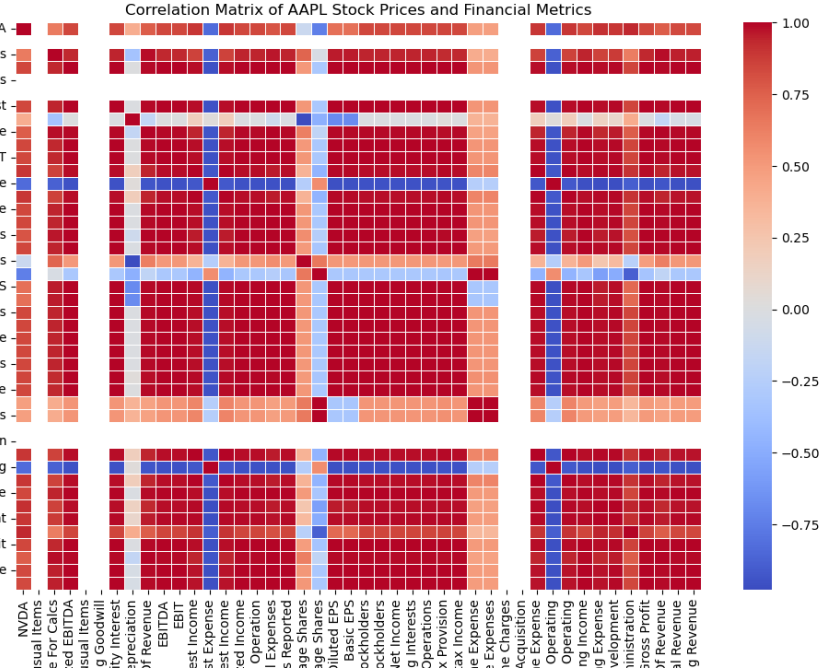
Price Related Factors:

PS Ratio (0.20) = Stock Price / Sales

Alibaba.com

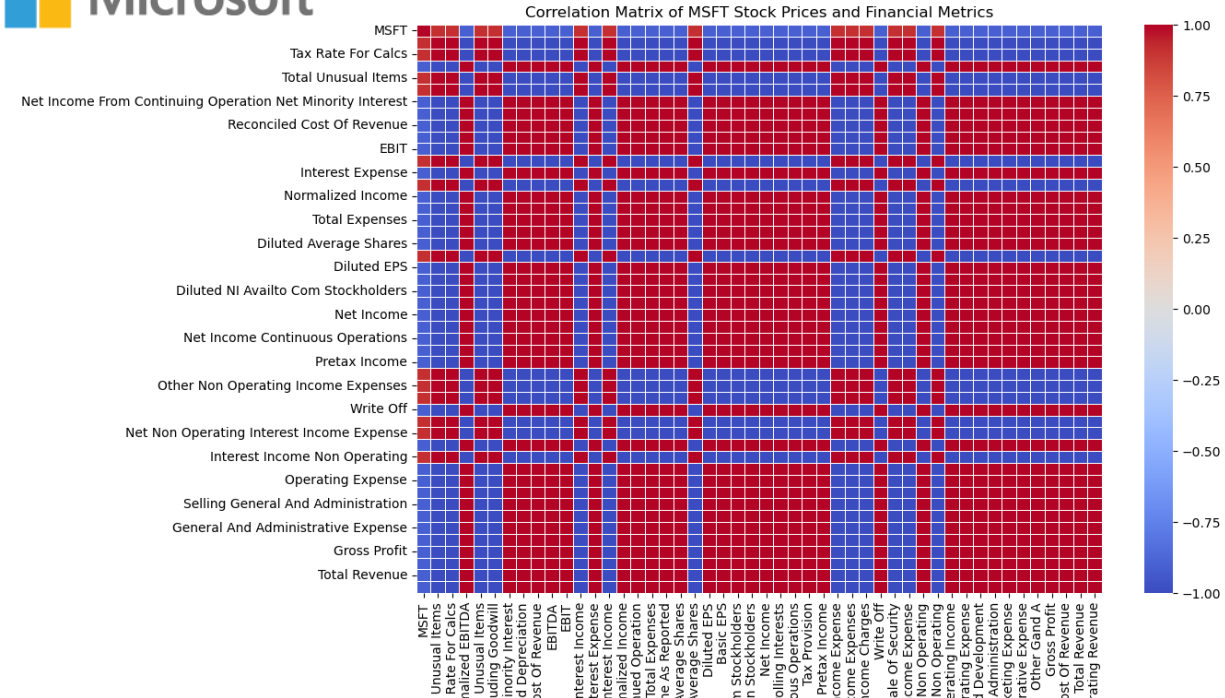


NVIDIA



AAPL

Microsoft



Financial Factors be Added to Model

- 'Interest Income Non Operating’
- 'Interest Income’
- 'Interest Expense Non Operating’
- 'Interest Expense’
- 'Basic EPS'
- 'Net Interest Income’
- 'Net Non Operating Interest Income Expense'
- 'Basic Average Shares’
- 'Diluted Average Shares’
- 'Net Income’
- 'Operating Income’

Long Short-Term Memory (LSTM) Model

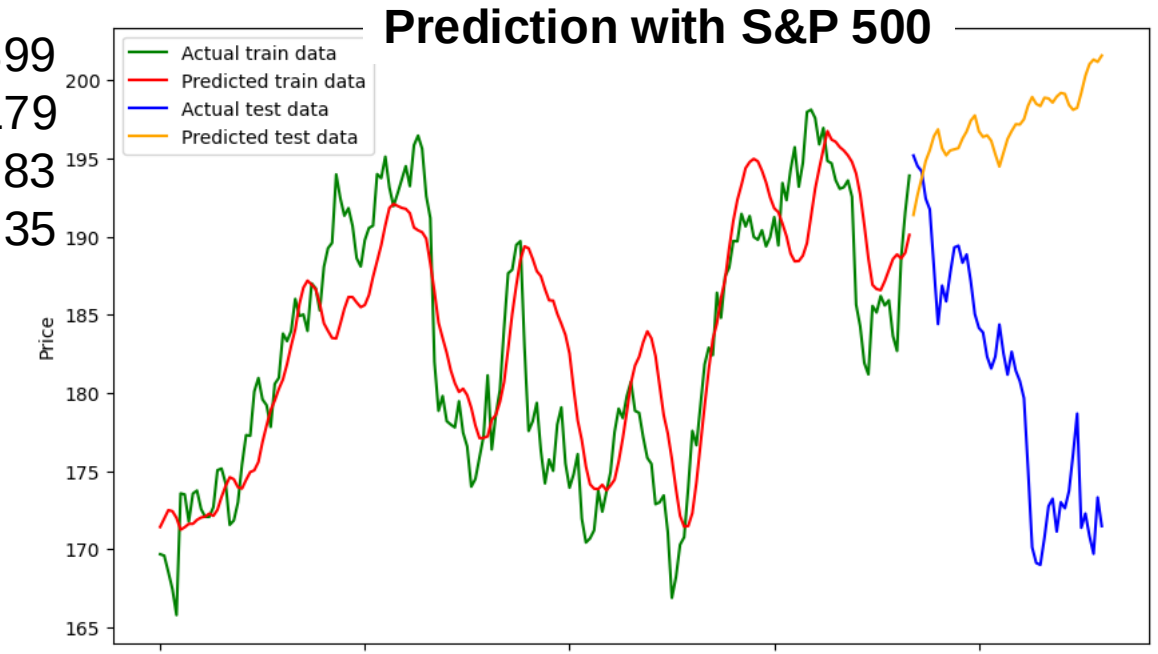
- **Normalization:** Using MinMaxScaler to scales the data to a fixed range of 0 to 1 (speed & performance)
- **Splitting Dataset:** 80% Training, 20% Testing
- **Model Architecture:** Sequential architecture consisting of bidirectional LSTM layers (past and future, accuracy)
- **Evaluation:** Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), R-squared value, quantify the model's performance in terms of error magnitude and prediction accuracy

Now Let’s See the Result…

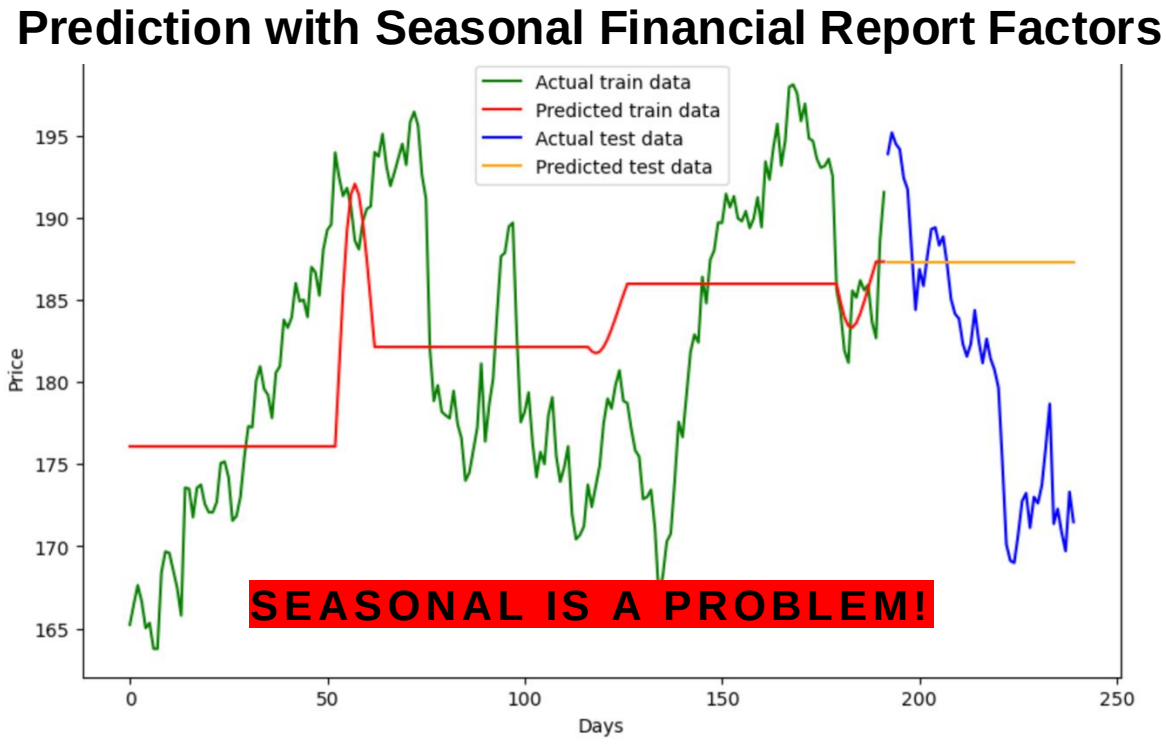
Mean Squared Error: 32399
Root Mean Squared Error: 179
Mean Absolute Error: 179.83
R-squared: -534.35

Long Short-Term Memory

(LSTM) Models



Mean Squared Error: 32528
Root Mean Squared Error: 180
Mean Absolute Error: 180.182
R-squared: -516.61



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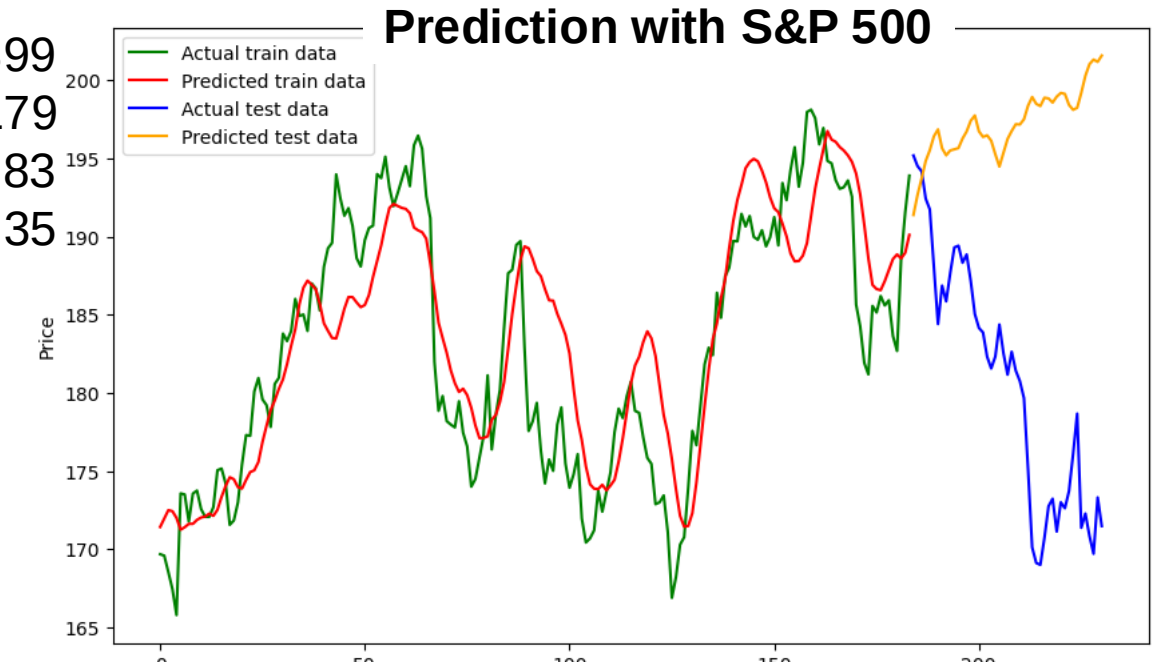
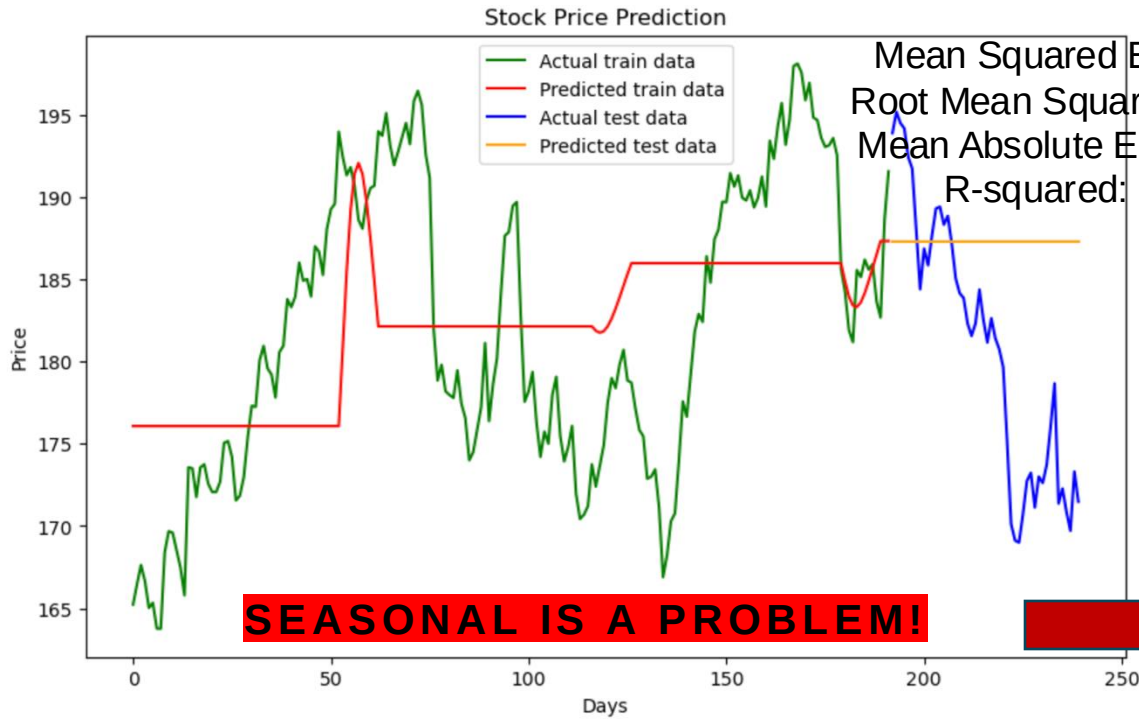


Long Short-Term Memory

(LSTM) Models



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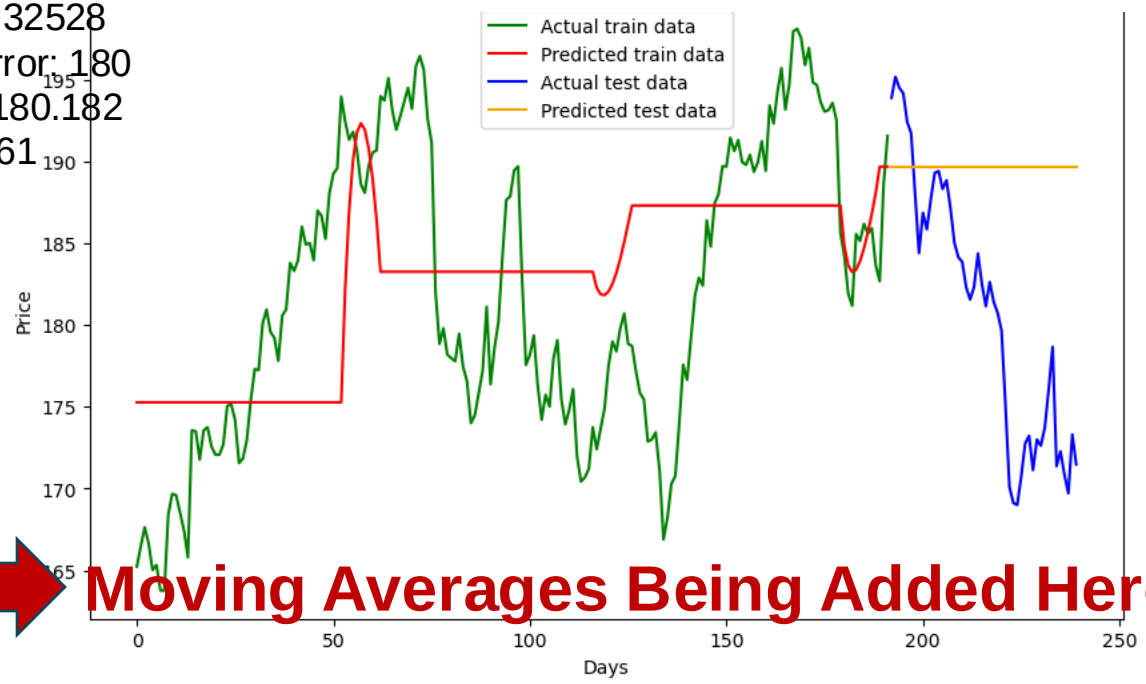
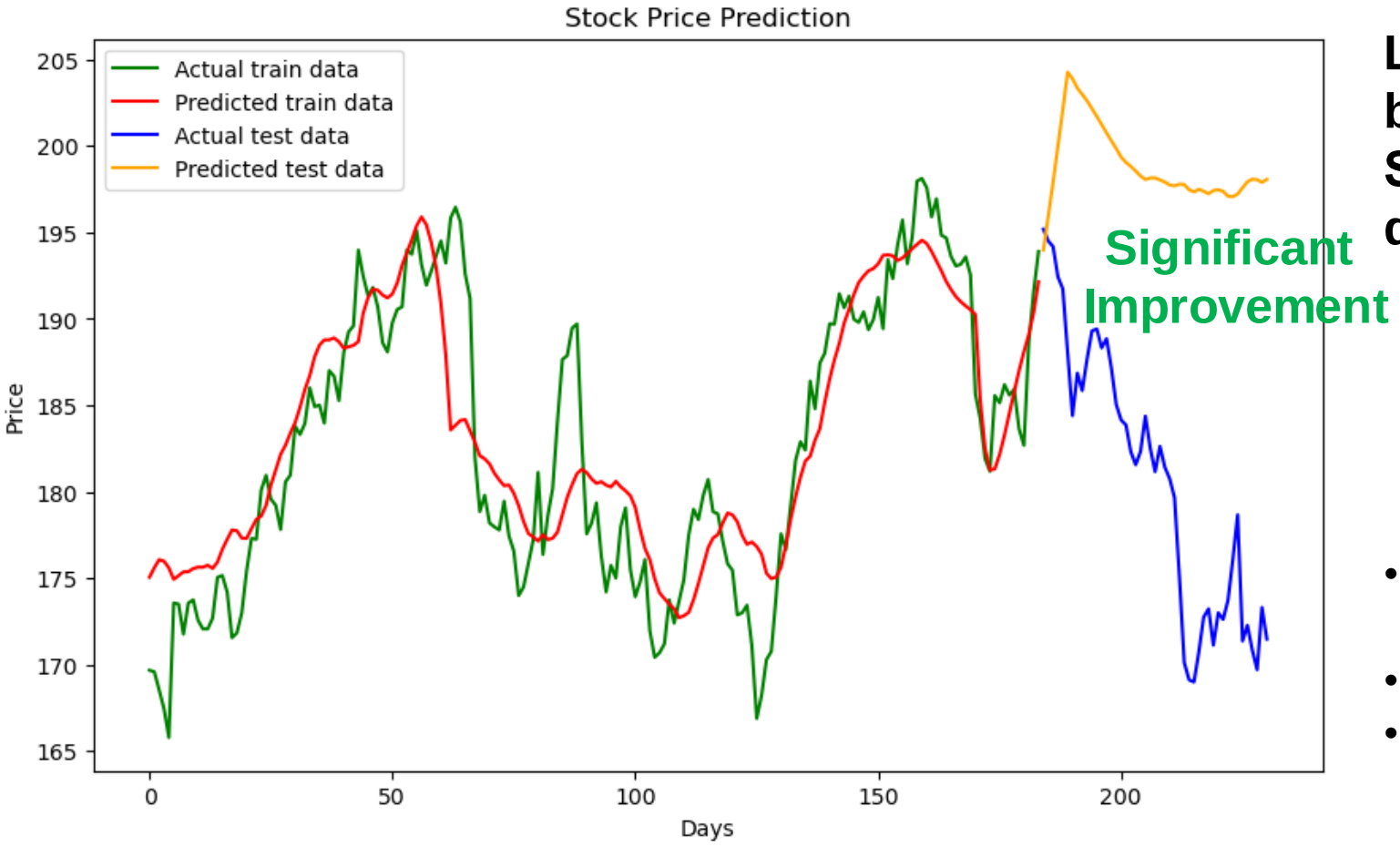
Prediction with Seasonal Financial Report Factors



Moving Averages Being Added Here

LSTM Time Series Model

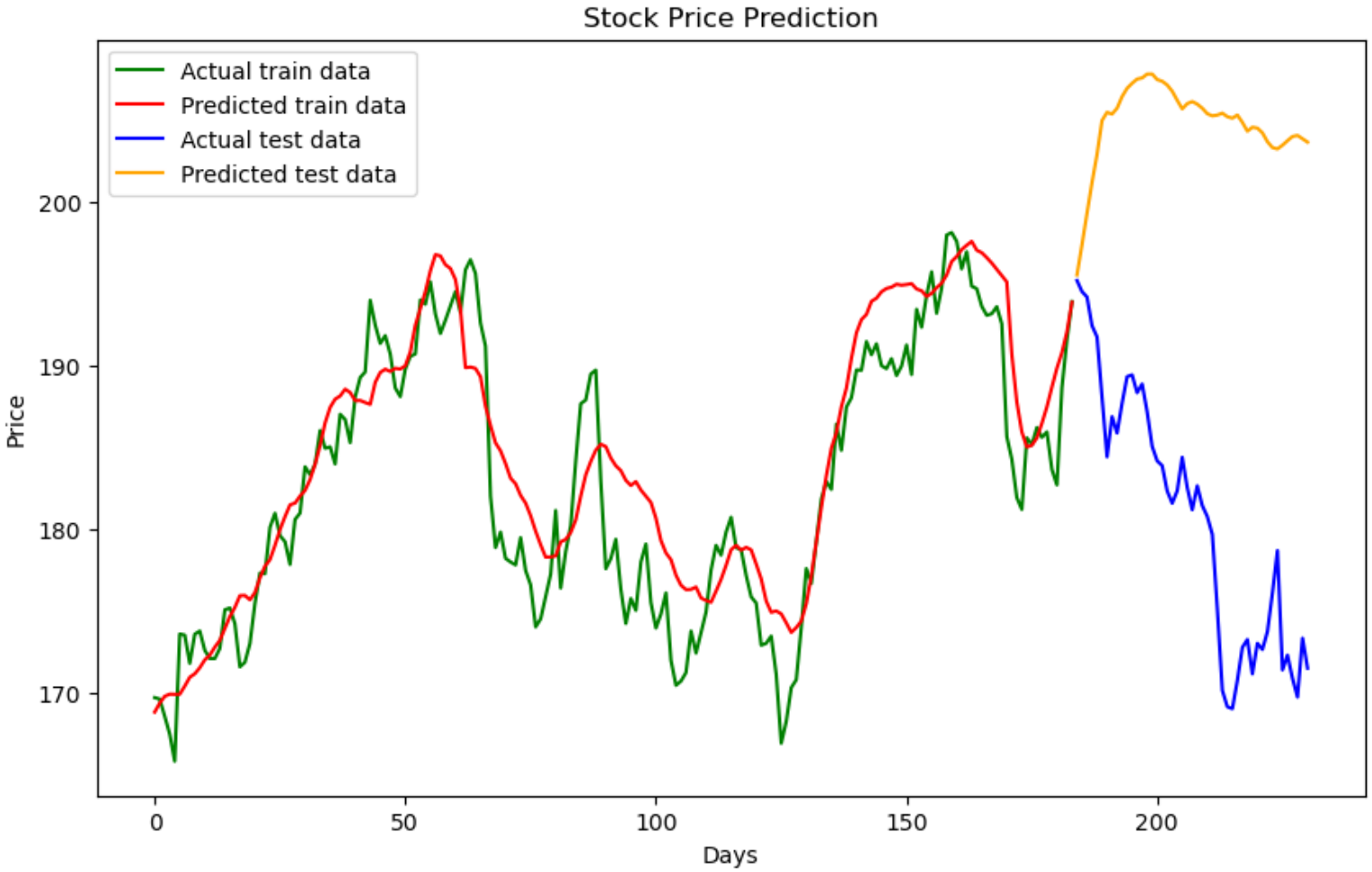


LSTM Time Series Model enhanced by combining stock prices of AAPL, S&P 500, AAPL's financial report datasets.

Mean Squared Error: 1233
Root Mean Squared Error: 35
Mean Absolute Error: 33
R-squared: -20

- Significant improvements in prediction accuracy
- Capture broader market trends
- Include reporting cycles that influence stock prices

LSTM Time Series Model



LSTM Time Series Model enhanced by incorporating stock prices from MSFT, NVDA, BABA

Mean Squared Error: 479.72
Root Mean Squared Error: 21.90
Mean Absolute Error: 20.24
R-squared: -6.92

- noticeable improvement in prediction accuracy
- more market-related data provided
- capture the complex dynamics of the stock market better

Further Improvements

- **More Data Dimensions:** trading volume, macroeconomic indicators, industry news
- **Regularization:** to prevent overfitting, incorporating L1 or L2 regularization.
- **Longer Period Dataset:** analyzing longer historical data

Application

- **Risk Management:** Estimate potential price volatility and risk
- **Timing for Buying/Selling:** e.g. buying when a price increase is predicted and selling at predicted peaks.
- **Portfolio Diversification:** Analyze correlations between different stocks or assets with the model to build a diversified investment portfolio.
- **Long-term Investment Strategies:** Choose stocks with high long-term growth potential based on the model’s predictions of long-term trends.

Thank You So Much.

Any Questions?