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Chemical Engineering, 3rd Year

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Technical Analysis

Overview

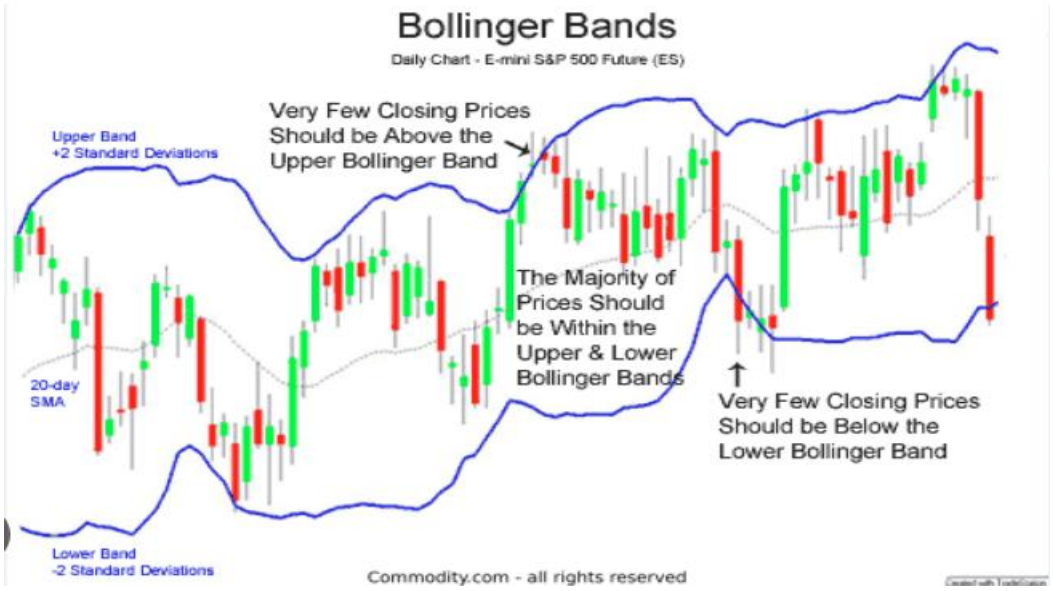
Combining Bollinger Bands and the Relative Strength Index (RSI) creates a powerful trading strategy. Bollinger Bands offer insights into price volatility and potential reversal points, while RSI indicates overbought and oversold conditions. when the price touches or crosses the upper Bollinger Band and RSI is above 70 (potential sell signal), a sell signal is generated whereas when the price touches or crosses the lower Bollinger Band and RSI is below 30 (potential buy signal), a buy signal is generated.

The project aims to develop an automated trading system based on 2 indicators and by executing trade according to this strategy, we aim to capture profitable opportunities in the market.

Hypothesis

The strategy used in this project is based on combination of 2 indicators which are Bollinger Bands and Relative Strength Index (RSI)

Bollinger Bands:



Bollinger Bands consist of three lines:

Middle Band (MA): This is typically a 20-day simple moving average (SMA) of the price.

Upper Band: Calculated as MA + (2 * standard deviation of price over 20 days).

Lower Band: Calculated as MA - (2 * standard deviation of price over 20 days).

Bollinger Bands help identify volatility and potential reversal points. When the price touches or crosses the upper band, it might be overbought, indicating a potential sell signal. Similarly, when the price touches or crosses the lower band, it might be oversold, indicating a potential buy signal.

Relative Strength Index (RSI):

RSI is a momentum oscillator that measures the speed and change of price movements. RSI ranges from 0 to 100. Traditionally, and according to Wilder, RSI is considered overbought when above 70 and oversold when below 30. Traders often look for divergence between price and RSI, which can signal potential reversals.

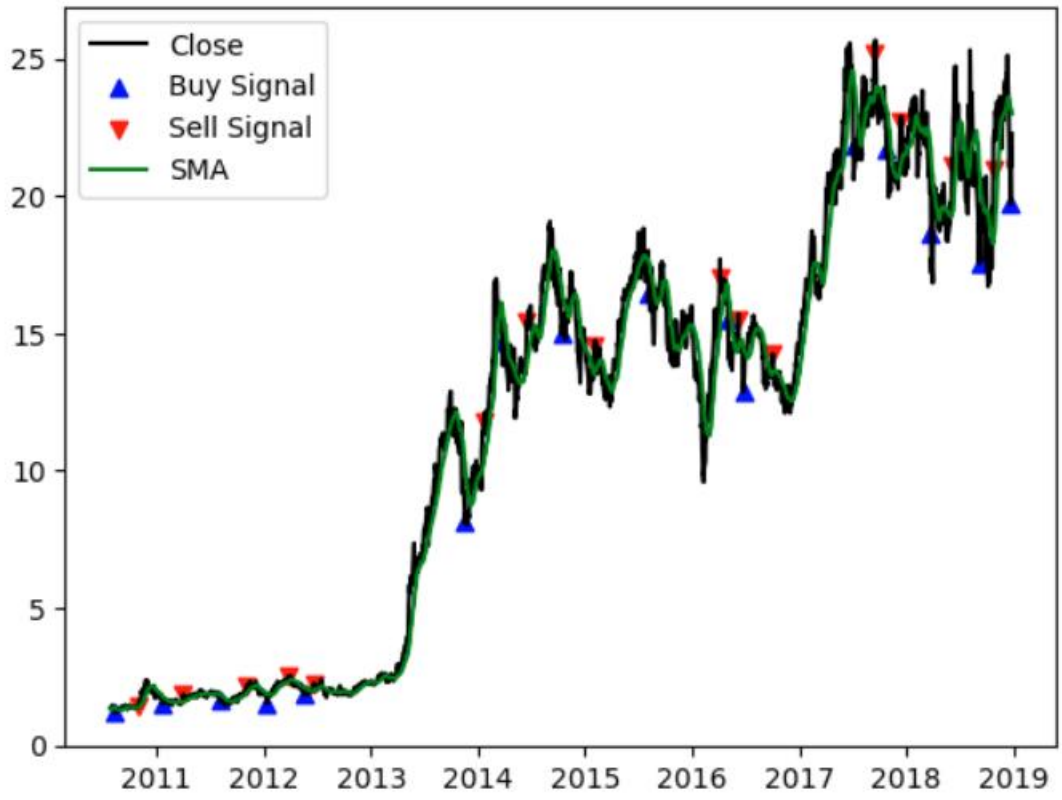
Specifications of Code

We start by importing all the necessary libraries and defining parameters for both the strategies and downloading the historical data from the yfinance library for the time period of 9 years (2010-1-1to 2018-12-31). We then implement the strategy and then plot the graphs with the help of matplotlib to visualize the buy and sell points based on the strategy.

We start our strategy by buying when a buy signal is generated and then compulsory sell signal for the sake of simplicity and better understanding of how the code works. We then calculate all the required ratios such as Total returns, annual returns, win ratio, number of profit and loss trades etc.

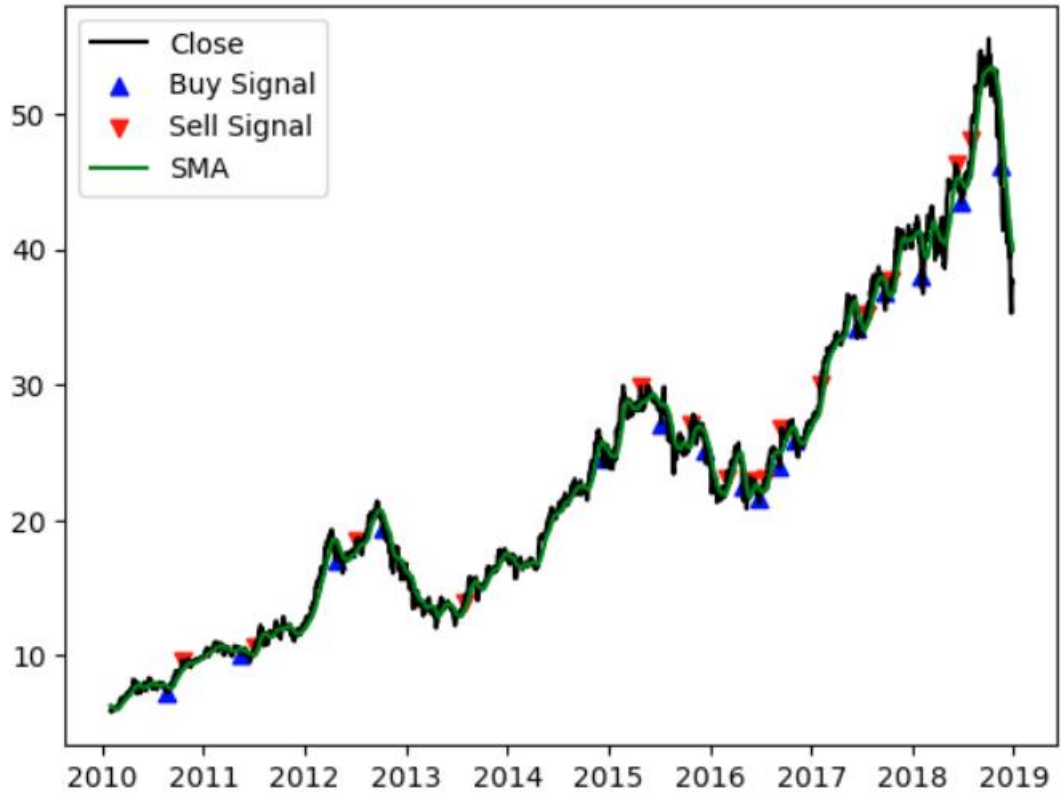
Back testing results on various Stocks.

1. Tesla (TSLA)



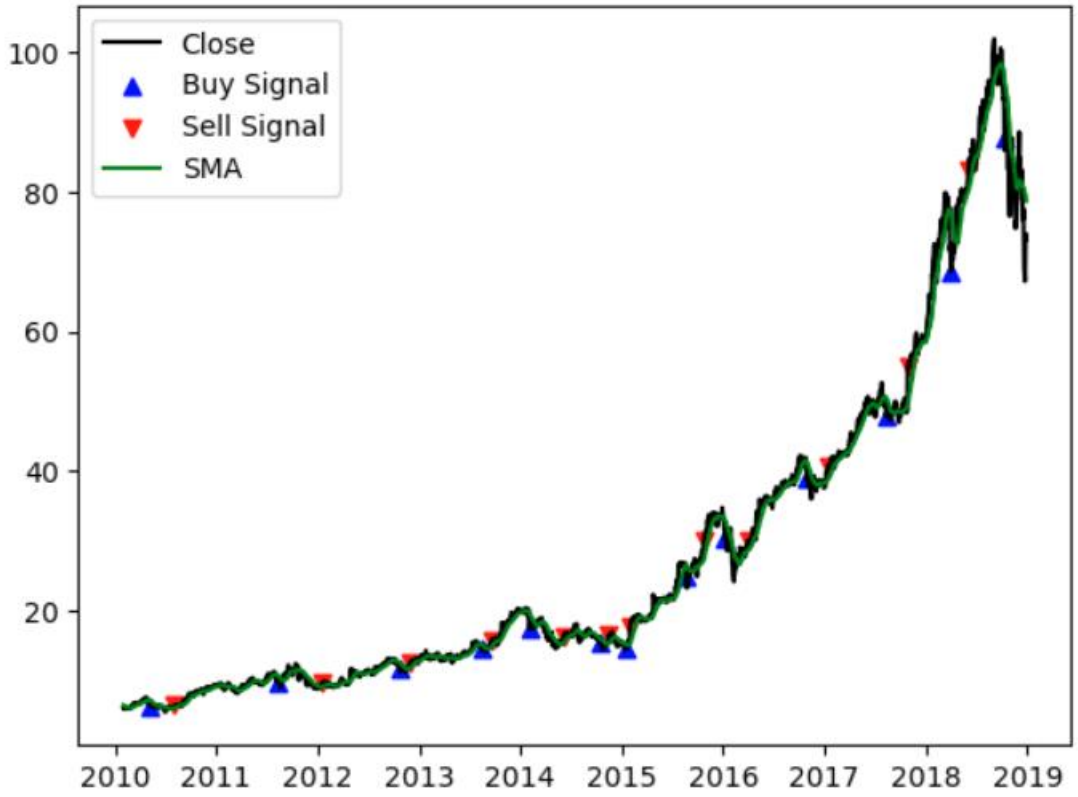
Total Result: 1658.99%
Benchmark Cumulative Return (S&P 500 Index): 119.40%
Executed Trades: 15.00
Profit Trades: 14.00
Loss Trades: 1.00
Win Percentage: 93.33
Largest Loss: -0.42
Largest Profit: 3.67
Maximum Drawdown: 0.49
Annualized Return: 37.52%

2. APPLE(AAPL)



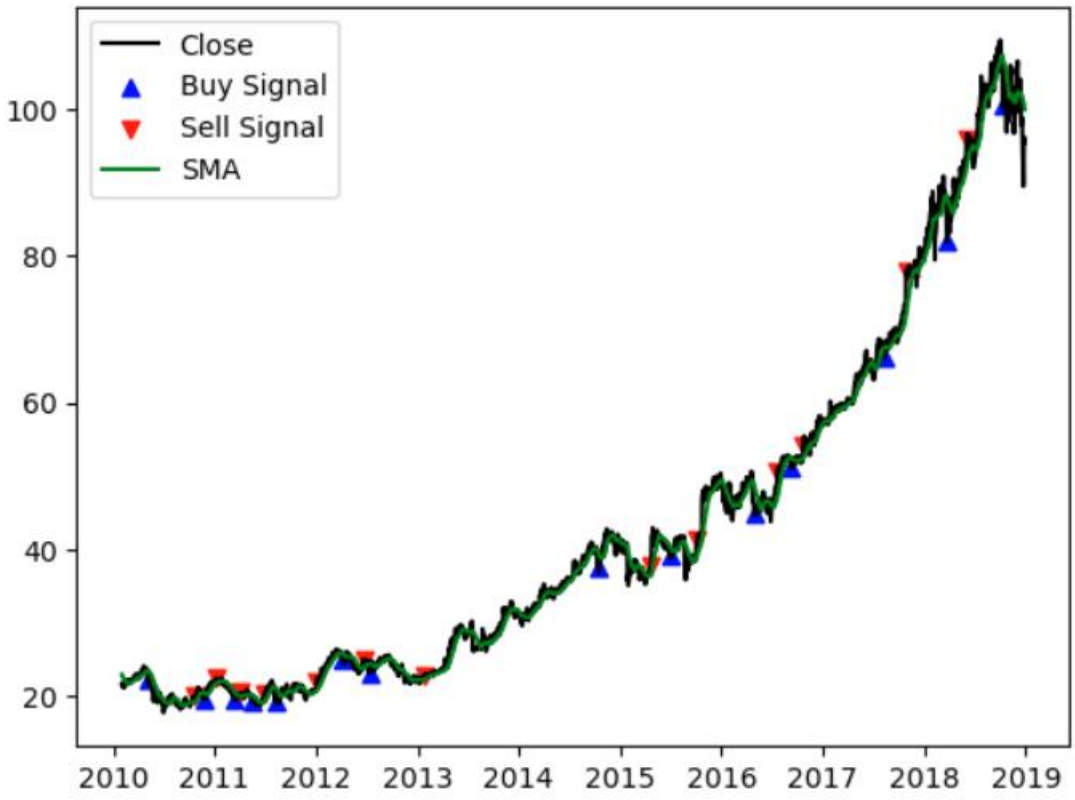
Total Result: 561.01%
Benchmark Cumulative Return (S&P 500 Index): 119.40%
Executed Trades: 15.00
Profit Trades: 12.00
Loss Trades: 3.00
Win Percentage: 80.00
Largest Loss: -5.56
Largest Profit: 8.29
Maximum Drawdown: 0.44

3. Amazon (AMZN)



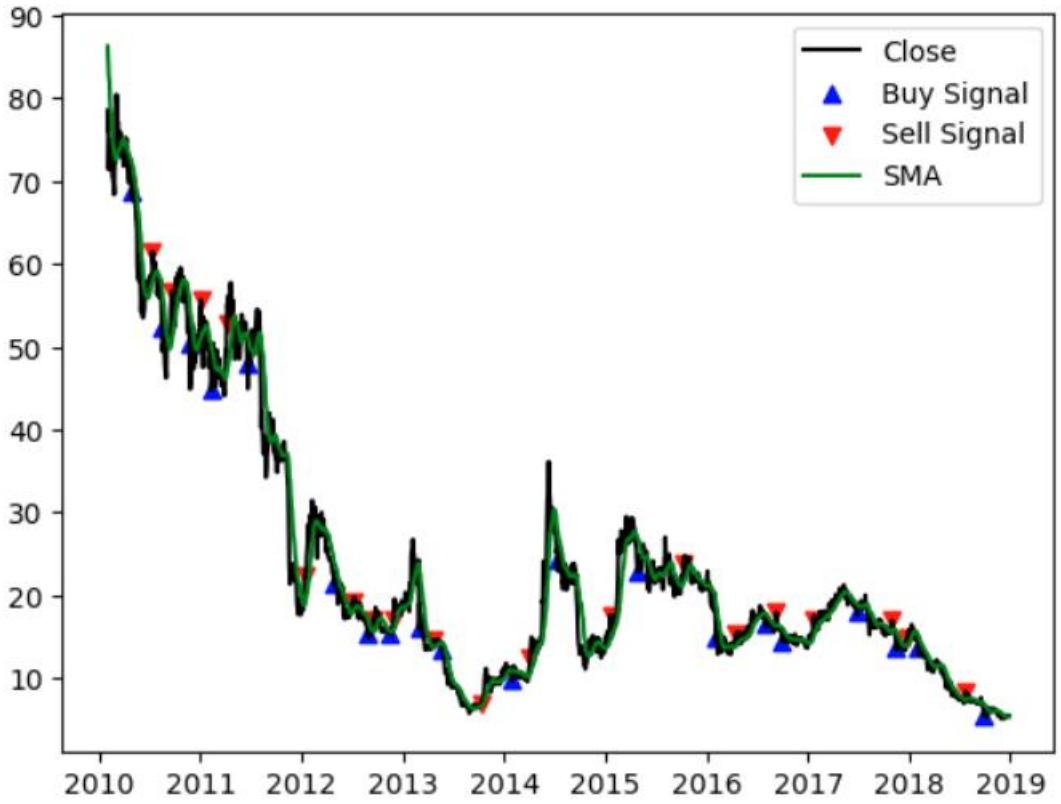
Total Result: 1232.43%
Benchmark Cumulative Return (S&P 500 Index): 119.40%
Executed Trades: 12.00
Profit Trades: 9.00
Loss Trades: 3.00
Win Percentage: 75.00
Largest Loss: -1.13
Largest Profit: 14.66
Maximum Drawdown: 0.34
Annualized Return: 33.34%

4.Microsoft (MSFT)



Total Result: 333.63%
Benchmark Cumulative Return (S&P 500 Index): 119.40%
Executed Trades: 13.00
Profit Trades: 10.00
Loss Trades: 3.00
Win Percentage: 76.92
Largest Loss: -2.22
Largest Profit: 14.03
Maximum Drawdown: 0.26
Annualized Return: 17.70%

5. Suzlon Energy (SUZLON.NS)



Total Result: -87.76%
Benchmark Cumulative Return (S&P 500 Index): 119.40%
Executed Trades: 19.00
Profit Trades: 11.00
Loss Trades: 8.00
Win Percentage: 57.89
Largest Loss: -25.60
Largest Profit: 8.15
Maximum Drawdown: 0.79
Annualized Return: -20.82%

Further Improvements

1. Trend Confirmation: We can add trend confirmation indicators like Moving Average Convergence Divergence (MACD) or Average Directional Index (ADX) to validate the trend direction before taking a trade.

2. Volatility filters: We can add a volatility filter to avoid trading during extremely volatile market conditions. For example, we can use Average True Range (ATR) and trade only when ATR values are below a certain threshold.

3. Volume Confirmation: We can also look for volume confirmation. When a trade signal is generated, we can check if there is a significant increase in volume, indicating strong market interest and potential validity of the signal.

Summary

This project underscored the significance of data driven and systematic approaches to trading and I gained a deeper understanding of how momentum strategies can be employed in real world trading scenarios. By looking for confluence between Bollinger Bands signals and RSI readings, we could identify strong entry and exit points. This project reinforced the significance of technical analysis and provided practical experience in developing and evaluating a trading strategy.