Open Project on Technical Analysis

Aim :

To develop a trading strategy utilizing *MACD*, *modified RSI* and *Volume Moving Average* each based on distinct datasets, and backtesting it on several stocks.

Indicators :

We are going to use a combination of 3 indicators:

a) *MACD :* MACD line represents the plot of the difference between the 12-day exponential moving average and the 26-day exponential moving average of the adjusted closing price of the stock.
Signal line represents the plot of the 9-day exponential moving average.

b) *Modified RSI :* RSI means relative strength index. It represents the strength of a stock. This strength index gives us an idea about probable moves of stock in the market whether it was overbought or oversold. We are also adding a 14-day exponential moving average of RSI as RSI_MA.

c) *Volume Moving Average :* Volume Moving Average (Vol_MA) will give us an idea about the volumes traded on a particular day whether it was more than of previous few days or not.

Strategy:

➤ _Buy Signal_: There are 3 conditions and we buy a stock when any one of them is satisfied
  a) RSI is above 60 when the MACD line is above the Signal line.
  b) RSI_MA line is cutting the RSI line from below (i.e. on the previous day, RSI_MA was below RSI but on the very next day RSI_MA crossed the RSI)
  c) MACD line cuts the Signal line from below (i.e. on the previous day MACD was below the signal line but on the very next day it crossed the Signal line) followed by the volume traded on that day was above Vol_MA.

➤ _Sell Signal_ : There are 3 conditions and we sell the stock when any one of them is satisfied
  a) RSI_MA line is cutting the RSI line from above (i.e. on the previous day, RSI_MA was above RSI but on the very next day RSI_MA crossed the RSI and moved downwards)
  b) MACD line cuts the Signal line from above (i.e. on the previous day MACD was above signal line but on the very next day it crossed the Signal line and move downwards) followed by the volume traded on that day was above Vol_MA.
  c) MACD line cuts the Signal line from above

★ _A person willing to take high risk can avoid the condition (c) of the sell signal as it will drastically increase the win % and returns but is sometimes unable to stop losses._

Backtesting:

> I have tested my program on the previous data of companies and found it to be reliable as it generates good returns and high win percentage.

> It also catches market upmove and generates phenomenal returns when any sector or company booms.

For example: Adani Enterprises, Adani Green, Bajaj Finance, Titan, etc.

> It also minimize the losses at initial stages which helps in generating decent profit in sideways market and good profit when market slightly show upmoves.

For example: Tata Motors, BHEL, Reliance, Infosys, Asian Paints etc.

I have presented the data of backtesting of 5 stocks here and also provided the summary and graph of the same below.:

1. *Aurobindo Pharma* : Backtested from 01-11-2013 to 02-11-2013 (10 Years)

   - No. of Buy 52
   - No. of Sell 52
   - Number of executed trades are 104
   - Total Profit is Rs. 16331.66
   - Portfolio Return 163.32 %
   - Largest profit making trade is 44.63%
   - Largest loss making trade is 16.27%
   - Maximum Drawdown is 31.76 %
   - Annualized return is 23.47 %
   - Sharpe ratio is 0.61
   - Win 50.0%
   - Benchmark return is 204.9 %

Buy and Sell Signals
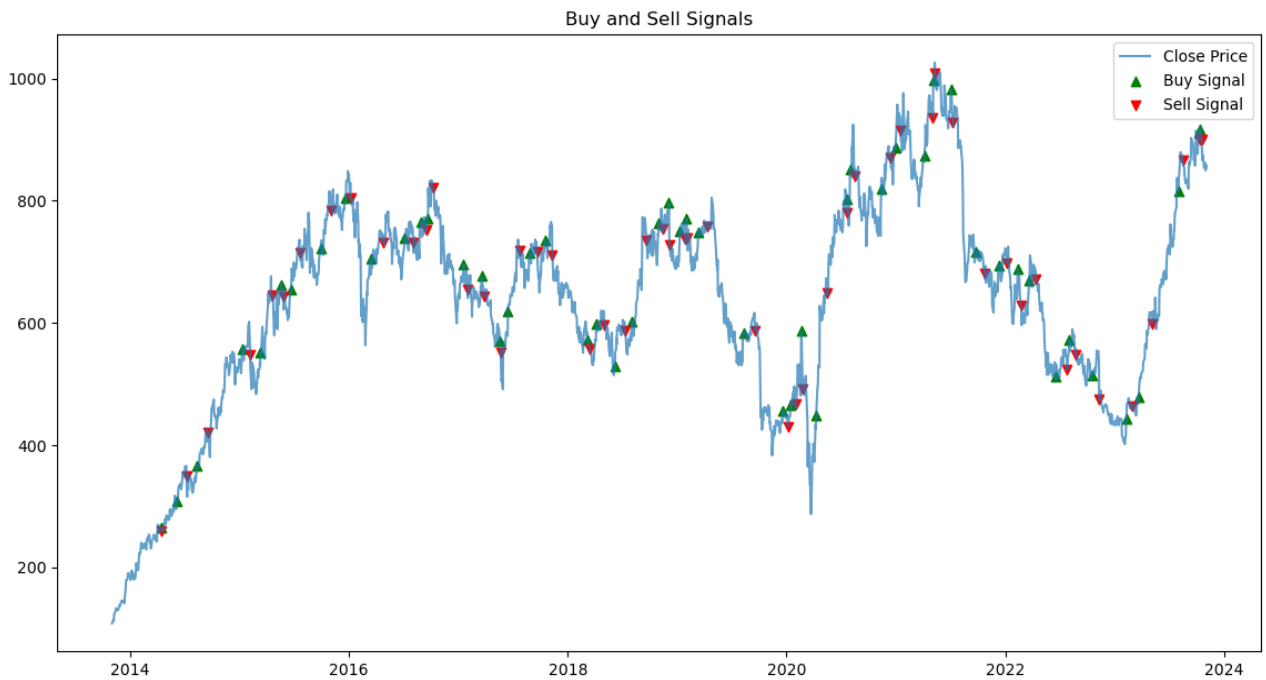
2. *Bharat Heavy Electricals Limited (BHEL)* : Backtested from 01-11-2013 to 02-11-2013 (10 Years)

- No. of Buy 45
- No. of Sell 45
- Number of executed trades are 90
- Total Profit is Rs. 75890.65
- Portfolio Return 758.91 %
- Largest profit making trade is 34.39%
- Largest loss making trade is 10.25%
- Maximum Drawdown is 15.24 %
- Annualized return is 4.15 %
- Sharpe ratio is 0.09
- Win 60.0%
- Benchmark return is 204.9 %

Buy and Sell Signals

3. *Adani Power* : Backtested from 01-11-2018 to 02-11-2023 (5 Years)

- No. of Buy 27
- No. of Sell 26
- Number of executed trades are 53
- Total Profit is Rs. 34953.3
- Portfolio Return 349.53 %
- Largest profit making trade is 104.57%
- Largest loss making trade is 11.26%
- Maximum Drawdown is 26.01 %
- Annualized return is 51.36 %
- Sharpe ratio is 0.9
- Win 42.31%
- Benchmark return is 85.26 %

4. *Adani Enterprises* : Backtested from 01-11-2013 to 02-11-2023 (10 Years)

- No. of Buy 52
- No. of Sell 52
- Number of executed trades are 104
- Total Profit is Rs. 105245.53
- Portfolio Return 1052.46 %
- Largest profit making trade is 70.19%
- Largest loss making trade is 14.07%
- Maximum Drawdown is 21.89 %
- Annualized return is 55.91 %
- Sharpe ratio is 1.03
- Win 51.92%
- Benchmark return is 204.9 %

Buy and Sell Signals
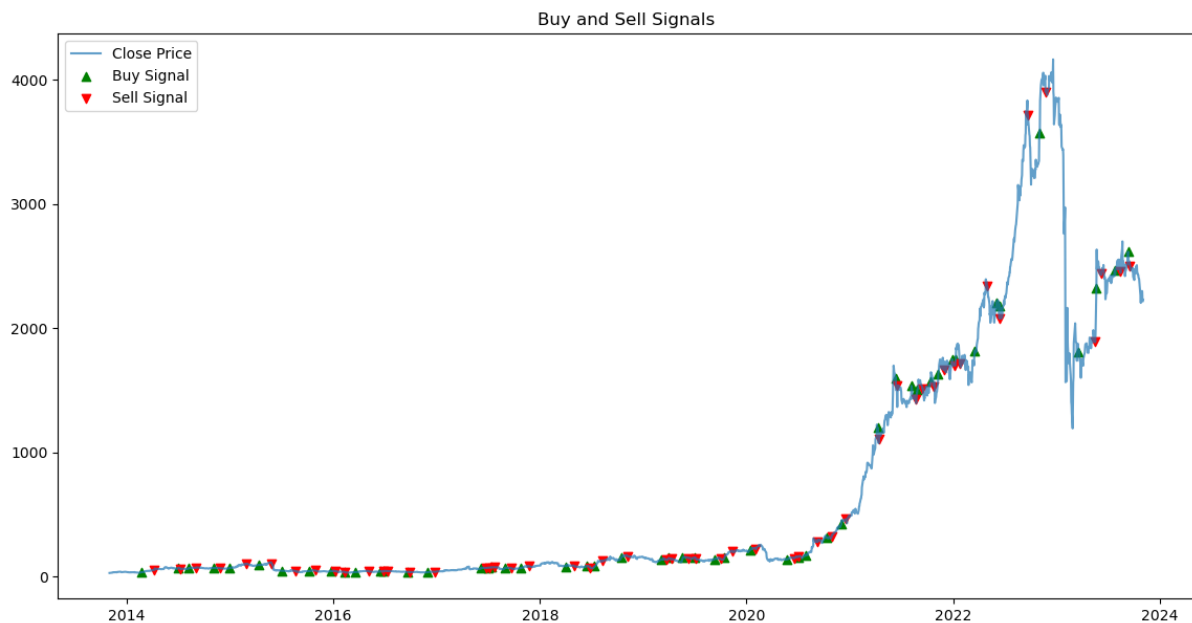
5. *Reliance* : Backtested from 01-11-2013 to 02-11-2023
   (10 Years)
   - No. of Buy 52
   - No. of Sell 52
   - Number of executed trades are 104
   - Total Profit is Rs. 19404.59
   - Portfolio Return 194.05 %
   - Largest profit making trade is 24.37%
   - Largest loss making trade is 7.77%
   - Maximum Drawdown is 13.18 %
   - Annualized return is 19.0 %
   - Sharpe ratio is 0.68
   - Win 53.85%
   - Benchmark return is 204.9 %

Buy and Sell Signals
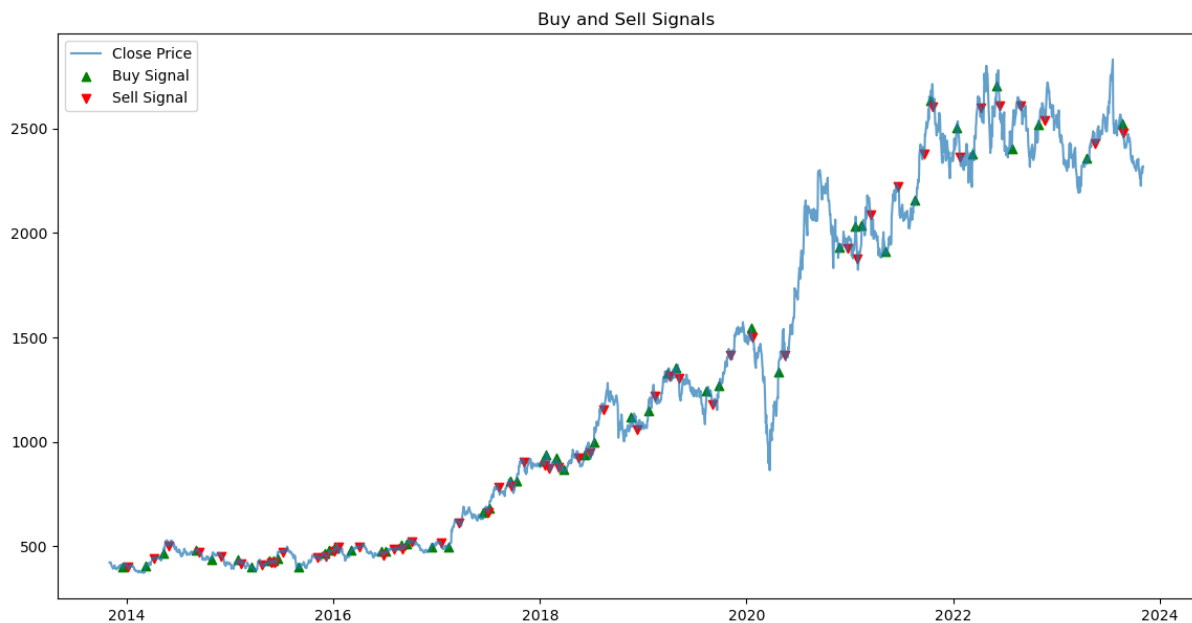
★ *I am considering Nifty-50 as a benchmark index in all cases.*
★ *More information and detailed portfolio is available as CSV files in the drive link.*

Performance :

As we can infer from the above results, it gives a win percentage of around 50-55% on average. In addition to this, it captures big moves in the market as well to increase the profit as we have seen predominantly in the case of Adani Enterprises, Aurobindo Pharma and Adani Power here.

It also squared off the position when the market was in a downtrend and this helped in limiting the losses which could be worse if the position was continued. We can see it in the case of Adani stocks as it squared off the position to minimize the loss of a trade when the Hindenburg report was published in early 2023.

★ *I have not considered the short sells. If I would consider short selling then returns will be much higher.*
★ *If a person is willing to take high risk then he can go with only the first 2 conditions for selling. This can increase the win percentage up to 70-75% and also increase returns but the risk of big losses are also present.*

Further Development :

  We can further develop this strategy in a more risk-averse way by implementing some more conditions for selling :

a) When RSI crosses the value of 50 in downward direction.
b) When RSI is in overbought zone (above 70-75).
c) When MACD starts declining along with its strength also decreasing in positive direction and involvement of big volumes on the days when red candles formed (Closing price is lower than the opening price of the stock).

 ★ *In drive folder, files with name "Stock_Portfolio.csv" contains detailed portfolio of that stock and "Stock_Summary.csv" contains summary of the backtest.*

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