

Basic Stock Bot Back Testing Simple Algorithms

In this assignment we will combine several skills covered in this class to load stock data, model stock data, and back test “what if” algorithms on the loaded Stock Data.

Collecting Stock Data

- I. Go to Yahoo Finance.
- II. Find a Stock you want to monitor and search for it in the search bar.
- III. Go to Download Historical Data to get the weekly csv.
 - a. Make sure you configured the upload to weekly.
- IV. Open the CSV in Excel and graph the results.
 - a. Check your answers by searching YourStock in a google search bar YourStock stock.
 - b. **Advice:** If you can't read it due to too much junk, fix your graphs. Ie Make more of them or other. ****Show me how it looks like when you get here**
- V. Use your existing CSV loading code from your previous project.
 - a. Load this CSV data into several ArrayLists. You may or may not need all the data that you load.
 - b. **Alternatively:** Write a data structure for all the values of a given day and load your data structure (this is the preferred way).

Calculate Relative Strength Index (RSI)

Use this site: <https://www.macroption.com/rsi-calculation/>

Write a program to calculate the RSI of your Stock Data.

1. $RSI = 100 - 100 / (1 + RS)$
2. $RS = \text{Relative Strength} = \text{AvgU} / \text{AvgD}$
3. AvgU = average of all up moves in the last N price bars
4. AvgD = average of all down moves in the last N price bars
5. N = the period of RSI

Graph the RSI for validation.

1. A common feature of RSI graphs are a line indicating 30 and 70 (these bounds are arbitrary, it could be 20/80, etc.).
2. Add this to your Excel Graph. Skip the first 28 days ($N*2$) in your graph. RSI is a momentum-based heuristic, so there is theoretically no momentum at the start of the data.

Creating a moving average trend line (MA)

1. Call your smoothing algorithm on your loaded Stock Data.
 - 1.5 This can be from any part of your PSS program or use one from the website listed later in this assignment.
2. Overlay the MA line with the loaded Stock Data.

Result: What you're doing here is creating a moving average trendline, which is one of the statistics used to help traders determine good trades.

Writing a Stock Bot

We want to use the RSI and MA to determine buy and Sell Points.

- i. Write a program where you initialize some starting balance.
- ii. Use the Stock Data that you've loaded. Load one data point (a single date) at a time.
- iii. Write a method `tradeEvaluator()` which will return the number of shares to buy or to sell, you can represent it as an integer that's positive or negative. (Or 0 for no trade)
 - a. Typically, people buy with 10%, 20%, 33%, 50%, or 100% of their account at a time.
 - b. Alternatively, 10, 100, 500, 1000 shares is another way to move shares.
- iv. At each date, your program has a job to:
 - a. either buy some number of shares.
 - b. sell some number of shares.
 - c. or do nothing. (Typically, this is the most common action.)
- v. Complete the run on the data, tracking each date what your total net worth is.

Trading Algorithm

Use Heuristics (Imperfect Measurement of your Data) to help guide an algorithm to buy or sell.

Determine when to Sell: Sell if winning too much money, sell if losing too much money.... never sell?

Determine when to Buy: Is the stock low enough, can you determine if this is a cheap as it gets without looking at future, is the RSI improving, never buy?

Possible Heuristics:

1. Mean, Variance, Standard Deviation.
2. It's above or below average.
3. The momentum of the prices are going up or down.

Write three algorithms:

1. Buy and hold for a year or more. I.e. Some form of long hold that you can theoretically exit from.
2. Use RSI + Moving Average to determine buy and sell points.
3. Implement one idea you might have.

Testing:

- i. Test your algorithm on a few stocks.
- ii. Test your algorithm on a few time frame, daily, weekly, yearly.
- iii. How does the algorithms perform on each of the scales.

Results:

Write up a report (same format as other reports for this class). Display the charts, graphs, include abstract, introduction, etc (true report format). Compare algorithms, describe what research you've done, summarize the results.