AlgoRisk Insights

Assignment 2

May 15, 2024

Submission Deadline: May 17, 14:00 hrs

Refrain from any means of plagiarism. You can take references from the web, but **links to the websites** should be clearly mentioned in a README file. Submit separate ipynb files for the problems you attempt **only after running all the cells**.

Problem 1. Code at least any 4 of the following technical indicators, along with their plots for any stock from the NIFTY 50 index:

MACD, RSI, Bollinger Bands, MFI, Supertrend, Keltner Channel

The function of an indicator should take as input the time period, and multiplier, wherever applicable.

Problem 2. In this question, you will be implementing a trading strategy (a long-only strategy) based on stop loss and take profit. First of all, let's have some definitions:

- **Stop Loss:** If the price goes below this level, we square off the trade to limit the loss.
- **Take Profit:** If the price goes above this level, we square off the trade to take the profit before it turns into a loss.

Create two lists, one for storing the buy indices and the other for sell indices. To simplify the problem, you can only be in 1 trade at a time. The trades should be continuous. You have to append the 1st date in the buy list As soon as either the stop loss or take profit hits, you have to square off the trade and start the next trade from the next day. The stop loss and take profit are defined in ratio format applied to the buying price.

The problem requires you to create a function (All trades have to be taken on the closing price):

Input: Any stock from NIFTY50, timeframe: 2019-01-01 to 2024-01-01, take profit percent and stop loss percent

Output: print buy and sell list
Also take trades based on these signals and compute the net returns.

Let's take an example:

Table 1: Stock Prices

Day	1	2	3	4	5	6	7
Close	1000	1020	1040	1050	1035	1030	1025

You entered the trade on day 1, with a stop-loss level set at 0.02, which means the stop loss for the 1st trade would be 980, and similarly, take profit is 1040.

$$\textit{Stop loss} = (1000 - 0.02 \times 1000) \quad \textit{and} \quad \textit{Take profit} = (1000 + 0.04 \times 1000)$$

The price reaches 1040 on day 3, so you exit the trade on day 3 with a profit of 40.

Similarly, you enter the trade on day 4, stop loss = $(1 - 0.02) \times 1050 = 1029$ and take profit = $(1 + 0.04) \times 1050 = 1092$.

The price fell below the stop-loss level on day 7, so you would exit the trade on that day with a loss of 25.
Hence, for these two trades, the buy list would be $[1, 4]$, while the sell list would be $[3, 7]$.