

# Assignment

In this assignment you will write a generic script that plots your portfolio growth for several strategies including "buy-and-hold" and "true labels?". Recall that buy-and-hold means that you invest \$100 in your stock at the beginning of week 1 and do not trade. As your stock varies in price, so does your portfolio. By contrast, "true labels" strategy means that you trade according to the labels ("red" or "green") that you assigned "manually":

- a "green" week means that it was a good week to be invested for that week (from the first to last trading day of this week, typically from Monday to Friday).
- a "red" week means that it was not a good week to be invested but to keep money in cash (e.g. prices fell or there was too much volatility in the price).

In this course, we are implementing a number of machine learning classifiers to predict labels. One way to compare our strategies is to compute elements of confusion matrices (e.g. True Positive, False Negative, etc.) Another way is to compare the growth (and volatility) of your (single stock) portfolio. In this

assignment we will focus on comparing portfolio performance vs. buy-and-hold and true-labels portfolios.

### Questions:

1. plot portfolio growth for "buy-and-hold", true labels and 3 nearest neighbor strategies (use optimal  $k$  that you computed and plot three graphs for kNN for  $p = 1, 1.5, 2$ ) for year 2. Each of the 5 plots should be in different color. On  $X$ -axis is the week number and on the  $Y$ -axis is the value of your portfolio for a strategy. In the legend section of the graph, indicate for each strategy an average weekly portfolio value and volatility (standard deviation). In other words, if you have 52 weeks  $1, \dots, 52$  on  $X$ -axis, you compute the portfolio values  $P_1, \dots, P_{52}$  at the end of weeks  $1, \dots, 52$  respectively. Then you compute the mean and standard deviation of these values.

Hint: if you have a Pandas frame where column 'X' contains week numbers and other columns containing portfolio values, then you can plot all your strategies using Pandas "plot" method.