Assignment

One of the common assumptions in stock market analysis is normal distribution of returns. There are statistical tests for normality. However, in this assignment, we will test it "empirically" by computing the number of days that have returns that (by absolute value) exceed some threshold. if a distribution is normal then you have as many values below the mean as you have above the mean. In addition, if μ is the mean of your daily returns and σ the standard deviation, then out of N trading days, you will expect 5% to be outside of the range $(\mu - 2\sigma, \mu + 2\sigma)$. For a year $N = 252$ and you expect about 12-13 days with abnormally high or low returns. For the overall market, this is not the case - the number of days when the market has wide swings is more than this and this provides an empirical evidence that market returns do not follow normal distribution.

You will check if your stock follows a normal distribution based on such arguments.

You can use this script to visualize your returns:

stock_data_vs_normal_distribution.py

We will analyze the normality (or lack of) intuitively of your stock by answering the following questions:

Questions:

1. for every year (2014 through 2018), compute the number of days with positive and negative returns.

2. for each year, compute the average of daily returns μ and compute the percentage of days with returns greater than μ and the proportion of days with returns less than μ. Are there more positive or negative return days? Does it change from year to year? Summarize your results for this question in a table for each year and discuss your findings. You table should have the following format:

year	trading days	μ	% days $< \mu$	% days $> \mu$

3. for every year, compute the mean and standard deviation of your daily returns. Compute the number of days that your (by absolute value) returns are more than 2 standard deviations from the mean. In other words, if $\mu = 5$ and $\sigma = 2$, compute the number of days that your (percent) daily returns are less than 1 (5 - 2*2) or more than 9 (5 + 2*2). The number of such days per year predicted by normal distribution is less than 5% (out of 252 trading days) - 2.5% below $\mu - 2\sigma$ and 2.5% above $\mu + 2\sigma$.

4. Summarize your findings in a table for each year and discuss your findings

year	trading days	μ	σ	% days $< \mu - 2\sigma$	% days $> \mu + 2\sigma$