Project Report – Portfolio Optimizer

My ulterior aim while doing this project is to improve my quantitative and programming skills. I chose this subject as this has various applications in Quantitative Investment Management. Building this from scratch will strengthen my understanding of foundational finance concepts and the coding challenges will also test my problem-solving skills.

A Portfolio Optimizer is an investment tool. It helps us to define how much weightage we must give to stocks, all while keeping the risk under check. An example for this could be an investor trying to choose the best stocks for his portfolio. He goes through hundreds of stocks, calculates returns over his desirable time period and then creates a priority list in a manner in which his capital will be divided. Let’s assume he goes through NIFTY 50 stocks. He identifies 3 stocks- INFY, TCS and WIPRO who have great returns in past 3 years and he would like to have these in his portfolio. But at the same time, he has to decide that he allocates 25% capital to TCS, 40% to Wipro and the rest to INFY. Why? Maximising returns.

My attempt is to automate this process, with precision, to save time in manual scraping and analysis of securities. The upcoming code has a basic requirement- It must be able to accurately create a portfolio of stocks and appropriately allocate capital to the chosen stocks to maximize returns. This will also incorporate the risk by calculating the risk-reward factor (Sharpe ratio, explained in the later parts.)

An interesting analogy is to fill your suitcase with most useful items while keeping the weight in limit.

Following is the python code. You can follow along with the attached comments, explaining all the ‘why’ part in most cases. My attempt will be to create a reader friendly project walk-through with proper comments and logic explanations.

I hope you find this document useful!