ISyE 6740 – Spring 2021
Project Proposal (or Final Report)

Team Member Names: Siddharth Gudiduri

Project Title: Stock Market Investment

Please include (at least) the following sections.

Problem Statement

The purpose of this project is to maximize expected returns on investments made in the stock market. We also want to minimize risk on investment. We are going to allow user to input stocks they may want to choose in their portfolio, or they may choose not to select any stocks. We are going to allow such constraints in this project. To pilot this project we may use Robinhood type apps to buy stocks or use market watch to make portfolio selection better. Many researchers have contributed to portfolio optimization in their own way, however in this project we want to allow constraints giving users ability to decide on the amount they want to invest, along with stocks they may want to choose. For example, a user may want to include one Tesla stock or a combination of amazon and google stock or may be to exclude cigarette stocks. We are however not going to take short selling under consideration for this project.

(Optional) Data Source

Data will be obtained by scraping various websites to get ticker information. One site, https://finance.yahoo.com, is considered to have latest company financial information. Along with https://tradingview.com/markets/stocks-usa/market-movers-all-stocks/, that has information for all stocks. https://datahub.io/core/s-and-p-500-companies/r/0.html, contains information about industry specific stocks. Finally Robinhood API(robin_stocks) python library will be used to collect tickers metadata such that user can invest in Robinhood app. We will use ticker metadata, such as name, price, change rate, change %, Volume, Avg Volume, Market Cap along with user inputs such as investment budget, constraints on stocks in, to train and optimize our model. We will be using timeseries data for the ticker to create covariance matrix of returns for stocks.

Methodology

For this problem we will

- First define the investment amount budget B
- Next, retrieve number of stocks available n
- Calculate expected return of stock r
- Find the covariance matrix of return of stocks C
- Next, we will calculate the amount invested in stock Xi

- Add constraints such as
    - Investment amount of stocks should be greater than 0
    - Sum of all invest amount should be less than budget
- Additional constrains such as
    - Subtracting transaction fees from budget per stock
    - Personal Investment constraints
- Next, we will test our model by reducing dimension for data, However I am not sure how this is going to work.
- There will be standardizing and normalizing of data
- Finally, we will build objective function from above variable to maximize expected return.
- We will also use modern portfolio theory and cutting-edge research done in this field for stock selection.
- This idea is to use this model in real world so that users can be guided into making money using stock market as a weekend warrior.

Evaluation and Final Results:

We will set a starting value for our personal investment. This value can be $1000, $2000, $5000 as stating investment, then we will calculate returns from our model. We will use month by month returns from our portfolio selection and apply then to starting cash balance. From this we will get a monthly picture of how our portfolio investment is doing.