Dynamic Portfolio Optimization

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This is the Read-Me on how to run the various portfolio optimization codes .

There are three python implementations ->

1) The first Python file implements Portfolio Optimization using HRP/HERC

   Python Code Link -> Google Colab Link

2) The second Python file implements three Portfolio Optimization Algorithms which are ->

   Hierarchical Clustering + Mean Variance Optimization
   Black Litterman Investor Views + Hierarchical Clustering
   Hierarchical Clustering + HRP Optimization

   Python Code Link -> Google Colab Link

3) The third Python file implements Portfolio Optimization using MVO + Bayesian analysis

   Python Code Link -> Google Colab Link

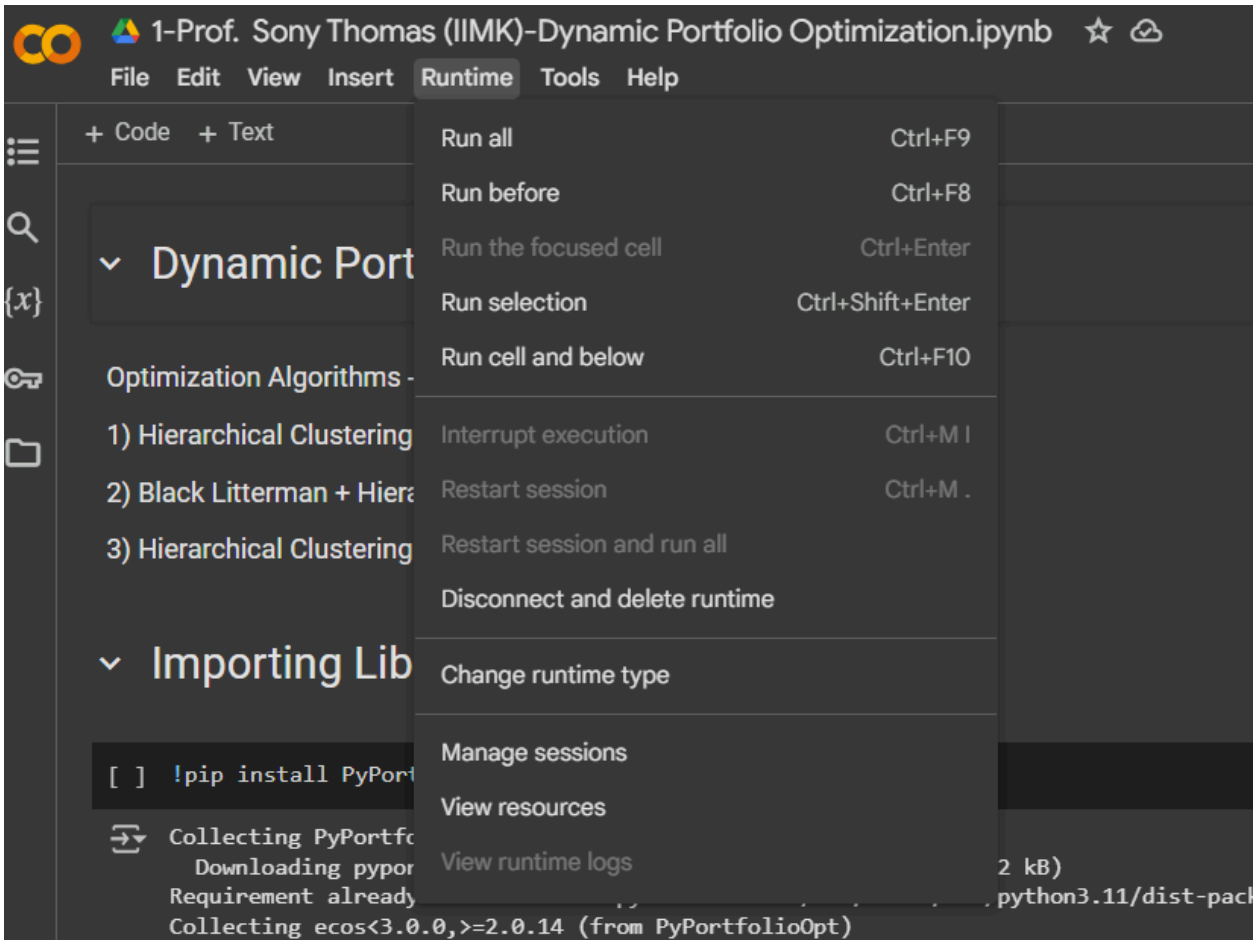
How to Run the Code ->

Steps ->

1) Open the python file in Google Colab using the link provided .

2) Click on the **Runtime** option in the taskbar .

3) Select the **Run All** option from the drop-down menu .



4) The file takes some time to run all the cells .

Now these steps are for the second implementation ->

5) The program asks the user for the following inputs ->

    1) The Strategy to use out of the three algorithms . The user can select **1** for Hierarchical Clustering + Mean Variance Optimization , **2** for Black Litterman Investor Views + Hierarchical Clustering and **3** for Hierarchical Clustering + HRP Optimization .

    2) Next the user can enter the tickers of the stocks he wants to keep in his portfolio separated by comma or press enter for the default list of stocks tickers .

    3) Next the user can enter the start date and end date for the back testing of the portfolio or press enter for default dates .
    Please ensure that the data for the stocks exists for the date ranges that you have chosen . The file can throw an error if the stocks were not listed in the date ranges .

    4) Next the user can select the number of top stocks the user wants to keep in his portfolio .

        Make sure that the number of top stocks are less than or equal to the number of stocks given in the above prompt .

        The top stocks function ranks the stocks on the basis of the final score calculated on the basis of technical analysis/indicators , fundamental analysis/ratios and sentiment analysis .

    5) Next the user can choose the lookback period which is the period of data used to calculate the initial optimal weights of the portfolio .

    6) Next the user can enter the rebalance period after which the optimal weights are calculated again .

        Choosing appropriate rebalance period affects the transaction cost incurred during the back testing .

7) Next the user can choose the number of clusters into which the user wants to divide his portfolio .

8) Finally the user can enter the initial capital for the portfolio .

The user needs to choose the parameters like Strategy to be used , Number of stocks to keep in the portfolio , The rebalance period (to account for transaction costs) and the Number of Clusters according to his own wish to maximize the profit and minimize the risk he wants to take .

Default values are set for each of these parameters .

The Algorithm automatically backtests the portfolio on the historical data and provide the useful metrics to judge the portfolio results like ->

Portfolio Performance Metrics:

1) **Total Return**
2) **Annualized Return**
3) **Sharpe Ratio**
4) **Maximum Drawdown**
5) **Total Transaction Costs**

The Algorithm also provide the following data frames of the optimization process->

1) **trades_df -> History of all the trades that have happened with the Stock traded , Entry Date , Exit Date , Number of Stocks traded and Net Profit/Loss from the trade .**
2) **portfolio_df -> History of the Portfolio Value with Daily Return , Transaction Costs , Total Value Traded .**
3) **weights -> Weights history of each asset in the portfolio .**

If you want to make changes to the file make a copy of the file in you Google Drive .

-> Go to File option in the taskbar and select the Save a copy in drive option .