Risk attribution analysis description

1. Data Preprocessing

   We first utilized data preprocessing provided by Tao to grab daily stock closing price and calculate portfolio value and output dataset data1.csv.

2. Risk calculation process

   a) Overall, our calculation of risk attribution utilized a weighted average of risk attribution of different stocks.

   $$\Sigma_P = \sum_{i=1}^{N} C\Sigma_i = \sum_{i=1}^{N} w_i MC\Sigma_i$$

   b) The formula for marginal risk contribution of each stock is determined by the volatility and correlation with portfolio, therefore as shown below:

   $$MC\Sigma_i = \sigma_i \rho_{i,p} = \sigma_i \frac{\sigma_{i,p}}{\sigma_P}$$

   c) Then after knowing the overall process, we will need to calculate portfolio value, standard deviation and stock weight, standard deviation as shown in the python code Vol.py.

   d) Worth noticing is that we calculate volatility using 21 days rolling window, as for a month's trading days.

3. Output

   a) We will have a graph of different stocks' risk contribution over the portfolio investing time

   b) And we will have the output data set df1 in the python file, with last column "PC" as each stock each day's risk contribution. Users can directly output the plot and dataset into excel for further analysis