Issued: March 7, 2024   ISE 789/OR 791 HW #3   Due: March 28, 2024

Consider two cases of the dataset, tenstocks.csv:

a. Take the stock price of XOM(Exxon Mobil Corp) as X, and the stock price of MSFT(Microsoft Corporation) as Y.

b. Take the prices of four stocks, XOM(Exxon Mobil Corp), APA(APA Corp(US)), PG(Procter & Gamble Co) and JPM(JPMorgan Chase & Co) as X, and the stock price of MSFT(Microsoft Corporation) as Y.

1. (20 points) Perform linear soft SVR with $C = 1, 10, 100$ and $\epsilon = 1, 3, 5, 10$ on the two cases respectively. Visualize the best fitting model with the data in case a, and plot the fitting value VS. average value of $X(\frac{x_1 + x_2 + x_3 + x_4}{4})$ in case b. Evaluate the MSE, MAE, MSPE and MAPE of your best fitting model based on five-fold cross validation in both cases.

2. (40 points) Perform the kernel-based LSSVR model with Gaussian kernel on the two cases respectively, with $C = 1, 10, 100$ and $\epsilon = 1, 3, 5, 10$. V Visualize the best fitting model with the data in case a, and plot the fitting value VS. average value of $X(\frac{x_1 + x_2 + x_3 + x_4}{4})$ in case b. Evaluate the MSE, MAE, MSPE and MAPE of your best fitting model based on five-fold cross validation in both cases.

3. (20 points) Perform the kernel-based LSSVR model with nonhomogeneous polynomial kernel the two cases respectively, with $k = 2, 3$. Visualize the best fitting model with the data in case a, and plot the fitting value VS. average value of $X(\frac{x_1 + x_2 + x_3 + x_4}{4})$ in case b. Evaluate the MSE, MAE, MSPE and MAPE of your best fitting model based on five-fold cross validation in both cases.

4. (20 points) Putting problems 1, 2 and 3 together, what do you learn from doing this exercise in terms of LSSVR, Gaussian-kernel based LSSVR and polynomial-kernel based LSSVR?