IE 412 AI for Finance

Hands-on Practice on Session #3

Factor analysis with clustering

Main TA for this assignment: Youngbin Lee, E-mail: young@unist.ac.kr

Here is the Colab link.

Description

Write a short report about the following.

1) **Clustering: In clustering, we grouped stocks together based on their similarities. Let's describe three different clusters. (3pts)**

   A. You may refer to company names and market capitalization within each cluster, and compare clusters with the F-F 3 factors.

   B. For example,
   "Cluster 1 consists of technology companies that are known for their innovative products and services. These companies often have high growth potential and are considered volatile. Some representative stocks in this cluster include Apple (AAPL), Microsoft (MSFT), and Amazon (AMZN). The market capitalization of these technology stocks tends to be high due to their significant presence in the market. For example, as of the latest available data, Apple (AAPL) has a market capitalization of $2.5 trillion, Microsoft (MSFT) has a market capitalization of $2.0 trillion, and Amazon (AMZN) has a market capitalization of $1.7 trillion. When comparing this cluster with the F-F 3 factors, stocks exhibit higher market risk (beta) due to their volatility. Additionally, their market capitalization is often significant, indicating a larger size factor."

2) **Clustering: Try different clustering methods and explain how they differ from original results (k-means). (3pts)**

   A. You may change the model (e.g., KernelKMeans, KShape) and distance measures (e.g., DTW, softDTW), referring to the following link:
   https://tslearn.readthedocs.io/en/stable/gen_modules/tslearn.clustering.html#module-tslearn.clustering

3) **Regression: Select one stock of your choice and perform regression fitting with the factor. Then, compare and interpret the results with the example of APPL stock shown in the PPT. (4pts)**

   A. You can refer to the values of beta, alpha, and R-squared, but provide interpretations rather than just listing the numbers.

   B. FYI, beta is a measure of a stock's sensitivity to factor movements, alpha represents the excess return of a stock compared to its expected return based on its beta, and R-squared is a statistical measure that represents the proportion of the stock's price movement that can be explained by the factor being analyzed (in other words, the degree to which the factor explains its price movement).