DATA HANDLING AND VISUALIZATION

MGMT 675

AI-Assisted Financial Analysis

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DATA HANDLING

- Merge
- Filter
- Sort
- Aggregate by group
- Transform

VISUALIZATION

- Distributions
  - Histograms, density plots, box plots, pie charts
- Bivariate
  - Line plots, scatter plots, scatter plots with regression lines
- 3D
  - 3D plots, contour plots
- Interactive plots saved as html

DATASETS

- metrics.xlsx and tickers.xlsx.
  - Download from the course website.
  - Upload in Julius.
- Online data from various sources.

MERGE METRICS AND TICKERS

- Ask Julius to merge the datasets on the ticker column
- Ask Julius the following.
  - How many rows are there?
  - What are the column names?
  - What are the unique values in the category column?
  - What are the unique values in the sector column?
  - Show the head of the data frame.

FILTER

- Ask Julius to filter on the category column to “Domestic Common Stock” and “Domestic Common Stock Primary Class.” Ask Julius to call this data frame common_stock.
- Ask Julius to create a copy of the common_stock data frame that contains only rows for which pe>0.
- Ask Julius to create a copy of the common_stock data frame that contains only rows for which marketcap is above the median marketcap.

SORT

- Ask Julius to sort on marketcap in descending order and to show the head of the data frame.

AGGREGATE BY GROUP

- Ask Julius to describe marketcap.
- Ask Julius to compute the mean marketcap by sector.
- Ask Julius to compute the number of firms by sector.
- Ask Julius to compute the total marketcap by sector.

- Ask Julius to compute the mean pe grouped by (sector, scalemarketcap) and to display the results as a two-dimensional table.
- Ask Julius to recreate the table using only rows for which pe > 0.
- Ask Julius to compute the percent of firms for which pe < 0 by sector.

TRANSFORM

- Ask Julius to create a new variable equal to the rank of marketcap in descending order.
- Ask Julius to create a new variable that is 1 if pe>0 and 0 otherwise (a dummy variable).
- Ask Julius to create a new variable equal to the excess of pb over the median sector pb.

YAHOO FINANCE

- Daily open, high, low, close, adjusted close, volume
- Income statement, balance sheet, and statement of cash flows for past 5 years
- Current market option data (bid, ask, last price, open interest, implied volatility, …)

FEDERAL RESERVE ECONOMIC DATA

- Ask Julius to use the pandas-datareader to get the history of crude oil prices from FRED.
- Ask Julius to get the history of 3-month, 1-year, 5-year, and 10-year Treasury yields from FRED.
- Ask Julius to get the history of inflation rates from FRED.

KEN FRENCH'S DATA LIBRARY

- Ask Julius to get the Fama-French factors from Ken French's data library.
- Ask Julius to list the datasets on Ken French's data library.
- Ask Julius to get the 48 industry returns from Ken French's data library.

OTHER DATA

- Ask Julius to find the constituents of the S&P 100.
- When Julius provides a link, ask Julius to read the table at the link.

VISUALIZATION EXAMPLES

- Ask Julius to create a density plot of marketcap in the metrics dataset.
- Ask Julius to save as a jpeg and provide a link.
- Ask Julius to create a bar chart of total marketcap by sector using the merged dataset.
- Ask Julius to make the font size larger.
- Ask Julius to create a pie chart of the number of firms by sector using the merged dataset.

- Ask Julius to use seaborn to create a boxplot of marketcap by sector. Ask Julius to save as a png.
- Ask Julius to use plotly to create a boxplot of marketcap by sector in the merged dataset and to include the ticker in the hover data. Ask Julius to save as html.
- Ask Julius to use plotly to create a figure containing line plots of the 3-month, 1-year, 5-year, and 10-year Treasury yields. Ask Julius to save as html.
- Ask Julius to recreate the figure using the plotly_white template.

- Ask Julius to calculate the daily percent changes in the crude oil price and to create a filled density plot using seaborn.
- Ask Julius to create a filled contour plot of the function $z = (4x + y)^2$ for x and y between -2 and 2.
- Ask Julius to create a 3D plot of the same function on the same range.