

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 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.

- 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 use plotly to create an animation showing a plot of the 3-month, 1-year, 5-year, and 10-year Treasury yields as a function of maturity. Tell Julius to use the date as the animation frame.