

Assignment 2

1. Scatterplots and Bivariate Distributions

The spreadsheet Basel_Temp_History.xlsx contains historical data of the temperature of the Basel city.

- a) Generate a scatterplot of the mean Basel Temperature versus,
 - i. Bitcoin rate (in US dollars)
 - ii. Facebook stock price
 - iii. Google stock price
 - iv. Microsoft stock price
 - v. WTI crude price
 - vi. Brent crude price
- b) Generate a bivariate
 - i. histogram of the temperature of the Basel city with
 - Bitcoin rate (in US dollars)
 - Facebook stock price
 - Google stock price
 - Microsoft stock price
 - WTI crude price
 - Brent crude price
 - ii. cumulative frequency distribution of the temperature of the Basel city with
 - Bitcoin rate (in US dollars)
 - Facebook stock price
 - Google stock price
 - Microsoft stock price
 - WTI crude price
 - Brent crude price
- c) Generate plots of the marginal frequency distributions for the temperature of the Basel city and,
 - Bitcoin rate (in US dollars)
 - Facebook stock price
 - Google stock price
 - Microsoft stock price
 - WTI crude price
 - Brent crude price
- d) Generate plots of the conditional frequency distributions for,
 - Bitcoin rate (in US dollars)
 - Facebook stock price
 - Google stock price
 - Microsoft stock price
 - WTI crude price
 - Brent crude price

When the temperature of the Basel city is in the 17 to 24 °C range and -5 to 2 °C range.

2. Covariance and Correlation

a) Calculate both the covariance matrix and correlation coefficient matrix between,

- Temperature of the Basel city
- Bitcoin rate (in US dollars)
- Facebook stock price
- Google stock price
- Microsoft stock price
- WTI crude price
- Brent crude price

Use Numpy and Pandas packages to verify your results. Plot your results of the covariance matrix and correlation matrix using matplotlib and seaborn.

b) Repeat part (a) to calculate the rank correlation coefficient.

3. Regression

a) Calculate the slope “m” and intercept “b” coefficients of a linear predictor of

- Bitcoin rate (in US dollars)
- Facebook stock price
- Google stock price
- Microsoft stock price
- WTI crude price
- Brent crude price

from the temperature of the Basel city?

b) Use the regression line to predict the dependent variable (Bitcoin rate, Facebook stock price, Google stock price, Microsoft stock price, WTI crude price, and Brent crude price) for each temperature measurement. Create a scatter plot of the data pairs as points and also plot the predicted line.

c) Calculate the residuals and plot them against the temperature of the Basel city (independent variable). Calculate the correlation coefficient between them. Create the Q-Q and P-P plots of the residuals. Compute the mean and variance of the residuals. Comment on how good the predictor is.

d) Plot a histogram of both the predicted and actual data of the dependent variables (Bitcoin rate, Facebook stock price, Google stock price, Microsoft stock price, WTI crude price, and Brent crude price). Also, calculate the mean and variance of predicted and calculated data of the dependent variables. Observe and explain the difference between them.

4. Repeat Q 1, Q 2 and Q 3 for latest five years of the data. Compare the results with Q 1, Q 2 and Q 3 results.