HW2

(due date: 2021 05 03)

IMPORTANT: For grading to be done correctly make sure you follow the instructions precisely.

Deliverables: You are required to submit the following two files:

1. A Python file containing all the commands and scripts.
2. An executive report. In other words, a pdf file summarizing what you have done and the results for each exercise; basically, your report. The pdf file should contain only the essentials. Up to one-third of the assignment grade can be deducted for poorly organized and formatted report.

Q1)

For this exercise we will use the data stored in **dats501_hw2_DataFile_nutritions.csv**. It contains the nutritional values per serving size for a large variety of foods as calculated by the USDA. The variables in the dataset are:

- ID
- Desc - Short description of food
- Water - in grams
- Calories - in kcal
- Protein - in grams
- Fat - in grams
- Carbs - Carbohydrates, in grams
- Fiber - in grams
- Sugar - in grams
- Calcium - in milligrams
- Potassium - in milligrams
- Sodium - in milligrams
- VitaminC - Vitamin C, in milligrams
- Chol - Cholesterol, in milligrams
- Portion - Description of standard serving size used in analysis

(a) Create a histogram of Calories. Make the plot presentable. Describe the shape of the histogram. Do you notice anything unusual?

(b) Create a scatterplot of calories (y-axis) vs protein (x-axis). Make the plot presentable. Do you notice any trends? Do you think that knowing only the protein content of a food, you could make a good prediction of the calories in the food?

(c) Create a scatterplot of Calories (y-axis) vs 4 * Protein + 4 * Carbs + 9 * Fat + 2 * Fiber (x-axis). Make the plot presentable. If you are at all familiar with nutrition, you may realize that this formula calculates the calorie count based on the protein, carbohydrate, and fat values. You'd expect then that the result here is a straight line. Is it? If not, can you think of any reasons why it is not?

Q2)

Do below:

- Use “range” function to create 11 values from 1 to 10 in an increasing order and assign the result to variable “a”
- Use “numpy arrange” function to create 11 values (step: -1) from 10 to 1 in a decreasing order and assign the result to variable “b” (hint: https://numpy.org/doc/stable/reference/generated/numpy.arange.html)
- Use “numpy arrange” function to create 21 values (step: 0.5) from 10 to 1 in a decreasing order and assign the result to variable “b2”
- Use “ * ” to create 10 times 1 values and assign the result to variable “c”
- Use “numpy power” function to create powers of 2 using the values in b array and assign the result to variable “d”

(a) Write a function called “f_sumOfSquares” that can be able to understand the size of a list and then can calculate the sum of the squares in that list. (Hint: A method is to use loop sum squares of the values until the elements in the list finishes). Apply the function to a,b,c,d values

(b) Write a function called “f_rms_diff”

- Arguments:
  - A vector of numeric data x.
  - A vector of numeric data y.
- Function hint: root(
  mean (
  squares of (difference (x,y))
)
)

https://en.wikipedia.org/wiki/Root-mean-square_deviation

- Provide your function, as well as the result of running the following code:
  - rms_diff(x = a, y = b)
  - rms_diff(x = d, y = c)
  - rms_diff(x = d, y = 1)
  - rms_diff(x = a, y = 0) ^ 2 * length(a)

Q3) Write a rock paper scissors game with 2 and 3 players.

- Arguments:
  - movePlayer1
  - movePlayer2
  - movePlayer3
- Output: Winner or draw
- Details:
  - The game will start with a welcome screen as “WELCOME to our ROCK-PAPER-SCISSOR GAME”
  - It will take your player moves as string input among “rock”, “paper”, “scissor”, “Taylor Swift” options. If the game sees “Taylor Swift” for the Player3 option, it will understand that only 2 players are available in the game (Hint: https://www.w3schools.com/python/ref_func_input.asp)

- The game will either finish when a winner is available or when the number of rounds exceed 5. Each implementation is okay. Draw is not accepted for that 5 rounds. An option is to use a while loop

BONUS: Rock, Paper, Scissors, Lizard, Spock

No loop is needed, the game finishes in 1 round

https://www.youtube.com/watch?v=x5Q6-wMx-K8&ab_channel=Wozamil

https://bigbangtheory.fandom.com/wiki/Rock,_Paper,_Scissors,_Lizard,_Spock