CS384 2020 Assignment 2

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Deadline: 23rd Sep 2020, 17:00 hrs

You are given a file "result.csv" having two columns x, y. The code to input two columns as list is also given in **test_cases_tutorial02.py**. You need to implement 13 functions (def() are already provided). Remember you can not use inbuilt functions of Python. Only inbuilt functions **sqrt**, **abs** are allowed, but inbuilt python functions like min, max, sort etc.. are not allowed.

For sorting you can use any of the bubble, insertion or any sorting algorithm. You also need to implement the summation function that returns the sum of a given list. If any of the formula uses the $\sum$ formula, you need to call the summation function wherever needed. The summation function returns sum of all elements of the list. The formulas that you need to implement are shown below. Each function needs to be committed separately. So you will have 13 commits (atleast 13, twelve for below functions and 13th sort function, it is mandatory to commit each function and having a commit statement of atleast 6 words)

Traverse into the **CS384_2020_skeleton** folder and run the command "git pull" (without quotes). Now copy the "Assignment2" folder from the **CS384_2020_skeleton** to your repo and start coding !

Decimal: use the round(x,3) function. 3 Decimals only

Notations:
x_i = actual values;
y_i = predicted values;
$\bar{x}$ = mean of actual values;
$\bar{y}$ = mean of predicted values;
n = # observations; Basically total values in the chosen column
σ = standard deviation

1. $Summation = \sum_{i=1}^{n} x_i$
2. Mean: $\mu = \frac{1}{n} \sum_{i=1}^{n} x_i$
3. Mean square error: $MSE = \frac{1}{n} \sum_{i=1}^{n} (x_i - y_i)^2$
4. Root mean square error: $RMSE = \sqrt{\frac{1}{n} \sum_{1}^{n} (x_i - y_i)^2}$

5. Nash Sutcliffe Efficiency coefficient: $NSE = 1 - \frac{\sum_{i=1}^{n}(x_i - y_i)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$

6. Pearson correlation coefficient: $PCC = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$

7. Mean absolute error: $MAE = \frac{1}{n}\sum_{i=1}^{n}|x_i - y_i|$

8. Median : You know how to compute median.

9. Variance: $\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x_i})}{(n)}$

10. Standard deviation: $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2}$

11. Skewness: $skewness = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{(x_i - \bar{x})}{\sigma}\right]^3$

12. Kurtosis: $Kurtosis = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{(x_i - \bar{x})}{\sigma}\right]^4$