Fall 2024 CSE 518: Assignment 1
Human Performance Modeling: Fitts' and Steering Laws
Deadline: 10/01/2024 11:59pm EST

Aim: Using Fitts' law and steering law to model input data.

Procedure:

1. Fitts' Law :
    - Review Lectures slides 3 – 5 from piazza resources.
    - Start with <GROUPID>_FL.csv as the input file.
    - Calculate the Index of Difficulty (ID = $\log_2\left(\frac{D}{W}+1\right)$) for each row in the input file. The Movement Time (MT in milliseconds) is given to you. State the formula you used.
    - Use a linear regression model to predict the mean MT given an ID value, and calculate the parameters a and b such that MT = a + b * ID.
    - Plot a graph of ID vs the mean MT: The actual values and your model's prediction.
    - Calculate R_Squared and RMSE to measure goodness of fit.
    - State in 2 - 3 sentences your final observations.
    - State in 1 sentence, your final conclusion based on the observations in the previous step.
    - All above steps should be clearly indicated in Section 1 of A1.ipynb
    - The results_FL.csv file should contain the following values: a, b, R_Squared, RMSE
2. Steering Law :
    - Review Lectures slide 6 from piazza resources.
    - Start with <GROUPID>_SL.csv file as the input file.
    - Calculate the Index of Difficulty (ID) for each row in the input file. The Movement Time (MT in milliseconds) is given to you. State the formula you used.
    - Use a linear regression model to predict the mean MT given an ID value, and calculate the parameters a and b such that MT = a + b * ID.
    - Plot a graph of ID vs the mean MT: The actual values and your model's prediction.
    - Calculate R_Squared and RMSE to measure goodness of fit.
    - State in 2 - 3 sentences your final observations.
    - State in 1 sentence, your final conclusion based on the observations in previous step.
    - All above steps should be clearly indicated in Section 2 of A1.ipynb
    - The results_SL.csv file should contain the following values: a, b, R_Squared, RMSE

What you should turn in:
1. Our TA will share randomly generated dataset with you. Each dataset has a <GROUPID>. (please do this well in advance of the deadline)
2. The assignment should be submitted on Brightspace as a single .zip file in the format <SBUID>_<GROUPID>_A1.zip
3. The <SBUID>_<GROUPID>_A1.zip file should contain only A1.ipynb (iPython notebook) with relevant code and your explanations and 2 .csv files (results_FL.csv and results_SL.csv)

Grading Criteria:
1. For each Section (50 points)
2. Linear Regression parameters a and b estimation: 20 points
3. Plot ID vs MT: 15 points
4. R_Squared and RMSE: 15 points
5. Deduct 5 points for not following the file naming convention.