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Final Exam

CSC 746: Human-Computer Interaction

Spring 2021

Answer to Problem 1:

<u>**Hypothesis 1**</u>**:**

Hypothesis: The Screen length-width ratio is better in layout 1 is better than Layout 2.

Dependent Variables: Number of mistakes per user for both layouts. Time taken per user.

Independent variables: Number of users.

Participants: All age-groups equally distributed with and without slight visual impairment.

Experiment method: A fixed number of users are given to use both the layouts. The number of errors made for each user is noted. Time taken for each user is noted. The average of errors for each layout is calculated. Average time taken by the users per layout is calculated. Some usability metric is used with these two values which will indicate the better layout.

<u>**Hypothesis 2**</u>**:**

Hypothesis: The navigation and control keys layout in layout 2 is better than in layout 1.

Dependent Variables: Number of errors per user for each layout. Time taken by each user to complete the task for each layout.

Independent variables: number of users.

Participants: Fixed number of users of all age groups with equally distributed left and right handedness.

Experiment method: A fixed number of users are given to use both the layouts. The number of errors made for each user is noted. Time taken for each user to complete the task is noted. The average of errors by the users for each layout is calculated. Average time taken by the users per layout is calculated. Some usability metric is used with these two values which will indicate whether the hypothesis stands true.

Answer to Problem 2

Report for Problem 2

Introduction: The dataset contains files of two interfaces A and B. Two CSV files are provided. One of the files contain number of errors per task per user and the other file contains time taken per task per user. Our goal is to attempt some statistical measures on these data that will indicate two things:

1. Which System is better for each task.
2. Which System is better overall.

Reading files: We construct a class for each system. The class objects are:
1. errors: contains a data frame of the errors per task per user.
2. time: contains a data frame of the time taken per task per user.
3. num_users: contains the number of users.
4. num_tasks: contains number of tasks.

Evaluation heuristics: We have developed statistical measures to give us a ballpark figure indication of the usability of the systems using the data provided.

1. **System usability per task:** For evaluating which system is better for each task, we have developed a usability equation,

$$Usability\ per\ task = \frac{1\ x\ 10^3}{error\ average\ per\ task + time\ average\ per\ task}$$

The program calculates the average of errors made by all the users and time taken by the users for each task of both the systems. Then it uses the above equation to find the usability score with the help of the two averages for each tasks of both systems. Then, the program compares the usability scores for each task from both the systems, and the system with the higher usability score is the better system, which is also displayed by the program.

2. **Usability per System:** For evaluating the overall usability of the system, we have developed the following statistical measure:

$$Usability\ per\ System = \frac{1\ x\ 10^4}{error\ average\ per\ system + time\ average\ per\ system}$$

The errors and time taken for all the tasks is summed for each user for both systems. Then the average of all user errors and times is calculated which gives us two average values for each system. We use the Usability per System measure to calculate the overall Usability of each system by plugging in the average time and average error values of each system into the equation. The system with a larger usability score is a better system.