

CS 598AK Fall 2021

Homework 2

due by email to alexkirlik@gmail.com one week it was assigned.

In this homework assignment, you will demonstrate the statistical techniques discussed in *Experimental Human-Computer Interaction*, chapters 5.2.2 - 5.2.3.

You are provided with an Excel file ("Homework2.xlsx") which contains the data you will use to perform the analysis and worksheets where you should show your solutions to the below questions. Additionally, provided are PDF files ("F-table.pdf" and "q-table.pdf"), which you should use in your calculations.

You are to submit 2 files for grading – please include your UI NETID in their file NAMES:

1. A filled out "Homework2.xlsx" file, which contains worksheets labeled "Question 1" through "Question 5" to show your solution and work.
2. A PDF file containing narrative explanations for the solutions for the questions.

You are to base your calculations on chapter 5.2.2 - 5.2.3 and the formulas listed in Appendix A2. You are NOT to use any statistical packages, such as R or SPSS, nor any statistical add-ons.

The purpose of this assignment is to perform the analysis and demonstrate the process by showing your work. You may use Excel, Google Sheets, or other spreadsheet software to complete the assignment, but submission of your analysis must be as an Excel file (for stats) and a PDF file (for narrative answers to the questions posed).

Katherine wanted to understand how changing the interface for users of a software application affected their satisfaction rating, time, and error rate. The attached Excel file shows the data Katherine collected. She split her 90 participants between the 3 versions of the interface, Interface X, Y, and Z. The Excel file shows the participant data.

After using the application for one day, all participants answered questions regarding their satisfaction. This resulted in a satisfaction score, Score 1. After two weeks using the application, participants answered the same questions regarding their satisfaction. This is the column of data participants answered the same questions regarding their satisfaction. This is the column of data labeled Score 3. Additionally, users performed a series of tasks in her lab where their average time and error rate were recorded. These are labeled in the Excel sheet as Time and Error.

Note: When reading a statistical table such as a t-table, q-table, or f-table, if the number of degrees of freedom you require are not listed, you should always round your degrees of freedom down to be more conservative. For example, if only the test statistic for degrees of freedom 100 and 200 are available and you have 170 degrees of freedom, you should use the test statistic for 100 degrees of freedom.

1. Plot histograms for each of the data values. In the PDF file justify why you should or should not perform a parametric test for the satisfaction scores for Interface X, Y, Z, time, or error rate. Hint: Error rate data for each condition and satisfaction scores for Interface Z should not be treated as normal.

2. Perform a repeated measure ANOVA to find if differences exist between satisfaction scores for Interface X. Do the same for Interface Y. Show your work on the tab labeled Question 2. Explain why you should not use this approach for Interface Z in the PDF file. Report your findings in the PDF for interfaces X and Y using the language shown on the bottom of page 135 as a template.

3. On the tab labeled Question 3 perform post-hoc pairwise comparison tests (Tukey) for the appropriate results from question 2. Report any differences in the PDF using page 209 as a template.

4. Perform an independent measure ANOVA to find if differences exist between time measures between conditions. Show your work on the tab labeled Question 4. Explain why you should not use this approach for the error measure in the PDF file. Report your findings using the language shown on the bottom of page 135 as a template.

5. On the tab labeled Question 5 perform a post-hoc pairwise comparison (Tukey). Report any differences in the PDF using page 209 as a template. NOTE: In Table A2.6, the approximation of simple average, (n) the equation used $k / \sum (nk)$ should be inverted, thus it should be $\sum (nk) / k$.