CS 598AK

Homework 4

due by email to alexkirlik@gmail.com by 5pm 1 week after date assigned

1 Description

In this homework assignment, you will demonstrate the statistical techniques discussed in Experimental Human-Computer Interaction, chapters 5.4 - 5.5.1.

You are provided with an Excel file ("Homework4.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, you will use the PDF files provided in Homework 3 (q, F, U, Wilcoxon, χ^2 tables).

You are to submit 2 files for grading:

- A filled out "Homework4.xlsx", which contains worksheets labeled "Question 1" and "Question 3" to show your solution and work.
- A PDF file containing explanations for the solutions for the questions below.

You are to base your calculations on chapters 5.4 - 5.5.1 and use the formulas listed in Appendix A1 and A2. You are NOT to use any statistical packages, such as R or SPSS, nor any statistical add-ons or inferential statistical tools found in Microsoft Excel or Google Sheets. You may use descriptive statistic formulas such as SUM, SUMSQ, AVERAGE, and SUMXMY2.

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.

2 Instructions

Erin asked 20 participants to complete the same task using 4 different interfaces. She then asked them to rank their preference for which interface was easiest to complete the task where 1 represented the "easiest" and 4 represented "hardest". The data is shown in the sheet labeled "Data 1" in "Homework4.xlsx." You may use this information to answer question 1 below.

1. Perform the appropriate test(s) to answer the question of which interface(s) were perceived as easiest to complete the task with. Show your work on the" Question 1" sheet and explain your findings in the PDF file. Follow the appropriate procedure for reporting your findings.

2. In Homework 3 - Question 4, you examined the error rate and time it took for participants to complete the tasks. Does the data indicate that a time-accuracy tradeoff was possible for any of the interfaces? In the PDF explain what a time-accuracy trade-off is, how you would determine if a time accuracy tradeoff was present, and if one was present in Homework 3. You do not have to perform the calculations.

Donnie asked participants to provide a rating on a 1 to 7 scale on the aesthetic appeal of 4 different interfaces, with 1 indicating "Very Unattractive" and 7 indicating "Very Attractive". Each participant only provided a rating for 1 interface. The data is shown in the sheet labeled "Data 2" in "Homework 4.xlsx." Use this information to answer question 3 below.

3. Perform the appropriate test(s) to answer the question of which interface(s) were perceived as most attractive. Show your work on the "Question 3 tab" and explain your findings in the PDF file. Follow the appropriate procedure for reporting your findings.

3 Errata

This section contains errors found in the text of the EHCI book that have been discovered so far. Please account for these errors.

- Table A2.6: The approximation of simple "average" n, the equation used ($\frac{k}{\sum_{i=1}^{k} n_k}$) should be inverted, thus it should be $\frac{\sum_{i=1}^{k} n_k}{k}$.
- Page 223 (Appendix A2): The formula for calculating the χ^2 value is incorrect. The denominator $nk(nk+1)$ should be $nk(k+1)$, remove the extra n in your calculations.
- Page 226 (Appendix A2): The formula for standard error for conditions c and d, the sqrt sign should encompass the entire formula, thus it should be $\sqrt{\frac{N(N+1)}{12}(\frac{1}{n_c}+\frac{1}{n_d})}$. Additionally, though this formula is only for when there are no ties in mean ranking (the book does not indicate this), you should use this formula even if ties are present.