Module: Data Analytics for Immersive Technology

Assignment: G-CA

Due: See Moodle

Credit: See Moodle

Objectives:

To practice the following:

- Statistical inference for numerical data.
- Generation of descriptive statistics (graphs, tables) for data.
- Formulation and use of appropriate tests.
- Use of R language and RStudio.

Statistical Analysis & Report (90 marks):

Dental surgical procedures like impacted third molar surgery (ITMS) may lead to increased intraoperative anxiety and pain perception in patients. Psychological interventions like meditation have been shown to decrease anxiety levels in individuals. Data from a study is presented which investigated the effect of mindfulness meditation on intraoperative anxiety and pain perception in patients. There are a number of methods employed to assess patient distress in general, and pain, anxiety and/or fear including observer-rated, self-report, parental-report, and physiological measurements. Intraoperative anxiety and pain perception measures were assessed using physiological (i.e., Galvanic Skin Response (GSR)) and self-report (i.e., Verbal Numerical Rating Scale (VNRS)) measurements, respectively. Both measurements are in the range 0 to 10. The study consisted of 100 patients (M=50, F=50) divided into two groups, *control* and *meditation*, using random sampling. All patients were adult and no information on age was recorded.

The data gathered is available in the CSV file accompanying this document. As part of this assignment, you are required to perform statistical analysis on these data. This will involve completion of the following steps:

1. Determine whether the data provided is appropriate for the test(s) available and that any analysis is achievable.
2. Formulate a hypothesis test to be used to compare the effectiveness of the two approaches (control, meditation) used during dental surgery.
3. Analyse the data to provide the hypothesis testing conclusion.
4. Provide descriptive statistics (graphs and tables) of the data.
5. Determine the 95% confidence interval for the population mean of each group, and the 95% confidence interval for the difference between the means of the two groups.

These steps will result in the generation of one or more R files and a short report (1200 words max). The report will have the following structure:

1. Short Introduction **(5 marks)**
2. Statement of the research question **(5 marks)**
3. Statement of all assumptions **(10 marks)**
4. Descriptive statistics **(15 marks)**
5. Formulate tests and carry out testing **(15 marks)**
6. Comment on results **(15 marks)**

Code Commenting, Graph Formatting & Report Quality (20 marks):

A total of **five marks** will be awarded for the clear commenting of any (non-trivial) line of R code and clear description of any novel processing and/or user-defined functions.

Next, **five marks** will be awarded if all included graphs and tables are clearly formatted to maximise readability (heading, labs, tick spacing and frequency, plot character)

Finally, you will be awarded a maximum of **ten marks** based on the **clarity, coherence,** and **quality** of your written expression. This corresponds to a report that is clear in its expression, logical in its presentation of the steps followed, and free from grammatic and typographic errors.

Version Control Requirements (10 marks):

You must use a recognised **online** code repository (e.g., GitHub) and make **regular well named** commits to your **private** repository. A link to your code repo **must** be included in a README as part of the final submission and you **must** add your lecturer as a developer to the repository. The repository **must** be named as *"2022_DAIT_GCA_<StudentInitials1>_<StudentInitials2>"*

Your grade for this component will depend directly upon the regularity of your commits. A development project of this size should consist of a minimum of **10+** distinct commit messages spread over the lifetime of the development. Committing all your code in one commit, before the deadline, will be interpreted negatively.

Any submission made which does not include a repository link will not be graded.

Submission Requirements:

1. A single **ZIP** file containing your report in **PDF** format and a **README** file containing a link to your repository. Ensure that NO changes are made to the repository following the submission deadline. You should create a separate branch/fork for this submission and leave it unchanged after the deadline.
2. The assignment must be entirely the work of each student group. Students are not permitted to **share** any pseudocode or source code from their solution with any other group in the class.
3. Students may not **distribute** the source code of their solution to any other student, in any format (i.e., electronic, verbal, or hardcopy transmission).
4. Plagiarised assignments will receive a mark of **zero**. This also applies to the individual/group allowing their work to be plagiarised. Any plagiarism will be

reported to the Head of Department and a report will be added to your permanent academic record.

5. Late assignments will only be accepted if accompanied by the appropriate **medical note**. This documentation must be received within 10 working days of the project deadline. The Institute standard penalties for late submission will apply.
6. Each student group must complete and sign a single **assignment cover sheet**. Please submit the signed cover sheet before 5pm on the Friday of the week of the deadline.
7. Online individual **video interviews** for this project will be scheduled in the first week following the deadline. You will need both **audio** and **video** in this interview so please ensure that you have both setup beforehand and adequate connection speed to support the video session (i.e., download/upload speeds >= 1.2Mbps). The interview will **not** take place in the absence of video and audio from your side of the connection.
8. Failure to attend the interview will result in a **0% grade**. Both students in a group will be required to answer several **questions** on your **submission** to **demonstrate understanding** of the submitted project.

References:

- https://www.futureproofinsights.ie/2021/04/08/all-you-need-to-know-galvanic-skin-response-gsr/
- https://www.clinicalpainadvisor.com/pediatric-pain-management/verbal-numerical-rating-scale-a-reliable-pediatric-pain-assessment-tool/