**Assignment 2: Neuroscience of Decision Making PSY 3/507 (Monsoon 2024)**

**Name:**

**Roll Number:**

**Instructions:** Please write your own responses and do not copy or lift text/code from any source (including the paper). If you are referring to credible external sources other than the attached paper for your answers, please cite those sources (within the body of text and the provide a reference list at the end) in the APA citation format (<https://www.mendeley.com/guides/apa-citation-guide>). Word limits given are indicative and less than the indicated numbers may also be used.

**Please download this MS word question-cum-response template to TYPE your answers and feel free to add sheets as required. Convert this document to a PDF and rename the file: name\_roll no. before submitting. Please note that answers in this template only will be evaluated and hand-written or scanned answer sheets will not be evaluated.**

**[Strict deadline for submission: 5.11.2024 Tuesday 11.00 AM]**

1. **Fill the following form** [**https://forms.gle/68zPBahEw9JxakyN8**](https://forms.gle/68zPBahEw9JxakyN8)

**2(A)**

**A researcher conducted a random dot motion discrimination task with 2 different motion coherence levels as different conditions. 30 participants performed 100 trials in each condition and the evidence accumulation was recorded. Column 1 of cell array = Condition 1 and each cell of Column 1 has one participant’s data. Each cell has a 100 x 1000 matrix. Each row of the matrix = one trial for 1000 ms. The evidence accumulation starts from 300 and reaches the decision threshold at 600.The same convention applies to data from Column 2.**

**The data is attached herewith: Assignment2\_2A\_NDM\_2024.mat’.**

**[ links about importing MATLAB data arrays into Python and R**

[**https://in.mathworks.com/help/matlab/matlab\_external/matlab-arrays-as-python-variables.html**](https://in.mathworks.com/help/matlab/matlab_external/matlab-arrays-as-python-variables.html)

[**https://stackoverflow.com/questions/11671883/importing-an-array-from-matlab-into-r**](https://stackoverflow.com/questions/11671883/importing-an-array-from-matlab-into-r) **]**

**Now solve the following. Insert a figure (wherever required) and paste the MATLAB/Python/R code for the same. Any figure must provide all information necessary to interpret it including axes labels, captions/legends (simple figure titles as captions are not enough).**

**From the data, calculate reaction time (RT) for all 100 trials of each participant. Divide the time axis in 20 bins (each bin of 50 ms) and calculate the mean RT for all 30 participants for both conditions. Plot one histogram of the mean RT distribution for each condition separately (total = 2 histograms). Mark the mean of the distribution with a red line and report on the title. Conduct an appropriate statistical test to compare the mean RT (across participants). Report the results with test statistics and p values. [5 points + 1 point + 2 points]**

**Interpret the findings with respect to motion coherence. [2 points]**

**(Hint: If the data in each of the two groups follow a normal distribution, use a parametric statistical test for testing the difference of two independent group means. Otherwise, use a suitable non-parametric counterpart of the parametric test.)**

[**https://in.mathworks.com/help/stats/hypothesis-tests-1.html**](https://in.mathworks.com/help/stats/hypothesis-tests-1.html)**).**

[Answer]

**2(B)**

**Please use the attached data file (Assignment2-2B-NDM-2024.xlsx). Each page of the Excel file contains data of one behavioural experimental condition (Cond) for 10 participants (P1 to P10). The participants were shown noisy images of different conditions and instructed to recognize those images as targets or lures. There are a total of four experimental conditions (Cond 1 – Cond 4). On each sheet and under each participant, the data shows hit rate (HT) and false alarm rate (FA) for each criterion value of inner confidence in their decision (each row). Solve the following and insert a figure (wherever required) and paste the MATLAB/Python/R code for the same. Any figure must provide all information necessary to interpret it including axes labels, captions/legends (simple figure titles as captions are not enough).**

**Calculate the accuracies for recognizing noisy images for all participants in each of the four conditions from the above graph. Use the accuracies thus calculated to graph four box and whisker plots (for four experimental conditions). Describe all details in the figure caption. Run a ‘Friedman’s test’ to statistically test for difference in accuracies across the four conditions and report the Friedman’s Chi square test statistic and p value for the same. Briefly explain the result of your statistical analysis. [6 + 2 + 2 points]**

**Hint: https://pingouin-stats.org/generated/pingouin.friedman.html**

**https://in.mathworks.com/help/stats/friedman.html#d124e450538**