MiniProject 2

Introducing MiniProject2

- We are going to combine the finger data with the brain data

- How can we do this in a meaningful way?

- What are the steps?

- ERP!

An ERP is an Event Related Potential. A certain event that occurred that caused a brain response.

What is our event?

How can we find the brain response?

MiniProject 2

- Explanation of data provided:
  - Brain data - brain signals from a single electrode that were recorded from a patient while they moved their fingers
    - (name of file: *brain_data_channel_one.csv*)
  - The index of the starting point of the movement of the finger and which finger was moved (the indices in the finger data indicating the starting point matches with the brain data – it was resampled as such)
    - (name of file: *events_file_ordered.csv*)
- Each finger movement was done multiple times – there were multiple trials – such that the total number of times a patient was asked to move their fingers was over 600 times. That means that each finger was moved multiple times.
- In order to understand the brain signal that came before and after the movement of the finger, we need to match up the finger signals and the brain signals.

The function

- Write a function called "calc_mean_erp"
  - This function will take an input of two variables:
    - "trial_points" – a CSV file with three columns with the starting point of every movement, the peak of every movement and the number finger (we worked on this together in the review session.) Your function needs to make sure the data imported is of type "int" for ONLY this csv file. (name of file: *events_file_ordered.csv*)
    - "ecog_data" – A CSV file of one column with the time series of the signal recorded using an ECOG electrode. The indices in this file (number of rows) match up to the indices that appear in the starting points and peak points in the trial_points data. (name of file: *brain_data_channel_one.csv*)
  - Output:
    - Your function will output a matrix with five rows and 1201 columns – 5x1201 into a variable named "fingers_erp_mean" in the order of fingers – 1, 2, 3, 4, 5.
    - `fingers_erp_mean = calc_mean_erp(trial_points, ecog_data)`
- **Please use the names and variables as listed in this slide.**

What should the function do?

- This function will define every finger movement as a block of time that is 200 ms before the starting point of the movement, 1 ms of the starting point, and 1000 ms after the starting point of the movement. Such that each finger movement will extract 1201 indices of brain data that relate to the movement of that finger

- Gather all the signals for each event and average across them such that there is a list of averaged brain signals of length 1201 for each unique finger movement.
  - For example – let's say the patient was asked to move finger 1 one hundred times (100 trials), there are now 100 samples of a block of time in brain data of length 1201. Average across the 100 trials such that we only end up with 1 list of length 1201 for that finger.

- This function will plot the averaged brain response for each finger

- This function will return a matrix with the averaged brain response list for each finger – matrix size will be 5x1201 – five finger events, and the length of brain data for each event – 1201 – order by finger – finger 1 should be the first row.

Submission:

You will upload this project to your Github account and paste the URL to your project into the google doc that is on the למדה – submission until 18/01

Guidelines for structure of project

- One python file (*not* .ipynb jupyter notebook file) with *just* the function – name this file fingers_erp.py

- One python file that imports the function and runs the code

Points will be taken off if the project is not submitted correctly.