4-WEEK PROJECT REPORT

DAKSHITHA B A

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Under the guidance of
DR. Supratim Ray ,
Centre for Neurosciences, IISc Bangalore.

WEEK 1

► Understood the basic concepts related to Electroencephalogram (EEG). It is a test that detects electrical activity in the brain using small, flat metal discs (electrodes) attached to the scalp

► Learnt the usage of EEGLAB. It is an interactive Matlab toolbox for processing continuous and event-related EEG. It also provides an interactive graphic user interface (GUI) allowing users to flexibly process high-density EEG and other dynamic brain data using independent component analysis (ICA).

► EEG data is contaminated by activities like eye blinks and line noise. ICA-based artifact correction can separate and remove a wide variety of artifacts from EEG data by linear decomposition. The ICA decomposed data can be plotted using the EEGLAB function topoplot which plots the scalp map projections.

WEEK 2

► The process of predicting scalp potentials from current sources inside the brain is referred to as the forward problem in electroencephalography.

► Conversely, the process of predicting the locations of the sources of the EEG from measurements of the scalp potentials is called the inverse problem.

► The solution to the inverse problem is not unique, so attempting to localize sources in EEG is a challenge. Source localization can be performed using methods like Current Source Density (CSD),Low resolution brain electromagnetic tomography (LORETA).

WEEK 3

► Worked on designing a Graphical User Interface (GUI) for real time data analysis of EEG signals.

► EEG signals were recorded from the subject's scalp using the brain amp recording system which allows the user to stream real-time EEG data to a client program through a TCP/IP connection.

Figure 1: Flow of Data for Real Time Data Analysis

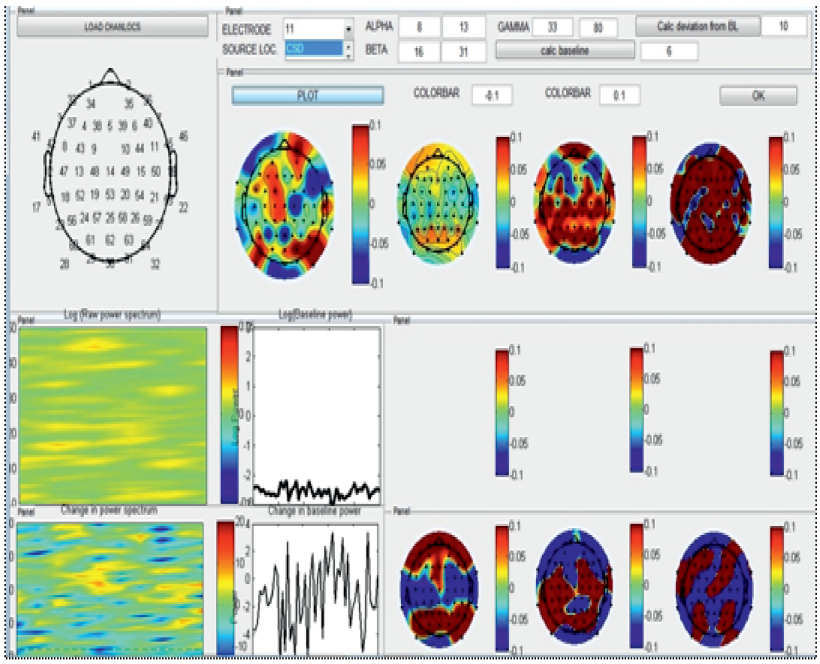

Figure 2: GUI for Real Time Data Analysis

► Signals from the recorder are picked by the Remote Data Access (RDA) and stored in a buffer using the brain amp proxy function, *ft_brainampproxy*. Data from this buffer is read using the field trip's read function *ft_readdata* as shown in Fig. (1).

► Several useful computations like Power Spectral Density (PSD) are performed on the data and the resulting plots are plotted using EEG lab function *topolot* in MATLAB.

WEEK 4

► Obtained the Power Spectral Density (PSD) and the voltage maps of the acquired data which were plotted at real time using *topolot*.

► Alpha, beta and gamma frequency components were obtained from the PSD plots and plotted at real time.

► CSD analysis was performed on the voltage scalp maps to localise the sources. CSD is a class of methods of analysis of electric potentials recorded at multiple sites leading to estimates of current sources generating the measured potentials. Fig. (2) shows the GUI with the various plots.