Quantitative Analysis of EEG Signal Patterns
With Respect to Age and Gender

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Abstract

The human brain consists of millions of neurons that utilize electro-chemical signals to transmit information to other parts of the body. Whenever a neuron triggers an electrical impulse to another neuron, it will generate electricity which is referred to as an EEG wave which can be measured by a sensitive device. In this study, we analyze such brainwaves obtained from individuals within same environmental conditions to uncover hidden relationships in age and gender. We conducted the study in three main steps, namely data gathering, data cleaning & processing, and result observation.

During data collection, the electrodes were placed in accordance with the international 10-20 system which is a widely accepted standard for electrode placement in EEG related studies. For this research, we used FP1 and F7 channel data. Our sample data set contained EEG data gathered from four subjects with nine data samples from each.

Raw EEG data usually contains a certain amount of noise added to the signal during eye movement, vibrations, etc. As such we used the Butterworth filter to pass frequencies in between lower and upper bound frequencies for filtering purpose.

We measured standard deviation of EEG signal patterns from young male and female subjects who were between 6 to 22 years of age. Using the analysis, we identified that more active brain signal patterns occurring from the frontal left area of the brain in young male subjects than in female subjects. Hence, it can be concluded that young male subjects are more active in logical subjects and linguistic activities than female subjects in their age.