3D Visualization of Human EEG Signals

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The brain is the most important and the most complex human organ that is responsible for all the functions that we do in our routine life. Moreover, the 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 generates electricity, referred to as an EEG wave that can be measured by a sensitive device. Using such brain patterns, it is possible to identify normal day-to-day human behavior. The brain commences its work before birth and works continuously until death during which brain waves are constantly generated according to what we perceive from the environment. By analyzing brain wave patterns, we can predict and identify valuable information on human or animal health. For examples we can monitor coma and brain death in human or animals, various effects of drugs on sleep disorder, day-to-day life human behavior, post-traumatic stress disorders (PTSD), etc.

In the experiments conducted, we took the potential differences between the respective channels to identify the variations in brain wave data among the individuals. We used linear interpolation to generate 3D views of the potential data between the locations where the electrodes were placed. A color code is then applied to indicate the range of potential values projected on the human skull. High frequency components were observed near the right parietal and right occipital lobes of the brain. Significant variations were not observed near the frontal or the left region of the brain for a specific activity.

The proposed project will introduce a technique to visualize human brain waves in 3D over the skull that will enable us to interpret how these brain waves are associated with various regions on the human brain.

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