

# Age and Gender Related Variations in Human EEG Signals

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There is a significant amount of research focused on discovering the functional behavior inside the human brain and methods to collect brain waves with respect to age. However, due to the lack of research using data-mining and pattern extraction methodologies on such data streams, we may be losing important features from human brain wave pattern data. The proposed research is aimed at collecting different kinds of brain wave patterns from different age categories of human beings and analyzing the correlation between the wave patterns of individuals. All the EEG data were taken from publically available and trusted data sources. The data from 22 subjects, five males and 17 females, within the age range from 3 to 22 years and were recorded with 256Hz and 16-bit resolution. We used FP1 and F7 channels as our main data sources for comparing and classification purposes. In the first phase, we applied a filtering process to clean the EEG data set of young male and female subjects to extract the hidden patterns. As EEG signals are acquired as a continuous stream, we use the sliding dot product or sliding inner product of two wave forms while searching for a long signal for shorter, known feature which is referred to as cross correlation. A correlation function is a function that gives the statistical correlation between random variables. In our research, the correlation between two signal forms (data sets) was used to measure the similarity between two wave forms. Subsequently, the cross correlation between all data pairs was calculated to find hidden relationships between each data group. In the sampling process, We ignored the first 256 data samples which was captured during 1s - 2s time period to compensate for possible errors added to the main brain wave during head movements and early adjustments. Using cross correlation diagrams, we observed similarity of brain wave signals between 11 year male and 22 year female subjects having a peak value of 3.5597e.

*Keywords:* brain waves; cross correlation; neurophysiology; EEG signals

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