

## EEG Signal Processing Methods to Differentiate Mental States

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**Abstract :** EEG is a very complex signal with noises and other bio-potential interferences. EOG is the most distinct interfering signal when EEG signals are measured and analyzed. It is very important how to process raw EEG signals in order to obtain useful information. In this study, the EEG signal processing techniques such as EOG filtering and outlier removal were examined to minimize unwanted EOG signals and other noises. The two different mental states of resting and focusing were examined through EEG analysis. A focused state was induced by letting subjects to watch a red dot on the white screen. EEG data for 32 healthy subjects were measured. EEG data after 60-Hz notch filtering were processed by a commercially available EOG filtering and our presented algorithm based on the removal of outliers. The ratio of beta wave to theta wave was used as a parameter for determining the degree of focusing. The results show that our algorithm was more appropriate than the existing EOG filtering.

**Keywords :** EEG, focus, mental state, outlier, signal processing

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