Python Implementation for Brain-Computer Interface Research by Acquiring and Processing the NeuroSky EEG Data for Classifying Multiple Voluntary Eye-Blinks

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The Brain-Computer Interface (BCI) is a challenging research field reporting outstanding breakthroughs in biomedical engineering. This paper proposes a new BCI research-related solution by implementing customized Python scripts based on an artificial neural networks model to classify the raw electroencephalographic (EEG) signal detected by the embedded biosensor of NeuroSky portable headset. Achieving this aim is possible by applying features extraction techniques on the raw EEG data to generate the training dataset composed of 3000 recordings corresponding to executing simple, double, or triple voluntary eye-blinks. Detection of their specific EEG patterns resulted in calculating the following seven statistical features: mean, median, standard deviation, route mean square, the sum of values, Kurtosis Coefficient, and skewness. The voluntary eye-blinking proved to be the most precise and easily detected control signal in a BCI application to assist people with neuromotor disabilities. The proposed Python implementation of BCI software is practical, especially for the initial stages of research, by leveraging simple to use, inexpensive, and efficient instruments.