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A Combination of Independent Component Analysis, Relative Wavelet Energy and Support Vector Machine for Mental State Classification

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Abstract : Mental state classification is an important step for realizing a control system based on electroencephalography (EEG) signals which could benefit a lot of paralyzed people including the locked-in or Amyotrophic Lateral Sclerosis. Considering that EEG signals are nonstationary and often contaminated by various types of artifacts, classifying thoughts into correct mental states is not a trivial problem. In this work, our contribution is that we present and realize a novel model which integrates different techniques: Independent component analysis (ICA), relative wavelet energy, and support vector machine (SVM) for the same task. We applied our model to classify thoughts in two types of experiment whether with two or three mental states. The experimental results show that the presented model outperforms other models using Artificial Neural Network, K-Nearest Neighbors, etc.

Keywords : EEG, ICA, SVM, wavelet
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