Relevance of Filter Bank Common Spatial Patterns Using Multiple Kernel Learning in Motor Imagery

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Abstract

Brain-Computer Interfaces directly communicate the human brain and machines through the analysis of sensorimotor activity, relying on the Motor Imagery paradigm of cognitive neuroscience. Conventional BCI systems use electroencephalographic signals due to its high temporal resolution, portability, and easiness to implement, for which the filter-banked analysis works as the characterization baseline. Due to such analysis yields to highly dimensional representation spaces leading to overtrained systems, we propose to combine the multiple spectral bands into a single representation space through the maximization of the centered kernel alignment criterion. As a result, the similarity between the measured EEG data and the available label sets is maximized, with the additional benefit of enhancing the spectral interpretation of the subject performance. The proposed κ-FB is evaluated in the dataset IIa of the BCI competition IV for a binary classification task. Attained accuracy proves that κ-FB outperforms other filter-banked representations without compromising the system confidence.

Keywords: *Brain computer interfaces, Common spatial patterns Multiple, kernel learning*

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