

UNIVERSITY OF WARSAW

Abstract

Biomedical Physics Division

Faculty of Physics

PhD

ERP analysis using a multi-channel Matching Pursuit algorithm

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In this study, we propose a new algorithm for analysing event-related components observed in EEG signals in psychological experiments. We investigate its capabilities and limitations. The algorithm is based on multivariate matching pursuit and clustering. It is aimed to find patterns in EEG signals which are similar across different experimental conditions, but it allows for variations in amplitude and slight variability in topography. The method proved to yield expected results in numerical simulations. For the real data coming from an emotional categorisation task experiment, we demonstrate two applications. First, the method can be used as a specific filter that reduces the variability of components, as defined classically, within each experimental condition. Second, equivalent dipoles fitted to items of the activity clusters identified by the algorithm localise in compact brain areas related to the task performed by the subjects across experimental conditions. Thus this activity may be studied as candidates for hypothetical latent components. The proposed algorithm is a promising new tool in ERP studies, which deserves further experimental evaluations.