Detecting EEG Dynamic Changes Using Supervised Temporal Patterns

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Abstract

The electroencephalogram signal records the neural activation at electrodes placed over the scalp. Brain-Computer Interfaces decode brain activity measured by EEG to send commands to external devices. The most well-known BCI systems are based on Motor Imagery paradigm that corresponds to the imagination of a motor action without execution. Event-Related Desynchronization and Synchronization shows the channel-wise temporal dynamics related to the motor activity. However, ERD/S demands the application of a large bank of narrowband filters to find dynamic changes and the assumption of temporal alignment ignores the between-trial temporal variations of neuronal activity. Taking to account the temporal variations, this work introduces a signal filtering analysis based on the estimation of Supervised Temporal Patterns that decode brain dynamics in MI paradigm which result from the solution of a generalized eigenvalues problem. The signal filtering analysis detects temporal dynamics related to MI tasks within each trial. The method highlights MI activity along channels and trials and shows differences between subjects performing these kinds of tasks.

Keywords: *Supervised Temporal Patterns, EEG signal, Motor Imagery, Temporal dynamics*

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