

Data sets 1 (motor imagery, uncued classifier application)

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Description of our method

Our method contains the following four steps.

Step 1: Common Average Reference (CAR) preprocessing.

Step 2: Idle state detection.

Feature extraction: We constructed common spatial pattern (CSP) features using the components in low frequency band (2-5Hz) and mu rhythm (8-14Hz). When we constructed CSP feature using mu rhythm, we divided the frequency band into 5 overlapped subbands. For each subband, a CSP feature vector was initially obtained. Next, we perform joint selection of channels and frequency bands based on a sparse representation method. Using the selected frequency bands and channels, we construct CSP features for classification. Note that the data in a time segment of 3.5 (1.5) seconds was used for constructing a feature vector for training (test) data set.

Detection: Three tools including sliding window method, support vector machine (SVM), and maximum posterior probability (MAP) were used for detection idle state. The detected idle state was labeled as 0.

Step 3: Classification of motor imageries.

Data: The data of idle state detected before were removed. The left data were used for motor imagery classification.

Feature extraction: Feature extraction was performed similarly as in idle state detection.

Classification: The three methods mentioned above also were used for motor imagery classification. One motor imaginary task was labeled as +1, the other one was labeled as -1.

Step 4: Post-processing.

Using the probabilities obtained in idle state detection and motor imagery classification, a value ranged in $[-1,1]$ was obtained for each sample point, which reflects a mental state.

We think that the data sets of subject c and subject d were artificially generated.

Data Format

Seven ASCII files were submitted, which are named as 'Result_BCIC_IV_dsla.txt', 'Result_BCIC_IV_dslb.txt',....., and 'Result_BCIC_IV_dslg.txt'. These files correspond to the subjects a, b,....., and g respectively.