A Comparison of Ensemble Methods for Motor Imagery Brain-Computer Interfaces

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Abstract. A Brain-Computer Interface (BCI) provides an alternative means of communication for people who are locked-in. For a BCI to work, the user will perform a specific mental task whilst wearing an Electroencephalography (EEG) cap that contains several electrodes. In particular, in a Motor Imagery (MI) BCI, users imagine themselves performing specific movements, e.g., rotating the right hand or moving his/her feet. The signals recorded by these electrodes are then preprocessed and fed to a classifier that will decide which of the possible actions is being performed. The output of the classifier is then sent to a device (e.g., a computer or wheelchair) for its execution.

In this paper, we will compare the performance of different systems (several ensembles using various voting algorithms and multiclass classifiers) on a 4-class MI task (left/right hand and feet movement imagery, plus an "idle" state). These methods will be ranked using a combination of different evaluation metrics. The best system will be applied to a real-time BCI used in an international competition.

References

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Keywords

BRAIN-COMPUTER INTERFACE, ENSEMBLE, MULTICLASS, MOTOR IMAGERY