
Using neurophysiological predictors to predict MI-BCI users' performances

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Abstract

Mental-Imagery based Brain-Computer Interfaces (MI-BCIs) use brain signals produced during mental imagery tasks to control the given system. Yet, users with poor performances may not be capable to produce distinct brain signals and therefore the BCI cannot interpret the user's intentions. This phenomenon impacts around 10% to 30% of BCI users[1]. Currently, the BCI community tried to predict users' performance (i.e., the classification accuracy) and model it. For instance, the mu-band predictor[2] suggested that good performance users are most likely to have higher mu amplitude during rest with eyes open. In addition, in[3] the task of rest with open eyes was used again, they found out high theta and low alpha wave patterns during MI for users with poor performance.

We first try to reproduce the mu-band predictor with our data set which contains N=53 [4] subjects. We indeed got a positive correlation coefficient of $r=0.44$ with ($p < .001$) which reconfirm the result of [2]. We furthermore tried to model the same predictor for the beta-band but our result showed $r=0.23$ with ($p < .1$) which is not statistically significant. In future studies, we aiming to find a model that predicts the performance of a user by using Elastic Net which will predict the performance of a user from two minutes rest with eyes open with the use of the mu-predictor among other features (e.g. the width of the peak at the mu-band) the specific we extract from the EEG signal.

References

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