Combining frequency and time-domain EEG features for classification of self-paced reach-and-grasp actions

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Introduction

Recent studies have shown that complex hand movements, such as reach-and-grasp tasks, can be decoded from low frequency activity of the electroencephalogram (EEG)[1]. In this work we investigated whether additional features extracted from the frequency domain of alpha and beta bands could improve classification performance of rest vs. palmar vs. lateral grasp.

Methods

1. Low Frequency Time Domain (LFTD) classification (0.3 - 3 Hz, amplitude values as features, 1 second feature window)
2. Combination of LFTD and bandpower based features from alpha (8-14 Hz) and beta band (17-31 Hz)

Results

We could show that a combined classification model of time-domain and frequency-domain features leads to significantly higher classification performances for multiclass classification of reach-and-grasp and rest conditions. While the contribution of the frequency-domain features for the classification of movement vs. movement classification is minimal, these additional features considerably boost movement vs. rest classification. We believe that these findings will effectively contribute to our research on BCI-controlled neuroprosthesis for persons with high spinal cord injury.

Conclusion

Acknowledgments


References

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