3-Class Motor-Imagery Dataset Description

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This dataset contains 3-class motor-imagery (MI) training recordings conducted in the study in [1]. Works that make use of this dataset should cite [1].

1 Experimental protocol

Five healthy subjects participated in a synchronous MI-BCI experiment. All participants gave written informed consent and the protocols were approved by the local ethics committee. Every subject did participate in four recording sessions containing 15 trials each. The BCI paradigm consisted of three different motor imagery tasks, namely the imagination of movement of the left hand (class 1), right hand (class 2) and both feet (class 3).

Every trial was conducted the same way illustrated in Fig. 1. The subjects where sitting in a chair in front of a screen. At t=0 sec, a fixation cross appears requesting the subject to focus for the next task. The actual MI cue is shown at t=2 sec by an arrow pointing either to the left (left hand), right (right hand) or bottom (both feet). The subject is requested to do the cued MI task from t=3-7 sec followed by a rest period.

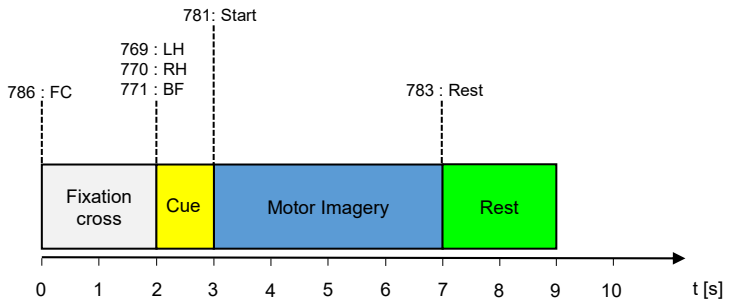

Figure 1: Timing scheme and trigger codes of one trial.

2 Data recording

The brain activity is acquired via 16 active EEG channels over the sensorimotor cortex: Fz, FC3, FC1, FCz, FC2, FC4, C3,C1, Cz, C2, C4, CP3, CP1, CPz, CP2 and CP4 according to the international 10-20 system with reference on

the right ear and ground on AFz (see Fig. 2). The EEG is recorded using a 16-channel g.USBamp(g.tec medical engineering, Schiedelberg, Austria) system at 512 Hz, band-pass filtered between 0.1 Hz and 100 Hz and a notch filter is set at the power line frequency of 50 Hz.

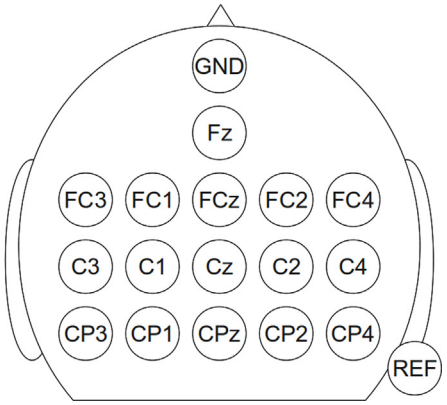

Figure 2: EEG electrode locations used over the motor cortex.

3 Data file description

The four recording sessions of every subject are stored in a separate folder. The data of every session is stored in a `.mat` file. It includes the events in `.Trigger`, the position of the events in `.Position` and the EEG data in `.signal`. The trigger events are described in Tab. 1.

Event	**Description**
769	Left hand
770	Right hand
771	Both feet
781	Start MI
783	Rest
786	Fixation cross

Table 1: Trigger events

References

[1] S. Saeedi, R. Chavarriaga, R. Leeb, and J. d. R. Millán, "Adaptive assistance for brain-computer interfaces by online prediction of command reliability," *IEEE Computational Intelligence Magazine*, vol. 11, no. 1, pp. 32–39, Feb 2016.