Dataset Description

Reference

Pulferer HS, Ásgeirsdóttir B, Mondini V, Sburlea AI, Müller-Putz GR. Continuous 2D trajectory decoding from attempted movement: across-session performance in able-bodied and feasibility in a spinal cord injured participant. J Neural Eng. 2022;19: 36005. doi:10.1088/1741-2552/ac689f

File format and naming

Each dataset is stored as a MATLAB .mat file with the naming convention:

<subject>_ses<session>_perc<percdec>.mat

Each file corresponds to one subject, one session, and one visual-mixing condition.

Visual-mixing percentage (percdec)

The variable percdec specifies the percentage contribution of the decoded trajectory to the visually displayed trajectory (vismix). It directly controls how much the participant sees their brain-decoded control signal versus the predefined paradigm (target) trajectory.

The visual-mix trajectory is computed as:

vismix = (percdec / 100) × decoded trajectory + (1 − percdec / 100) × target trajectory

The three experimental conditions are:

- percdec = 0%

  The displayed trajectory fully follows the paradigm target. Decoded signals do not influence the visual feedback.

- percdec = 50%

  The displayed trajectory is an equal mixture of decoded control and target trajectory. Participants receive partial feedback of their decoded brain activity.

- percdec = 100%

  The displayed trajectory fully follows the decoded control signal. The paradigm target no longer contributes to the visual feedback.

Variables stored in each .mat file

Each file contains the following variables:

data : double [nChannels × nSamples]
labs : cell array {1 × nChannels}
MARKERS : numeric [nSamples × 1]
RUN : numeric [nSamples × 1]
Fs : scalar (Hz)

data — Continuous signals

The variable data contains EEG and auxiliary signals, all resampled and aligned to the EEG timeline.

Channel composition and order:

1. 1. EEG channels

   Original EEG channels from the BrainVision RDA stream. The GND channel is removed and channel locations are assigned using channels_fyr.xyz.

2. 2. Decoded trajectory channels (type = DEC)

   decoded posX – decoded trajectory position X
   decoded velX – decoded trajectory velocity X
   decoded posY – decoded trajectory position Y
   decoded velY – decoded trajectory velocity Y

3. 3. Paradigm target channels (type = PARA)

   target posX – target trajectory position X
   target posY – target trajectory position Y

4. 4. Visual-mix channels (type = MIXED)

   vismix posX – displayed trajectory X
   vismix posY – displayed trajectory Y

5. 5. Error channel (type = ERROR)

   error signal – Euclidean distance between visual-mix and target trajectories

MARKERS — Sample-wise event codes

MARKERS is a sparse vector aligned to EEG samples. A value of 0 indicates no event; non-zero values correspond to paradigm marker codes.

Defined marker codes used in analysis:

1000 – start of trial
1003 – hold phase
1004 – start of tracking
300 – reset trajectory decoder
-1000 – end of trial
-1200 – end of paradigm
0 – no event

RUN — Run boundary indicator

RUN is a binary vector indicating the start of each run within a concatenated dataset.

Summary

The dataset provides EEG synchronized with decoded control signals, paradigm targets, visual feedback trajectories, and continuous error metrics under different decoder influence conditions.