EEG Project

Notes

25th November 2023

1 Preprocessing

1.1 Raw Data

- Filenames seem to have been renamed **after** exporting to fit the bids file naming convention, causing inconsistency in vhdr and vmrk files that needs to be fixed. This seems to be a design limitation of bids requiring hard coding file names in vhdr and vmrk files.

1.2 Lecture Notes from 2023-11-23

- Re-referencing
  • note: In practice, average referencing (?Does this equal global mean?) seems to be a good idea for more than 60 electrodes.
  • note: For measuring e. g. `P3`, referencing towards ?mastoid? could result in better results (even with > 60 electrodes).
  • If re-referencing is applied to a single electrode (e. g. `FCz`), the difference between zero-vector (all samples of the channel are zero) to global mean of all channels at global mean re-referencing is the `FCz` channel signal.

- Downsampling
  • lowest f_{sample} in real study: 250 Hz
  • here: e. g. 128 Hz or similar, since the computations will then run a lot faster on student computers
  • note: mention the reason for (strong) downsampling in the report
  • note: Empirical mode decomposition can benefit from higher frequencies than e. g. 30 Hz $\rightarrow$ sample rate of > 80 Hz could make sense.

- Detrending / Baseline Correction / High Pass Filtering
  • fit linear or quadratic function to data (whole duration $\rightarrow$ about 1 h)
  • $\rightarrow$ similar to high pass filter at $0.0 \ldots 01$ Hz
  • simpler version: apply high pass filter at e. g. 0.1 Hz
  • note: If a high pass filter is applied, baseline correction = subtracting channel mean = removing DC offset *does not* make any sense on whole-length signals.
  • note: After applying epoching, applying baseline correction = subtracting channel mean = removing DC offset *can* make sense.

- ICA
  • run ICA decomposition on filtered signals with high pass filter at about 1-2 Hz

- The ICA can then get applied on the signals only filtered with high pass filter at $\leq 0.5\,Hz$, if wanted by students/researchers
- note: ICA without high pass filter will not look good.
- note: Use IClabel software for automatic labelling of ICA components.
- Picard or (normal one, iterative) are a lot better than FastICA.

1.3 Analysis

- t Test
  - t test is somehow also multiple regression

1.4 Off-topic

- Slides
  - Put the name giving animal on the slides. (just4fun)