Resting State EEG Preprocessing Pipeline

If you have questions, please contact DEEDLabEEG@gmail.com

This folder contains five custom MATLAB scripts for automatically preprocessing resting state EEG data collected from children in the DEED Lab: (1) rest_loop_over_subjects.m, (2) rest_process_single_subject.m, (3) create_eyes_open_closed_resting_events.m, (4) rest_trim_data_loop.m, (5) rest_trim_data_single_subject.m

(1) rest_loop_over_subjects.m runs (2) rest_process_single_subject.m for all files in the user-specified directory

(2) rest_process_single_subject.m does all of the preprocessing (see below for overview)

(3) create_eyes_open_closed_resting_events.m is called within (2) rest_process_single_subject.m to insert event markers for eyes-open versus eyes-closed segments

(4) rest_trim_data_loop.m runs (5) rest_trim_data_single_subject.m for all files in the user-specified directory

(5) rest_trim_data_single_subject.m trims each file to a user-specified data length and saves the file in EEGLAB (.set) and Brain Vision (.bva) formats

Broad Overview of Preprocessing Steps
See script for details on steps and parameters

Step 1: Remove outer ring of electrodes and Cz
Step 2: Downsample from 1000 to 250 Hz
Step 3: Insert eyes-open and eyes-closed markers
Step 4: Apply 40 Hz low pass and 1 Hz high pass filters
Step 5: Apply CleanLine to remove 60 Hz electrical line noise
Step 6: Automatically reject bad channels
Step 7: Automatically reject artifacted segments with Artifact Subspace Reconstruction
Step 8: Apply Independent Component (IC) Analysis (ICA)
Step 9: Automatically select ICs related to eye and muscle artifact with ICLabel
Step 10: Copy ICA fields over to data pre-ASR (the data right before Step 7 above) and remove ICs identified in Step 9
Step 11: Epoch the data and use the TBT plugin to automatically reject artifacted epochs
Step 12: Interpolate channels removed in Step 6
Step 13: Re-reference data to the average