Appendix A: Data Cleaning

December 9, 2019

Data Cleaning

To simplify the final project output, the data cleaning part is done in this notebook, and exports
the final data to use for analysis as a `*.csv` file.

What this data cleaning notebook does is it iterates through all of the available subjects and
sessions (some subjects have multiple EEG scans/sessions), capture all the onset epochs (the only
thing we care about) as defined as 10 seconds before onset, and 5 seconds after. Then, for each
epochs, difference from time 0s is taken with vector-wise operation, and then combined into a giant
dataframe. A 1/0 indicated is appended to the end of the dataframe to indicate whether this row
of record corresponds to an expert (1) or non-expert (0). The final dataframe is then exported as
`.*csv` to be used.

```python
[1]: import mne
     import pandas as pd
```

0.0.1 Defines the indices of subjects and sessions available

```python
[2]: nonexperts =␣
     ↪['001','002','003','004','005','006','007','008','009','010','011','012']
     experts =␣
     ↪['013','014','015','016','017','018','019','020','021','022','023','024']
     sessions = ['01','02','03']
```

0.0.2 A function to load BDF files for EEG measures

```python
[3]: def load_bdf_file(raw_fname):
         raw = mne.io.read_raw_bdf(raw_fname, preload=True)
         raw.drop_channels(['EXG1', 'EXG2', 'EXG3', 'EXG4', 'EXG5', 'EXG6', 'EXG7',␣
     ↪'EXG8',
                             'GSR1', 'GSR2', 'Erg1', 'Erg2', 'Resp', 'Plet', 'Temp'])
         raw.set_montage('biosemi64alpha');


         from os.path import abspath
         montage = mne.channels.read_montage(abspath("../biosemi64alpha.txt"))
         raw.set_montage(montage);
```

```
    events = mne.find_events(raw, stim_channel='Status')

    # We really only care about the onset, so I am neglecting all other events
    event_dict = {'First question onset (most important marker)': 128}

    epochs = mne.Epochs(raw, events, event_id=event_dict, tmin=-10, tmax=5,␣
→preload=True)
    conds = ['First question onset (most important marker)']
    epochs.equalize_event_counts(conds)

    onset_epochs = epochs['First question onset (most important marker)']

    return onset_epochs
```

0.0.3 A function to transform Epochs to a difference dataframe

```
[4]: def transform_dataframe(onset_epochs):
         # Transforming onset epochs to a Pandas dataframe
         df = onset_epochs.to_data_frame().loc['First question onset (most important␣
     →marker)',].drop('Status', axis=1)
         epochs = df.index.get_level_values(0).unique()

         transformed_df = pd.DataFrame(columns=df.columns)

         # Iterate through the epochs and take the vector-wise difference in
         # reference to time 0 (onset), and append to the final dataframe
         for i in epochs:
             ref = df.loc[i].loc[0]
             diff_df = df.loc[i] - ref
             transformed_df = transformed_df.append(diff_df)

         return transformed_df
```

0.0.4 Iterate through all BDF files available and create final data

```
[5]: # Supresses warnings
     import warnings
     warnings.filterwarnings('ignore')

     from pathlib import Path

     # Set up a large dataframe for our analysis; this operation will
     # neglect individuals as well as continous time.
     channels=['A1', 'A2', 'A3', 'A4', 'A5', 'A6', 'A7', 'A8', 'A9', 'A10', 'A11',
             'A12', 'A13', 'A14', 'A15', 'A16', 'A17', 'A18', 'A19', 'A20', 'A21',
```

```
        'A22', 'A23', 'A24', 'A25', 'A26', 'A27', 'A28', 'A29', 'A30', 'A31',
        'A32', 'B1', 'B2', 'B3', 'B4', 'B5', 'B6', 'B7', 'B8', 'B9', 'B10',
        'B11', 'B12', 'B13', 'B14', 'B15', 'B16', 'B17', 'B18', 'B19', 'B20',
        'B21', 'B22', 'B23', 'B24', 'B25', 'B26', 'B27', 'B28', 'B29', 'B30',
        'B31', 'B32']
nonexpert_data = pd.DataFrame(columns=channels)
expert_data = pd.DataFrame(columns=channels)

# Iterate through all non-experts
for subj in nonexperts:
    for ses in sessions:
        raw_fname = f'../rawdata/bidsexport/sub-{subj}/ses-{ses}/eeg/
 ↪sub-{subj}_ses-{ses}_task-meditation_eeg.bdf'

        if Path(raw_fname).exists():
            onset_epochs = load_bdf_file(raw_fname)
            transformed_df = transform_dataframe(onset_epochs)
            nonexpert_data = nonexpert_data.append(transformed_df)

nonexpert_data['expert'] = 0

# Iterate through all experts
for subj in experts:
    for ses in sessions:
        raw_fname = f'../rawdata/bidsexport/sub-{subj}/ses-{ses}/eeg/
 ↪sub-{subj}_ses-{ses}_task-meditation_eeg.bdf'

        if Path(raw_fname).exists():
            onset_epochs = load_bdf_file(raw_fname)
            transformed_df = transform_dataframe(onset_epochs)
            expert_data = expert_data.append(transformed_df)

expert_data['expert'] = 1

final_data = nonexpert_data.append(expert_data)
final_data
```

Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
1/ses-01/eeg/sub-001_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 696575 =   0.000 … 2720.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
87 events found

Event IDs: [2   4 128]
28 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 28 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
1/ses-02/eeg/sub-001_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695551 =   0.000 … 2716.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
101 events found
Event IDs: [2   4 128]
27 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 27 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
2/ses-01/eeg/sub-002_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 694015 =   0.000 … 2710.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
107 events found
Event IDs: [2   4 128]
32 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 32 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00

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2/ses-02/eeg/sub-002_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 473599 =   0.000 … 1849.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
85 events found
Event IDs: [2   4 128]
22 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 22 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
3/ses-01/eeg/sub-003_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 247295 =   0.000 …   965.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
26 events found
Event IDs: [2   4   8 128]
9 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 9 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
3/ses-02/eeg/sub-003_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 696575 =   0.000 … 2720.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
79 events found
Event IDs: [2   4   8 128]

22 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 22 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
4/ses-01/eeg/sub-004_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 394495 =   0.000 …   1540.996 secs…
36 events found
Event IDs: [2   4 128]
15 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 15 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
4/ses-02/eeg/sub-004_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 381183 =   0.000 …   1488.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
42 events found
Event IDs: [2   4 128]
17 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 17 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
5/ses-01/eeg/sub-005_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…

```
Reading 0 … 709119  =       0.000 …   2769.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
64 events found
Event IDs: [  2   4   8 128]
25 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 25 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
5/ses-02/eeg/sub-005_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 628991  =       0.000 …   2456.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
84 events found
Event IDs: [  2   4 128]
24 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 24 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
6/ses-01/eeg/sub-006_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 697855  =       0.000 …   2725.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
87 events found
Event IDs: [  2   4 128]
29 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
```

Loading data for 29 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
6/ses-02/eeg/sub-006_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 462335 =   0.000 … 1805.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
54 events found
Event IDs: [2   4   8 128 254]
18 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 18 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
7/ses-01/eeg/sub-007_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 694783 =   0.000 … 2713.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
78 events found
Event IDs: [2   4   8 128]
27 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 27 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
7/ses-02/eeg/sub-007_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 705023 =   0.000 … 2753.996 secs…

Trigger channel has a non-zero initial value of 65536 (consider using initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
79 events found
Event IDs: [2   4   8 128]
25 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 25 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
8/ses-01/eeg/sub-008_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 696575 =   0.000 … 2720.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
95 events found
Event IDs: [2   4   8 128]
25 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 25 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
9/ses-01/eeg/sub-009_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695551 =   0.000 … 2716.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
81 events found
Event IDs: [2   4   8 128]
32 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 32 events and 3841 original time points …

0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-00
9/ses-02/eeg/sub-009_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 697087 =   0.000 … 2722.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
84 events found
Event IDs: [2   4   8 128]
32 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 32 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
0/ses-01/eeg/sub-010_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 703487 =   0.000 … 2747.996 secs…
75 events found
Event IDs: [2   4   8 16 128]
24 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 24 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
0/ses-02/eeg/sub-010_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 699391 =   0.000 … 2731.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
90 events found

Event IDs: [2   4   8 128]
27 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 27 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
1/ses-01/eeg/sub-011_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695807 =   0.000 … 2717.996 secs…
Trigger channel has a non-zero initial value of 65790 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
87 events found
Event IDs: [2   4   8 128]
22 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 22 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
1/ses-02/eeg/sub-011_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695807 =   0.000 … 2717.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
121 events found
Event IDs: [2   4   8 128 254]
30 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 30 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01

2/ses-01/eeg/sub-012_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 787711 =   0.000 … 3076.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
113 events found
Event IDs: [2   4   8 128 254]
28 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 28 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
3/ses-01/eeg/sub-013_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695807 =   0.000 … 2717.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
70 events found
Event IDs: [2   4   8 128]
25 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 25 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
4/ses-01/eeg/sub-014_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 697599 =   0.000 … 2724.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
61 events found
Event IDs: [2   4   8 128]

24 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 24 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
5/ses-01/eeg/sub-015_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695807 =   0.000 … 2717.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
84 events found
Event IDs: [2   4 128]
25 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 25 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
6/ses-01/eeg/sub-016_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 344319 =   0.000 … 1344.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
39 events found
Event IDs: [2   4   8 128]
12 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 12 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
6/ses-02/eeg/sub-016_ses-02_task-meditation_eeg.bdf…

BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 307967 =   0.000 … 1202.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
37 events found
Event IDs: [2   4   8 128]
11 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 11 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
7/ses-01/eeg/sub-017_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 713471 =   0.000 … 2786.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
83 events found
Event IDs: [2   4   8 128]
28 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 28 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
7/ses-02/eeg/sub-017_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 695551 =   0.000 … 2716.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
72 events found
Event IDs: [2   4 128]
29 matching events found

Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 29 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
8/ses-01/eeg/sub-018_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 694783 =   0.000 … 2713.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
96 events found
Event IDs: [2   4 128]
27 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 27 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
8/ses-02/eeg/sub-018_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 683519 =   0.000 … 2669.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
102 events found
Event IDs: [2   4   8 128]
29 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 29 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-01
9/ses-01/eeg/sub-019_ses-01_task-meditation_eeg.bdf…
BDF file detected

```
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 926463  =      0.000 …  3618.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
104 events found
Event IDs: [  2   4   8 128]
36 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 36 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
0/ses-01/eeg/sub-020_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 924671  =      0.000 …  3611.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
110 events found
Event IDs: [  2   4   8 128]
42 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 42 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
1/ses-01/eeg/sub-021_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 850431  =      0.000 …  3321.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
140 events found
Event IDs: [  2   4   8 128 254]
37 matching events found
Applying baseline correction (mode: mean)
```

Not setting metadata
0 projection items activated
Loading data for 37 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
2/ses-01/eeg/sub-022_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 371711 =   0.000 … 1451.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
38 events found
Event IDs: [2   4   8 128]
15 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 15 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
2/ses-02/eeg/sub-022_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 318207 =   0.000 … 1242.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
33 events found
Event IDs: [2   4 128]
13 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 13 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
2/ses-03/eeg/sub-022_ses-03_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…

Creating raw.info structure…
Reading 0 … 343807 =   0.000 …   1342.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
34 events found
Event IDs: [2   4 128]
11 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 11 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
3/ses-01/eeg/sub-023_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 704255 =   0.000 …   2750.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
57 events found
Event IDs: [2   4   8 128]
19 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 19 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
3/ses-02/eeg/sub-023_ses-02_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 696575 =   0.000 …   2720.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
53 events found
Event IDs: [2   4   8 128]
18 matching events found
Applying baseline correction (mode: mean)
Not setting metadata

```
0 projection items activated
Loading data for 18 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
Extracting EDF parameters from /Users/yuyang.zhong/eeg/rawdata/bidsexport/sub-02
4/ses-01/eeg/sub-024_ses-01_task-meditation_eeg.bdf…
BDF file detected
Setting channel info structure…
Creating raw.info structure…
Reading 0 … 929023  =      0.000 …  3628.996 secs…
Trigger channel has a non-zero initial value of 65536 (consider using
initial_event=True to detect this event)
Removing orphaned offset at the beginning of the file.
164 events found
Event IDs: [  2   4   8 128]
42 matching events found
Applying baseline correction (mode: mean)
Not setting metadata
0 projection items activated
Loading data for 42 events and 3841 original time points …
0 bad epochs dropped
Dropped 0 epochs
Converting "time" to "<class 'numpy.int64'>"…
```

[5]:

channel	A1	A2	A3	A4	A5 \
-10000	96.843571	255.093279	198.843383	156.562211	24.624954
-9996	98.656068	256.218277	203.499624	160.124704	21.187461
-9992	111.718544	267.093256	214.655853	171.030934	30.999943
-9988	114.624788	267.718255	216.562100	173.437180	43.562420
-9984	112.281043	263.874512	212.499607	169.062188	42.281172
…	…	…	…	…	…
4984	-79.999852	78.749854	-120.999776	-67.749875	-70.874869
4988	-83.624845	74.593612	-124.843519	-71.749867	-73.218615
4992	-87.906088	69.781121	-130.187259	-75.624860	-76.624858
4996	-93.999826	63.687382	-134.437252	-81.906099	-83.124846
5000	-99.749816	58.999891	-137.874745	-86.499840	-88.281087

channel	A6	A7	A8	A9	A10	… \
-10000	23.906206	208.718364	32.374940	-53.718651	98.999817	…
-9996	24.312455	208.405865	33.812438	-52.968652	101.656062	…
-9992	34.437436	216.187101	41.343674	-45.031167	108.937299	…
-9988	38.968678	215.468352	42.437422	-42.718671	110.093547	…
-9984	32.062441	211.499609	40.437425	-46.593664	105.937304	…
…	…	…	…	…	…	…
4984	-86.624840	-3.843743	73.499864	-68.531123	-12.156228	…
4988	-87.124839	-7.249987	70.062371	-70.718619	-13.937474	…

```
4992     -90.374833   -12.593727   66.781127  -71.343618   -18.406216   …
4996     -96.374822   -18.312466   62.499885  -75.406111   -27.062450   …
5000    -102.374811   -22.999958   56.968645  -82.406098   -33.999937   …

channel          B24          B25          B26          B27          B28          B29  \
-10000    70.843619   66.187378   53.156152   34.093687  -68.374874   64.562381
-9996     72.718616   66.874876   55.468648   37.281181  -64.937380   72.281116
-9992     79.187354   72.718616   62.999884   46.249915  -55.906147   84.374844
-9988     81.187350   74.843612   66.374877   51.281155  -51.124906   88.968586
-9984     81.062350   75.156111   68.031124   54.312400  -49.281159   89.999834
...              ...          ...          ...          ...          ...          ...
 4984    -49.624908  -38.781178  -54.406149  -13.937474  -42.562421   24.499955
 4988    -50.656156  -41.781173  -58.906141  -16.874969  -45.531166   17.406218
 4992    -50.343657  -44.156168  -60.781138  -20.593712  -50.312407   12.031228
 4996    -54.937398  -47.218663  -65.218629  -28.499947  -61.281137    3.656243
 5000    -51.906154  -44.218668  -59.281140  -22.406209  -57.968643    3.562493

channel          B30          B31          B32  expert
-10000     5.906239  -23.968706   -5.937489       0
-9996      7.281237  -22.562458   -5.343740       0
-9992     13.624975  -16.749969   -5.312490       0
-9988     17.468718  -14.374973   -3.812493       0
-9984     21.843710  -11.968728    4.281242       0
...              ...          ...          ...     ...
 4984    190.812147   13.406225  -76.093609       1
 4988    183.155912    8.249985  -83.093596       1
 4992    175.843425    4.499992  -88.374837       1
 4996    168.843438   -1.374997  -95.968573       1
 5000    172.124682    2.562495  -95.999823       1

[3775703 rows x 65 columns]
```

0.0.5 Exporting to CSV

```python
[6]: final_data.to_csv('../final_data.csv')
```