

Untitled

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#
# License: BSD (3-clause)

import os.path as op

import numpy as np
import matplotlib.pyplot as plt
from matplotlib.cm import get_cmap
from mne_bids import BIDSPath, read_raw_bids

import mne
from mne.viz import plot_alignment, snapshot_brain_montage

mne.viz.set_3d_backend("notebook")
print(__doc__)

# paths to mne datasets - sample ECoG and FreeSurfer subject
bids_root = mne.datasets.epilepsy_ecog.data_path()
sample_path = mne.datasets.sample.data_path()
subjects_dir = op.join(sample_path, 'subjects')
```

Automatically created module for IPython interactive environment

```
[4]: print(mne.sys_info())
```

```
Platform:      macOS-10.16-x86_64-i386-64bit
Python:        3.8.6 | packaged by conda-forge | (default, Jan 25 2021,
23:22:12) [Clang 11.0.1 ]
Executable:    /Users/adam2392/Documents/sickkids/.venv/bin/python
CPU:           i386: 8 cores
Memory:        Unavailable (requires "psutil" package)
mne:           0.24.dev0
numpy:         1.20.1 {blas=openblas, lapack=openblas}
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scipy:          1.6.0
matplotlib:    3.4.2 {backend=module://ipykernel.pylab.backend_inline}

sklearn:       0.24.1
numba:         0.52.0
nibabel:       3.2.1
nilearn:       Not found
dipy:          Not found
cupy:          Not found
pandas:        1.2.2
mayavi:        Not found
pyvista:       0.30.1 {pyvistaqt=0.4.0, OpenGL 4.1 ATI-4.4.17 via AMD Radeon Pro
560 OpenGL Engine}
vtk:           9.0.1
PyQt5:         5.15.2
None

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[5]: # first define the bids path
bids_path = BIDSPath(root=bids_root, subject='pt1', session='presurgery',
                    task='ictal', datatype='ieeg', extension='vhdr')

# then we'll use it to load in the sample dataset
# Here we use a format (iEEG) that is only available in MNE-BIDS 0.7+, so it
# will emit a warning on versions <= 0.6
raw = read_raw_bids(bids_path=bids_path, verbose=False)

# Pick only the ECoG channels, removing the EKG channels
raw.pick_types(ecog=True)

# Load the data
raw.load_data()

# Then we remove line frequency interference
raw.notch_filter([60], trans_bandwidth=3)

# drop bad channels
raw.drop_channels(raw.info['bads'])

# the coordinate frame of the montage
print(raw.get_montage().get_positions()['coord_frame'])

# Find the annotated events
events, event_id = mne.events_from_annotations(raw)

# Make a 25 second epoch that spans before and after the seizure onset
epoch_length = 25 # seconds
epochs = mne.Epochs(raw, events, event_id=event_id['onset'],

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        tmin=13, tmax=13 + epoch_length, baseline=None)

# And then load data and downsample.
# .. note: This is just to save execution time in this example, you should
#           not need to do this in general!
epochs.load_data()
epochs.resample(200) # Hz, will also load the data for us

# Finally, make evoked from the one epoch
evoked = epochs.average()

```

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Extracting parameters from /Users/adam2392/mne_data/MNE-epilepsy-ecog-data/sub-
pt1/ses-presurgery/ieeg/sub-pt1_ses-presurgery_task-ictal_ieeg.vhdr...
Setting channel info structure...
Reading events from /Users/adam2392/mne_data/MNE-epilepsy-ecog-data/sub-pt1/ses-
presurgery/ieeg/sub-pt1_ses-presurgery_task-ictal_events.tsv.
Reading channel info from /Users/adam2392/mne_data/MNE-epilepsy-ecog-data/sub-
pt1/ses-presurgery/ieeg/sub-pt1_ses-presurgery_task-ictal_channels.tsv.
Reading electrode coords from /Users/adam2392/mne_data/MNE-epilepsy-ecog-
data/sub-pt1/ses-presurgery/ieeg/sub-pt1_ses-presurgery_space-
fsaverage_electrodes.tsv.
Reading 0 ... 269079 = 0.000 ... 269.079 secs...

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<ipython-input-5-4eb508ffbb46>:8: RuntimeWarning: Fiducial point nasion not
found, assuming identity unknown to head transformation
raw = read_raw_bids(bids_path=bids_path, verbose=False)
<ipython-input-5-4eb508ffbb46>:8: RuntimeWarning: DigMontage is only a subset of
info. There are 3 channel positions not present in the DigMontage. The required
channels are:

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['RQ1', 'RQ2', 'N/A'].
```

Consider using `inst.set_channel_types` if these are not EEG channels, or use the `on_missing` parameter if the channel positions are allowed to be unknown in your analyses.

```
raw = read_raw_bids(bids_path=bids_path, verbose=False)
```

Setting up band-stop filter from 58 - 62 Hz

FIR filter parameters

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Designing a one-pass, zero-phase, non-causal bandstop filter:
- Windowed time-domain design (firwin) method
- Hamming window with 0.0194 passband ripple and 53 dB stopband attenuation
- Lower passband edge: 58.35
- Lower transition bandwidth: 1.50 Hz (-6 dB cutoff frequency: 57.60 Hz)
- Upper passband edge: 61.65 Hz
- Upper transition bandwidth: 1.50 Hz (-6 dB cutoff frequency: 62.40 Hz)

```

- Filter length: 2201 samples (2.201 sec)

mni_tal

Used Annotations descriptions: ['AD1-4', 'ATT1,2', 'AST1,3', 'G16', 'PD', 'SLT1-3', 'offset', 'onset']

Not setting metadata

Not setting metadata

1 matching events found

No baseline correction applied

0 projection items activated

Loading data for 1 events and 25001 original time points ...

0 bad epochs dropped

```
[6]: %matplotlib widget
fig = plot_alignment(raw.info, subject='fsaverage', subjects_dir=subjects_dir,
                    surfaces=['pial'], coord_frame='mri')
az, el, focalpoint = 160, -70, [0.067, -0.040, 0.018]
mne.viz.set_3d_view(fig,
#                 azimuth=az, elevation=el, focalpoint=focalpoint
)

xy, im = snapshot_brain_montage(fig, raw.info)
```

Plotting 84 ECoG locations

```
HBox(children=(Text(value='', layout=Layout(margin='2px 0px 2px 0px',
min_width='0px')), placeholder='Type a fi...
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```
ViewInteractiveWidget(height=800, layout=Layout(height='auto'), width=800)
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