Biometrich Technologies and Behavioural Security

Tutorial 6 - Behavioural Biometrics - EEG and Face

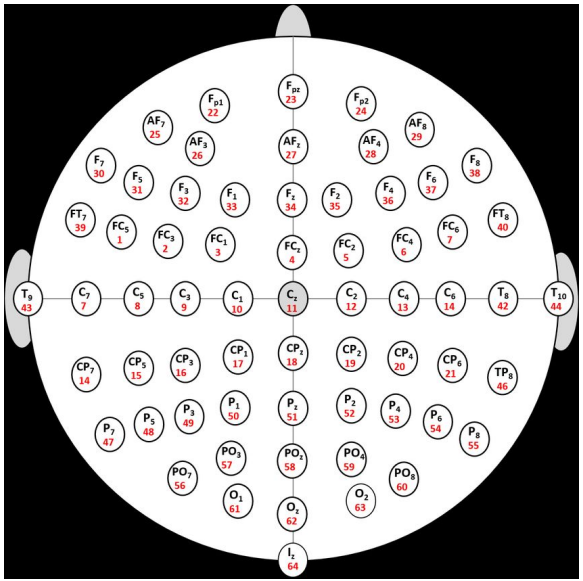
Behavioural Biometrics

	Universality	Uniqueness	Permanence	Collectability	Performance	Acceptability	Circumvention
Voice	L	L	L	H	L	H	L
Signature	L	L	L	H	L	H	L
Gait	M	L	L	H	L	H	M
EEG	M	M	L	M	L	M	M

EEG as a biometry

EEG Motor Movement/Imagery Dataset

- EEG acquired from **109** volunteers.
- Signal length: **1 and 2** minutes
- Device: **BCI2000**
- Number of channels : **64**
- Task**: T0 (rest)**



EEG analysis with MNE-Python

mne.io.read_raw_edf

`mne.io.read_raw_edf` (*input_fname, eog=None, misc=None, stim_channel='auto', exclude=(), preload=False, verbose=None*) ¶

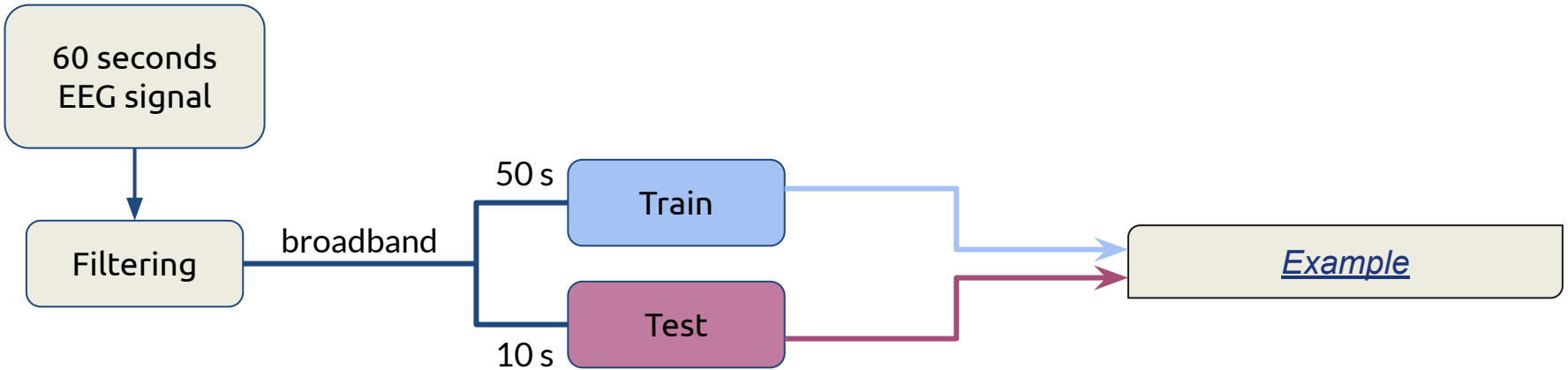
Reader function for EDF or EDF+ files.

mne.io.Raw.filter

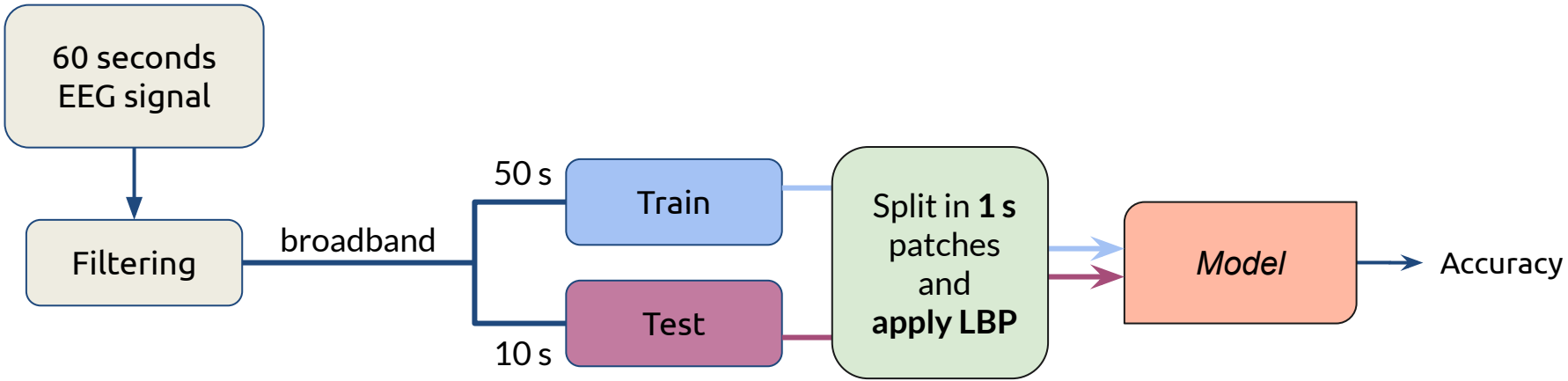
`mne.io.Raw.filter` (, , *h_freq, picks=None, filter_length='auto', l_trans_bandwidth='auto', h_trans_bandwidth='auto', n_jobs=1, method='fir', iir_params=None, phase='zero', fir_window='hamming', fir_design='firwin', skip_by_annotation='edge', 'bad_acq_skip', pad='reflect_limited', verbose=None*) [source]

Filter a subset of channels.

EEG MID: Workflow chart



EEG MID: Workflow chart



Let’s move to colab!

EEG part 1 : https://bit.ly/Tutorial7_EEG0

Behavioural Biometrics: a different view

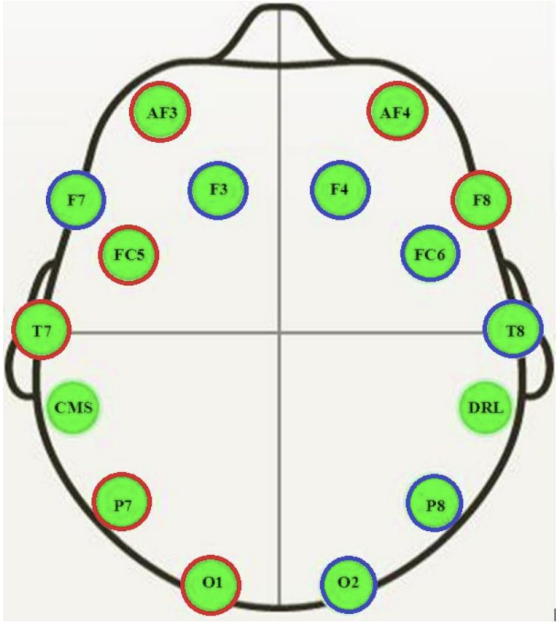
Behavioural Biometrics: some applications

Eye State Recognition from EEG

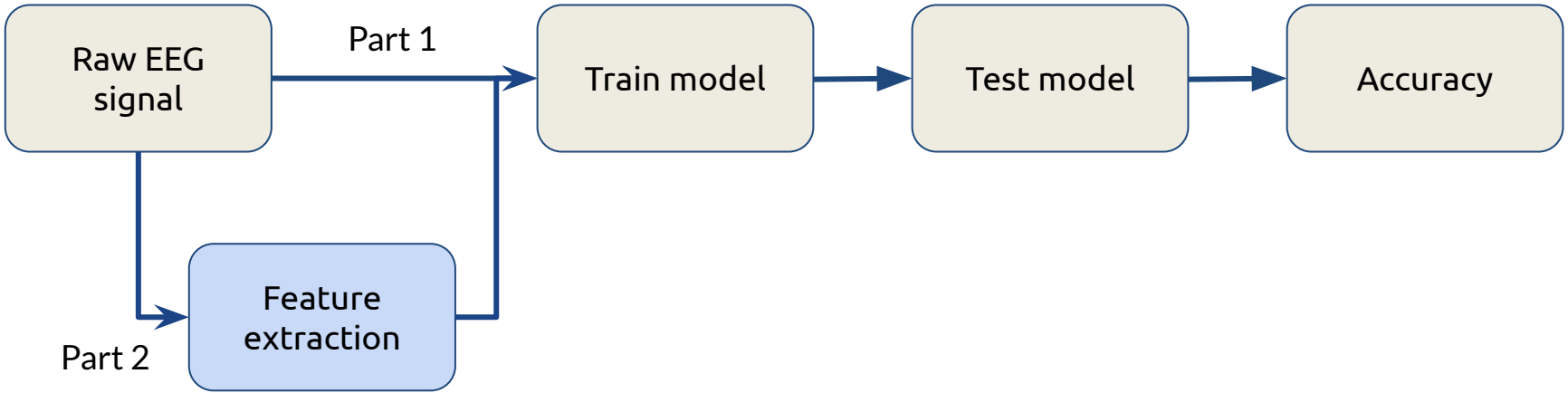
- ESR: predict the state of the eye, whether it is open or closed.
- Today tasks:
  - The eye-state prediction problem and a standard machine learning dataset that you can use.
  - How to reproduce skilful results for predicting eye-state from brainwaves in Python.
  - How to uncover an interesting methodological flaw in evaluating forecast models.

ESR: Dataset

- EEG acquired from a **single** person.
- Signal length: **117 s** (about 2 minutes)
- Device: **Emotiv EEG Neuroheadset**
- Number of channels : **14**



ESR: Workflow chart



Let’s move to colab!

EEG part 2 : https://bit.ly/Tutorial7_EEG1

Let’s move to colab!

EEG part 3 : https://bit.ly/Tutorial7_EEG2