Overview of Neuroimaging workshop

Objectives

- Learn about how you can utilize tools for Neuroimaging analysis
- Basics of data handling and different specialized packages like freesurfer, FSL, Nilearn, Mrtrix3, etc.
- Familiarize you with tools to start in your research

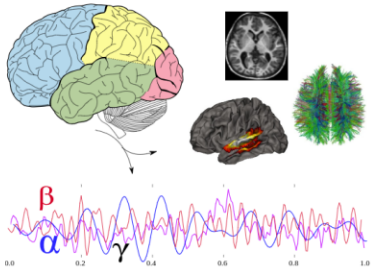
Logistics

Outline of the topics

&

Content

Neuroimaging workshop for beginners



MRI and EEG data analysis in Nilearn, FSL, Nipype, and more

View the Project on GitHub
BCCL-IIITH/Workshop_Neuroimaging

This project is maintained by BCCL-IIITH

Hosted on GitHub Pages — Theme by orderedlist

Two sessions on Structural MRI and its applications (T1 weighted)

Topics
Imaging modalities in Structural MRI
Preprocessing workflow
After preprocessing: Quality control
T1 weighted imaging workflow - Cortical thickness, etc.
Cortical thickness comparison in Alzheimer's disease and Controls
Voxel-based morphometry
Lesion to Symptom mapping

Two sessions on Diffusion MRI and Visualizations

Topics
Exporing preprocessing tools for dMRI
After preprocessing: Quality control
Local fiber orientation reconstruction
Tractography
Visualization of fiber tracts pathways
Estimating structural connectivity
Structure to Function coupling example

Four sessions on Functional MRI

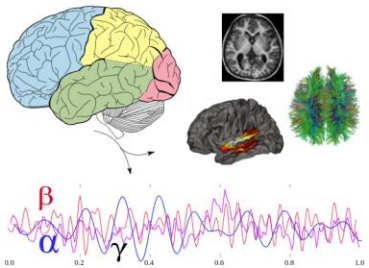
Topics
Introduction lecture on fMRI case studies
Exploring preprocessing tools for fMRI
After preprocessing: Quality control
Image manipulation via nilearn

https://bccl-iiith.github.io/Workshop_Neuroimaging/outline

Logistics

Setup

Neuroimaging workshop for beginners



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Before the workshop

Hands-on

- *Software Carpentry Unix and/or Python*
- *Tal Yarkoni's "Introduction to Python" lecture delivered at Neurohackademy 2019*
- *Gaël Varoquaux's Scipy Lecture Notes*
- *J. R. Johansson IPython notebooks*

Installations

Python 3 via Miniconda (recommended)

```
conda create -n nimg_workshop python=3.9
conda activate nimg_workshop
```

Install Python packages

Pip is the most common package installer for Python. This session requires a few additional neuroimaging-specific Python packages that can be installed with:

```
pip install nibabel nilearn pybids
```

`nilearn` and `nibabel` are for Neuroimaging data loading & handling; `pybids` for organizing neuroimaging data in proper structure

```
pip install pandas
```

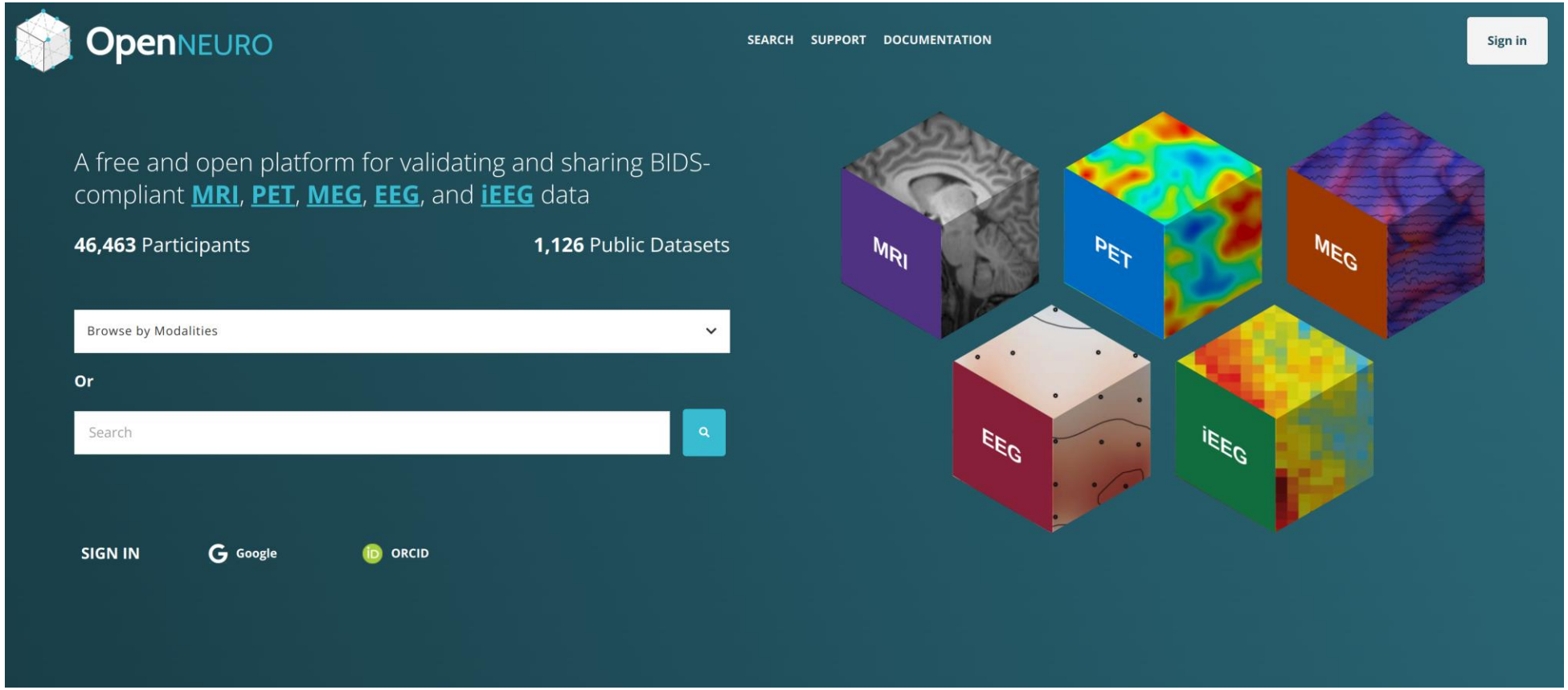
`pandas` is for non-imaging data loading

Install dcm2niix

`dcm2niix` software package for converting neuroimaging data from the DICOM format that is exported from the MRI scanner to the NIfTI format. Detailed installation instructions for various operating systems can be found on the `dcm2niix` README. With the Anaconda Python distribution which is recommended, `dcm2niix` can be installed by:

https://bccl-iiith.github.io/Workshop_Neuroimaging/setup

Open datasets/Your datasets



https://openneuro.org/

Schedule

When is the workshop?

The workshop will start from **August 10th 2024 3-5pm**, every Saturday and it continues for entire Monsoon semester. Each week every Saturday we will have sessions that cover several topics as outlined below.

Where is the workshop?

CR1 in Vindhya Building, IIITH

Any update will be posted here!!!

Your role

- If you want to get the most out of it, please attend all sessions, and start using what you have seen and implement in your research
- Please come prepared with all installations
- If any issues with the laptops, don't hesitate to email

Thank you!!

Any questions?