

Brain Imaging Data Structure

DATA ORGANIZATION STANDARD FOR NEUROIMAGING EXPERIMENTS

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The Goal

To define away of organizing and describing the results of a neuroimaging experiment that would facilitate sharing.

The Problem

Previously defined standards either require incorporate complicated file formats (XML, RDF) or dedicated database (XNAT).

The Solution

We need a simple, easy to adapt standard that will be based of folder organization and simple file formats (TSV and JSON).

Who is it for?

1. Lab PIs. It will make handing over one dataset from one student/postdoc to another easy.
2. Workflow developers. It's easier to write pipelines expecting a particular file organization.
3. Database curators. Accepting one dataset format will make curation easier.

Data types

Imaging data:

- NIFTI files

Behavioral/phenotypic data:

- Tab Separated Values files (.tsv)

Metadata (key/value dictionaries):

- JSON files

Features

1. Handles multiple sessions and runs
2. Supports sparse acquisition (via slice timing)
3. Supports contiguous acquisition covariates (breathing, cardiac etc.)
4. Supports multiple fieldmap formats
5. Supports diffusions data (together with corresponding bvec, bval files)
6. Supports behavioral variables on the level of subjects, sessions, and runs.

Folder organization (simplified)

sub00001\
◦

◦ ses001\
◦

◦ anatomy\
◦

◦ sub00001_T1w_001.nii.gz

◦ sub00001_T1w_001.json

◦ sub00001_T2w_001.nii.gz

◦ sub00001_T2w_001.json

◦ functional\
◦

◦ sub00001_task001_run001_bold.nii.gz

◦ sub00001_task001_run001_bold.json

◦ sub00001_task001_run001_events.tsv

◦ sub00001_task001_run001_physio.tsv

◦ diffusion\
◦

◦ sub00001_dwi_001.nii.gz

◦ sub00001_dwi_001.bval

◦ sub00001_dwi_001.bvec

◦ fieldmap\
◦

◦ sub00001_fieldmap_001_phase.nii.gz

◦ sub00001_fieldmap_001_magnitude.nii.gz

◦ sub00001_fieldmap_001.json

participants.tsv

Example events file

```
onset duration trial_type ResponseTime
1.2    0.6      go          1.435
5.6    0.6      stop        1.739
...
```

Example metadata file

```
{
  "repetition_time": 3.0,
  "echo_time": 0.03,
  "flip_angle": 78,
  "slice_timing": [0.0, 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6,
1.8, 2.0, 2.2, 2.4, 2.6, 2.8, 3.0],
  "multiband_factor": 4,
  "parallel_factor": 2,
  "phase_encoding_direction": "AP"
}
```

Example demographics file

```
participant_id age sex
sub00001      34  M
sub00002      12  F
sub00003      33  F
```

Comments

1. Presence of most files is optional
2. Model and contrast description is not included in the standard
3. Metadata common for all subjects or sessions can be defined in one file
4. Datasets can include additional files not include in the standard
5. There is a white paper outlining the details of the standard
6. A JavaScript based validator available on github.com

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