UM fMRI Lab Data: BIDS Conversion

MICHIGAN FMRI COURSE 2023

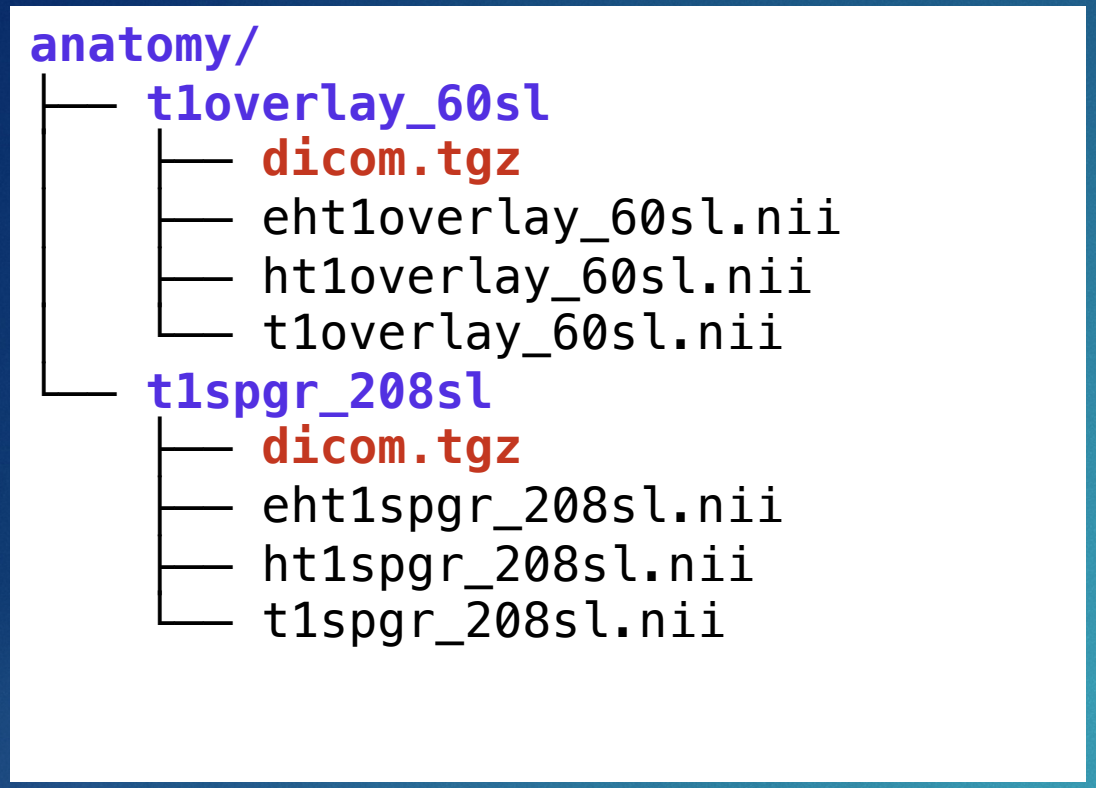
SLIDES PROVIDED BY KRISANNE LITINAS, UM FMRI LAB

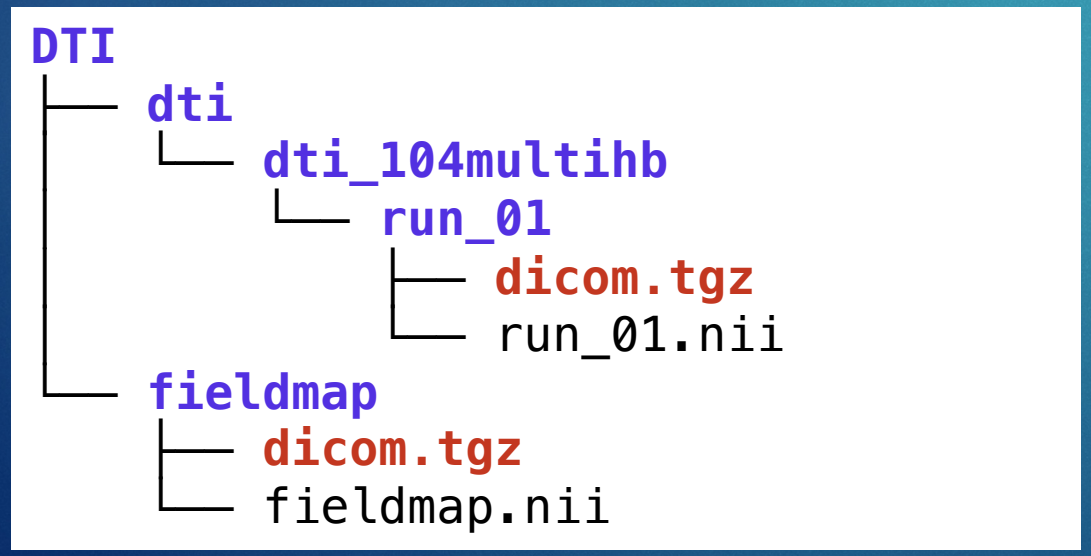
Outline

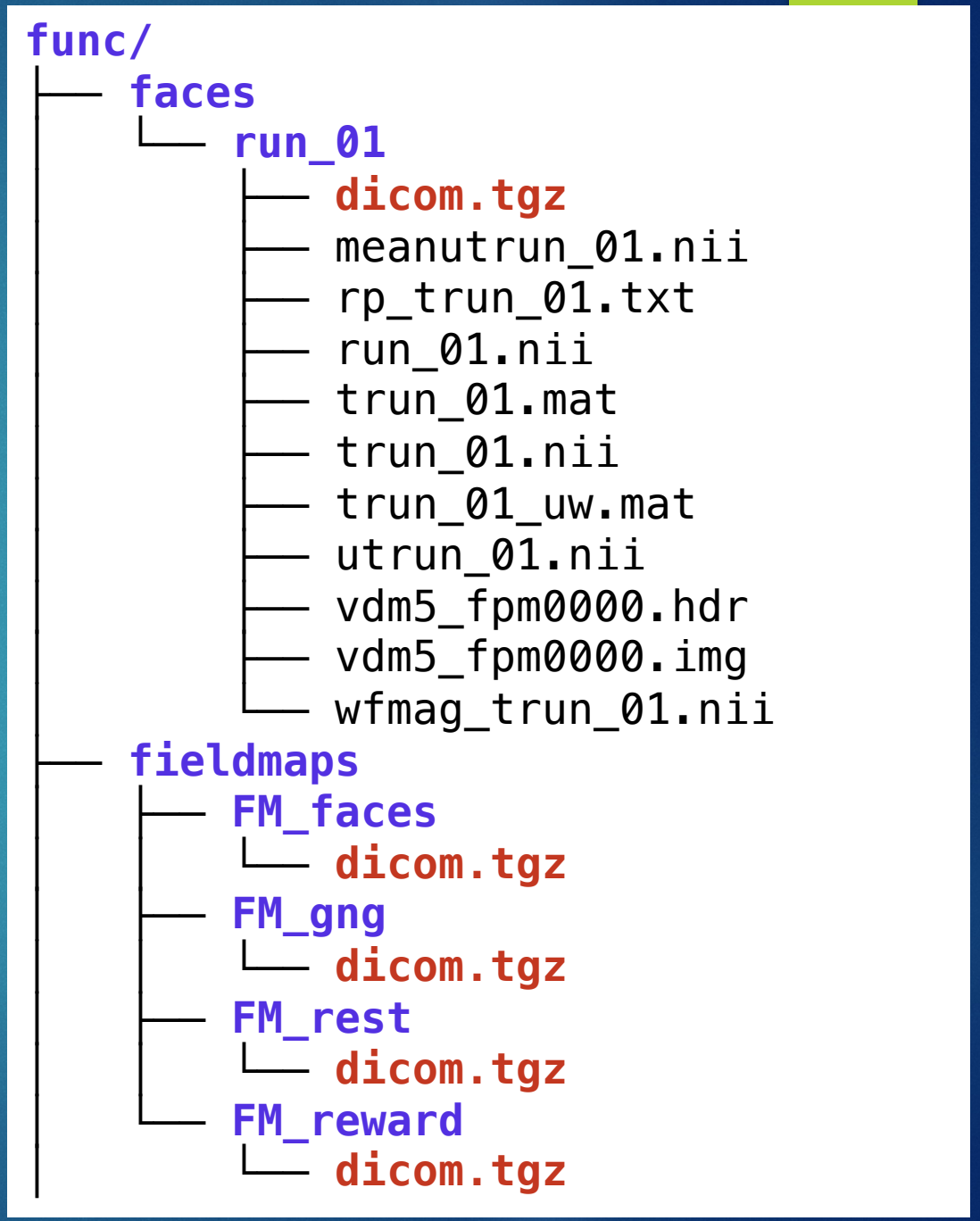
- Current data structure ("MIDS")
- Conversion to BIDS
- Example of converted data (multiband EPI)
- Derived data (e.g. fMRIPrep/MRIQC)
- fMRIPrep output example

Current Data Structure (MIDS)

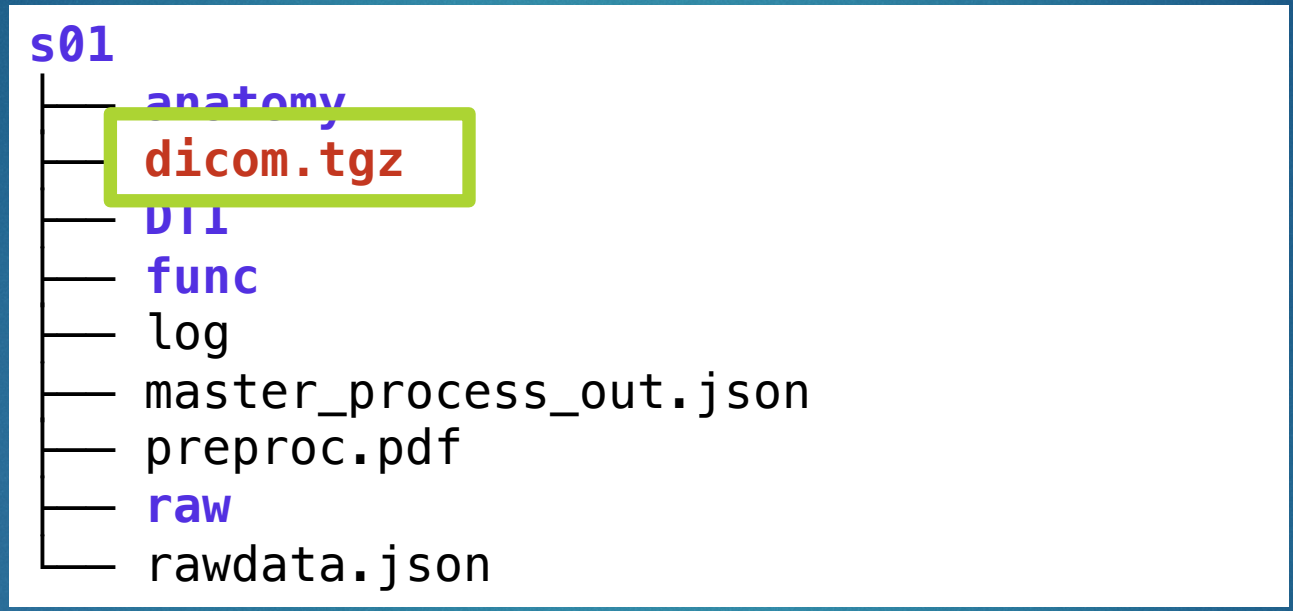
```
s01/
├── anatomy
├── dicom.tgz
├── DTI
├── func
├── log
├── master_process_out.json
├── preproc.pdf
├── raw
└── rawdata.json
```


anatomy/
t1overlay_60sl
dicom.tgz
eht1overlay_60sl.nii
ht1overlay_60sl.nii
t1overlay_60sl.nii
t1spgr_208sl
dicom.tgz
eht1spgr_208sl.nii
ht1spgr_208sl.nii
t1spgr_208sl.nii


DTI
dti
dti_104multihb
run_01
dicom.tgz
run_01.nii
fieldmap
dicom.tgz
fieldmap.nii


func/
faces
run_01
dicom.tgz
meanutrun_01.nii
rp_trun_01.txt
run_01.nii
trun_01.mat
trun_01.nii
trun_01_uw.mat
utrun_01.nii
vdm5_fpm0000.hdr
vdm5_fpm0000.img
wfmag_trun_01.nii
fieldmaps
FM_faces
dicom.tgz
FM_gng
dicom.tgz
FM_rest
dicom.tgz
FM_reward
dicom.tgz

Converting to BIDS



Converting to BIDS

- Use DICOM files as source data
- dcm2bids (https://unfmontreal.github.io/Dcm2Bids)
  - Relies on defined configuration files to sort/classify the data

```
s01
├── anatomy
├── dicom.tgz
├── DTI
├── func
├── log
├── master_process_out.json
├── preproc.pdf
├── raw
└── rawdata.json
```

```
dicom/
├── s00001
├── s00002
├── s00003
├── s00004
├── s00005
├── s00006
├── s00007
├── s00008
├── s00009
├── s00010
├── s00011
├── s00012
├── s00013
├── s00014
└── s00015
```

BIDS Data Format: Example

- Parent directory

```
subjects/
├── CHANGES
├── code
├── dataset_description.json
├── derivatives
├── participants.json
├── participants.tsv
├── README
├── sourcedata
└── sub-s01
```

BIDS Data Format: Example

```
sub-s01/
├── anat
│   ├── sub-s01_inplaneT1.json
│   ├── sub-s01_inplaneT1.nii.gz
│   ├── sub-s01_T1w.json
│   └── sub-s01_T1w.nii.gz
├── dwi
│   ├── sub-s01_dwi.bval
│   ├── sub-s01_dwi.bvec
│   ├── sub-s01_dwi.json
│   └── sub-s01_dwi.nii.gz
└── func
    ├── sub-s01_task-faces_run-01_bold.json
    ├── sub-s01_task-faces_run-01_bold.nii.gz
    ├── sub-s01_task-faces_run-02_bold.json
    ├── sub-s01_task-faces_run-02_bold.nii.gz
    ├── sub-s01_task-rest_bold.json
    └── sub-s01_task-rest_bold.nii.gz
```

BIDS Data Format: Example

```
anatomy/
├── t1overlay_60sl
│   ├── dicom.tgz
│   ├── eht1overlay_60sl.nii
│   ├── ht1overlay_60sl.nii
│   └── t1overlay_60sl.nii
└── t1spgr_208sl
    ├── dicom.tgz
    ├── eht1spgr_208sl.nii
    ├── ht1spgr_208sl.nii
    └── t1spgr_208sl.nii
```

```
anat/
├── sub-s01_inplaneT1.json
├── sub-s01_inplaneT1.nii.gz
├── sub-s01_T1w.json
└── sub-s01_T1w.nii.gz
```

MIDS

BIDS

BIDS Data Format: Example

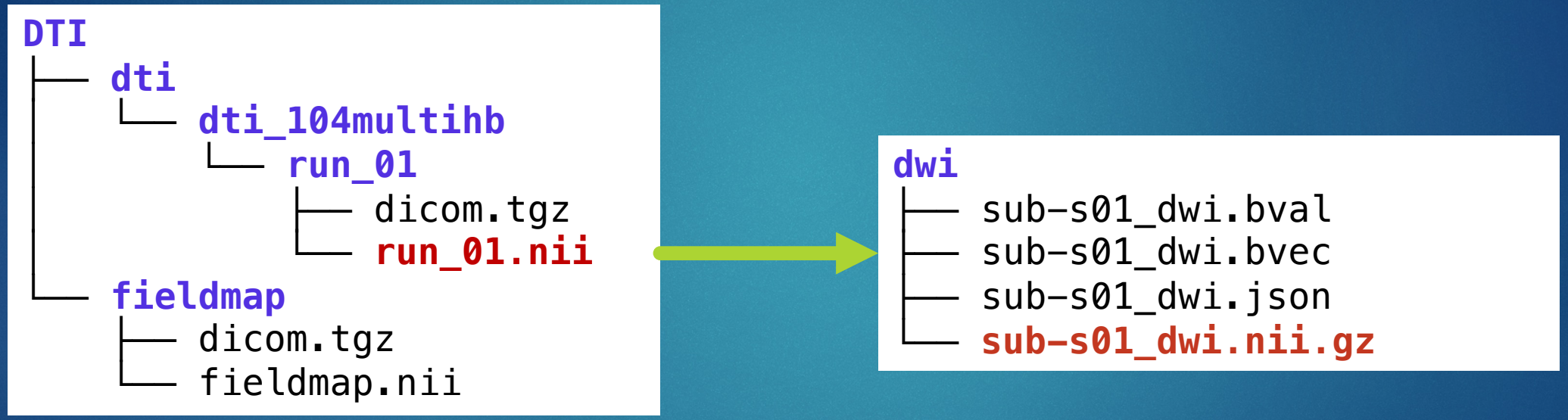
```
func/
└── faces
    └── run_01
        ├── dicom.tgz
        ├── meanutrun_01.nii
        ├── rp_trun_01.txt
        ├── run_01.nii
        ├── trun_01.mat
        ├── trun_01.nii
        ├── trun_01_uw.mat
        ├── utrun_01.nii
        ├── vdm5_fpm0000.hdr
        ├── vdm5_fpm0000.img
        └── wfmag_trun_01.nii
```

```
func
├── sub-s01_task-faces_run-01_bold.json
├── sub-s01_task-faces_run-01_bold.nii.gz
├── sub-s01_task-faces_run-02_bold.json
├── sub-s01_task-faces_run-02_bold.nii.gz
├── sub-s01_task-rest_bold.json
└── sub-s01_task-rest_bold.nii.gz
```

MIDS

BIDS

BIDS Data Format: Example



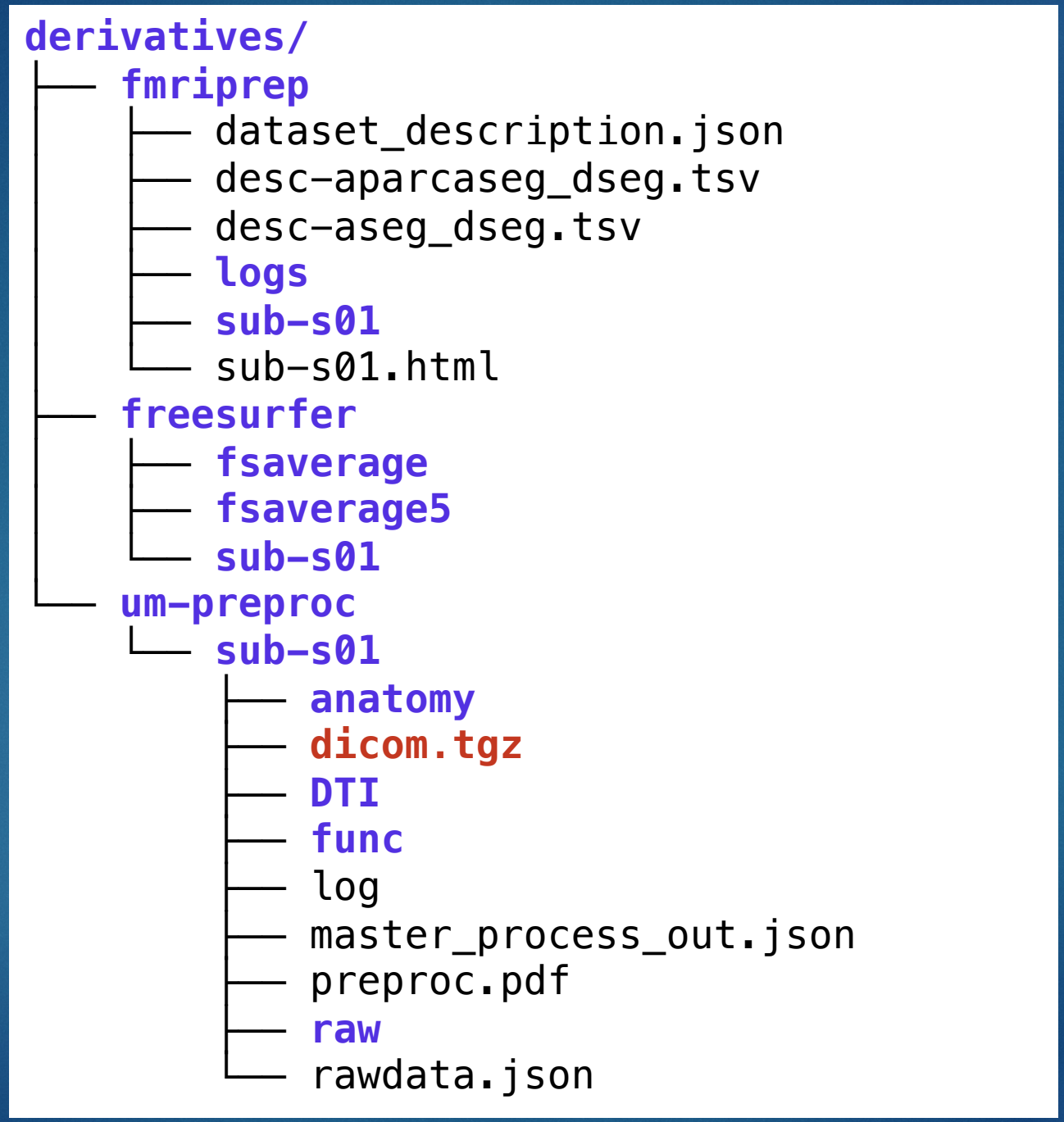
MIDS

BIDS

Derivatives

- Main directory used for processed outputs
- Does not have to be BIDS-compliant
- Can store as many pipeline analyses as necessary

```
subjects/
├── CHANGES
├── code
├── dataset_description.json
├── derivatives
├── participants.json
├── participants.tsv
├── README
├── sourcedata
└── sub-s01
```


derivatives/
fmriprep
dataset_description.json
desc-aparcaseg_dseg.tsv
desc-aseg_dseg.tsv
logs
sub-s01
sub-s01.html
freesurfer
fsaverage
fsaverage5
sub-s01
um-preproc
sub-s01
anatomy
dicom.tgz
DTI
func
log
master_process_out.json
preproc.pdf
raw
rawdata.json

Use of fMRIPrep

- Able to run from BIDS-ified data
- Can use docker or singularity container
- Easy-to-use wrappers available:

```
fmriprep-docker /path/to/subjects /path/to/subjects/derivatives participant --participant-label s01 \
--ignore fieldmaps sbref  \
--fs-license-file ~/freesurfer/license.txt
```

fMRIPrep: Sample Output