- Welcome to The Carpentries Etherpad!

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Please sign in below:
Annajiat Alim Rasel, Brac University
Melanie Gainey, Carnegie Mellon University Libraries, went hiking in Cook Forest State Park
Patrick Campbell, Carnegie Mellon University, sat INDOORS at Starbucks for the first time in two months :)
Hannah Gunderman, Carnegie Mellon University (Helper), played spooky video games! Tis the season!
Paco Martinez Murcia, University of Granada (Spain).. I was returning home from holidays in Greece :'(. But excited to teach this lesson! Jealous that you were in Greece! :)+1
Juan Carlos Angel, University of Pittsburgh, played soccer with an old group of friends
Sophia Robert, Carnegie Mellon University, went to soccer camp in Rockwood, PA
Naga Thovinakere, McGill University - meal prepped!
Eva Bacas, University of Pittsburgh - started a weaving class!
Raymundo Cassani (McGill University), trained my cat to give her paw for food
Miriam Taza, McGill University - finished watching gilmore girls! Sounds relaxing! :) hehe
Haolun Li, University of Pittsburgh,
Ryan Seger, University of Pittsburgh, played settlers of catan for the first time
Laura Cabral, University of Pittsburgh- hiked in the Laurel Highlands (PA) with my dog
Michael Granovetter, CMU
Asa Borzabadi Farahani, McGill University
Min Su (Peter) Kang, McGill University. went to a park and enjoyed the weather!
Aria Wang, Carnegie Mellon Univerisity
Zoe Zhou, University of Pittsburgh
Liyuan Liang, Carnegie Mellon University
Hillary Wehry, Carnegie Mellon University; went to an all-vaccinated, outdoor house party!
Yifan Zhao, University of Pittsburgh
Linggang Luo, University of Pittsburgh, made my own Kimchi
Tara Pirnia, Carnegie Mellon University
Jemal Yesuf, McGill University
Dilan Yucel, University of Amsterdam (the Netherlands),
Thibault Vlieghe, McGill University
Debbie Bitran, University of Pittsburgh

Speed check: please use plus sign (+) to vote for one of the options below
go-faster:

go-slower:
okay:

Notes and Helpful Links

DAY 1

- Strongly recommend having separate folders for code and data etc. in Jupyter Notebooks
- Google or Stack Overflow (use the right words) for troubleshooting errors
- **neurostars.org for help with neuroimaging code**
- The Princeton Handbook for Reproducible Code
- How to ask perfect questions in Stack Overflow: https://codeblog.jonskeet.uk/2010/08/29/writing-the-perfect-question/
- https://stackoverflow.com/questions/41729669/why-is-matplotlib-plotting-the-transpose-of-a-matrix-in-3d-plots
- https://matplotlib.org/stable/tutorials/intermediate/imshow_extent.html
- https://pythonhosted.org/SPIEPy/opening_spm_files.html
- https://codebeautify.org/jsonviewer
- https://realpython.com/python-json/
- https://unfmontreal.github.io/Dcm2Bids/docs/2-tutorial/
- https://unfmontreal.github.io/Dcm2Bids/docs/2-tutorial/#dicom-to-nifti-conversion
- https://openneuro.org/

Day 1 Code

```
#Correct load pathway
t1_img = nib.load("../data/dicom_examples/0219191_mystudy-0219-1114/nii/dcm_anat_ses-01_T1w_20190219111436_5.nii.gz")

t1_hdr = t1_img.header #store the headers from t1_img file in a new variable
print(t1_hdr)
t1.img. #full dictionary

t1_hdr.keys() #just the keys from the dictionary

t1_hdr['pixdim']

#CODE FOR TERMINAL
  1  PS1=\\w$
  2  ls
  3  cd data/dicom_examples/
  4  mkdir -p bids
```

```
  5  ls
  6  cd bids/
  7  ls
  8  mkdir -p sub-01/ses-01/{anat, func}
  9  cd ..
 10  tree bids
 11  mkdir -p bids/sub-01/ses-01/{anat,func}
 12  tree bids
 13  rmdir bids/func}/
 14  tree bids
 15  rmdir bids/sub-01/ses-01/\{anat\,/
 16  tree bids
 17  cd nii/
 18  ls
 19  mv *T1w* ../bids/sub-01/ses-01/anat/
 20  ls
 21  tree ../bids
 22  mv *func* ../bids/sub-01/ses-01/func/
 23  ls
 24  tree ../bids
 25  cd ../bids/sub-01/ses-01/anat/
 26  ls
 27  mv dcm_anat_ses-01_T1w_20190219111436_5.json sub-01_ses-01_T1w.json
 28  mv dcm_anat_ses-01_T1w_20190219111436_5.nii.gz sub-01_ses-01_T1w.nii.gz
 29  ls
 30  tree ../../../../bids/
 31  cd ../func/
 32  ls
 33  mv dcm_func_ses-01_task-faces_run-01_20190219111436_13.json sub-01_ses-01_task-
faces_bold.json
 34  mv dcm_func_ses-01_task-faces_run-01_20190219111436_13.nii.gz sub-01_ses-01_task-
faces_bold.nii.gz
 35  ls
 36  mv dcm_func_ses-01_task-sound_run-01_20190219111436_6.json sub-01_ses-01_task-sound_run-
01_bold.json
 37  mv dcm_func_ses-01_task-sound_run-01_20190219111436_6.nii.gz sub-01_ses-01_task-
sound_run-01_bold.nii.gz
 39  mv dcm_func_ses-01_task-sound_run-01_20190219111436_7.json sub-01_ses-01_task-sound_run-
02_bold.json
 40  mv dcm_func_ses-01_task-sound_run-01_20190219111436_7.nii.gz sub-01_ses-01_task-
sound_run-02_bold.nii.gz
 44  dcm2bids_scaffold -o 0219191_mystudy-0219-1114/dcm2bids/
 45  tree 0219191_mystudy-0219-1114/dcm2bids/
 46  dcm2bids_helper -d 0219191_mystudy-0219-1114/dcm/ -o
0219191_mystudy-0219-1114/dcm2bids/
 47  cd 0219191_mystudy-0219-1114/dcm2bids/
 49  mkdir rawdata
 51  dcm2bids --help
 52  dcm2bids -d ../dcm/ -p 01 -s 01 -c code/config.json -o rawdata/
```

CONFIG.JSON file for `dcm2bids`:

```
{
   "descriptions": [
      {
      "dataType": "func",
      "modalityLabel": "bold",
      "customLabels": "task-faces",
      "criteria": {
         "SidecarFilename": "*task-faces*"
         }
      },
      {
      "dataType": "func",
      "modalityLabel": "bold",
      "customLabels": "task-sound",
      "criteria": {
         "SidecarFilename": "*task-sound*"
         }
      },
      {
      "dataType": "func",
      "modalityLabel": "bold",
      "customLabels": "task-story",
      "criteria": {
         "SidecarFilename": "*task-story*"
         }
      },
      {
      "dataType": "anat",
      "modalityLabel": "T1w",
      "criteria": {
         "SidecarFilename": "*T1w*"
         }
      }
   ]
}
```

Reminder of Lesson Link for following along with Annajiat: https://nbviewer.jupyter.org/github/carpentries-incubator/SDC-BIDS-IntroMRI/blob/gh-pages/code/02-anatomy-of-nifti.ipynb#Visualizing

Reminder of Lesson Link for following along with Paco: https://github.com/carpentries-incubator/SDC-BIDS-IntroMRI/blob/gh-pages/code/03-brain-imaging-data-structure.ipynb

Questions

1. Loading multiple NIfTIs simultaneously - Is there a convention for how to do load and process multiple timepoints?

2. BIDS for longitudinal studies when there's just 1 anatomical at baseline (@keith)

https://bids-specification.readthedocs.io/en/stable/06-longitudinal-and-multi-site-studies.html

Helpful Links

- Paper decribing BIDS: The brain imaging data structure, a format for organizing by KJ Gorgolewski · 2016, Nature
- Opening SPM files with Python: https://pythonhosted.org/SPIEPy/opening_spm_files.html
- DCM2BIDS: https://unfmontreal.github.io/Dcm2Bids/docs/2-tutorial/
- OpenNeuro: https://openneuro.org/

Modified slides from Paco: https://github.com/pakitochus/Teaching-SWC-Lessons/blob/master/intro-MR/0_before_we_start.pdf

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DAY 2

Workshop Website: https://annajiat.github.io/2021-10-05-neuroimaging/
Lesson Plan Day 2: https://carpentries-incubator.github.io/SDC-BIDS-fMRI/
To access Binder link: https://carpentries-incubator.github.io/SDC-BIDS-fMRI/setup.html
Source slides (modified) for today:
https://docs.google.com/presentation/d/1er6dQcERL-Yeb5-7A29tJnmqgHNaLpTLXM3e-SmpjDg/edit#slide=id.g8d9c4cd832_0_0
Modified slides: https://github.com/pakitochus/Teaching-SWC-Lessons/blob/master/intro-MR/1_func_analysis.pdf (pdf)
Episode 2 of Lesson:
ttps://mybinder.org/v2/gh/carpentries-incubator/SDC-BIDS-fMRI/gh-pages?urlpath=lab/tree/code
If anyone is interesated in structural MRI, the authors of these lessons have another lesson focused on cleaning, normalization, segmentation and so on:
https://carpentries-incubator.github.io/SDC-BIDS-sMRI/

Day 2 Code

```
$ cd code
$ ./setup_workshop

layout = nids.BIDSLayout('../data/ds000030/derivatives/fmriprep/', validate=False)

#Getting Subjects
layout.get_subjects()

#Getting tasks
layout.get_tasks()
```

```
#Getting a specific file
preproc_T1 = layout.get(datatype='anat', suffix='preproc', extension='nii.gz')
preproc_T1

mni_preproc_T1 = layout.get(datatype='anat', suffix='preproc', extension='nii.gz',
space=MNI15NLin2009cAsym)
mri_preproc_T1

native_preproc_T1 = [f for f in preproc_T1 if f not in mni_preproc_T1]
native_preproc_T1

# Alternative for loop for code above
native_preproc_T1 = []
for f in preproc_Tq
```

- if f not in mni_preproc_T1:
    - native_preproc_T1.append(f)

```
#Exercise: Pulling functional data
#1. Get list of all preprocessed functional data
func_data = layout.get(datatype='func', suffix'=preproc')
func_data

#2. Get list of functional data in MNI152NLin2009cAsym space
mni_func_data = layout.get(datatype='func', suffix='preproc', space='MNI152NLin2009cAsym')
mni_func_data

#3. Get list of functional data in T1w space (native)
native_func_data = [f for f in func_data if f not in mni_func_data]
native_func_data
```