fmriPrep

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What is fmriPrep

- Data preprocessing pipeline created by the Standard Center for Reproducible Neuroscience
- Designed to be robust, easy to use, and transparent
- Performs minimal processing: motion correction, fieldmap correction, normalization, bias field correction, and brain extraction
- Makes use of the best bits of popular software packages (e.g., ANTs, FSL, FreeSurfer, AFNI), as well as custom code
Reasons to use fmriPrep

- Field-tested
- Reproducible
- Each step has been optimized
- Easy to use output
- Automatically generated reports for QC of each step
Reasons to not use fmriPrep

- Data do not meet assumptions (e.g., narrow FOV)
- Need unlimited flexibility
- Have study population that does not conform to standard adult MNI templates (e.g., infants, NHP, rodent)
Options of interest

- ICA-AROMA
- FreeSurfer (including longitudinal)
- Anatomy only
- Fieldmap-less distortion correction
- Multi-echo EPI
- Multiple output spaces
Things fmriPrep does not do

- Smoothing
- ICA-FIXX
- Denoising with user-specified confounds (e.g., in preparation for resting-state analyses)
How to run fmriPrep?
Option 1: Docker

- fmriPrep is a Docker container
- Can be run directly from Docker
  
  ```bash
  docker run -ti --rm \
  -v filepath/to/data/dir:/data:ro \n  -v filepath/to/output/dir:/out \n  poldracklab/fmriprep:latest \n  /data /out/out \n  participant
  ```
- Can be run using the fmriprep-docker wrapper script
  
  ```bash
  pip install --user --upgrade fmriprep-docker
  
  fmriprep-docker /path/to/data/dir /path/to/output/dir participant
  ```
Option 2: Compute Canada

- Khan Lab has a set of wrapper scripts: neuroglia-helpers
  
  git clone http://github.com/khanlab/neuroglia-helpers ~/neuroglia-helpers
  ~/neuroglia-helpers/setup.sh

- BIDS apps can be run using bidsBatch

  bidsBatch fmriprep_1.0.4 ~/my-bids-dataset ~/my-bids-dataset/derivatives/fmriprep-v1.0.4 participant
Tips on running fmriPrep

• Running time scales with number of functional runs

• If using Docker, it is recommended to only process one subject at a time

• If using Compute Canada, try and keep the job under 24 hours

• If time/memory is an issue, consider omitting FreeSurfer
Output