DPRC Diffusion Preprocessing Pipeline

Preprocessing script for DPRC diffusion data, which can be downloaded here: <https://github.com/Ltah72/DPRC-analysis>.

Software programs, such as FSL, MRtrix3, and ANTs are utilised for these steps. Assumes BIDS formatting and organisation as inputs. This script calls upon 6\* preprocessing steps which are, in order:

Steps, output & directory: \_\_\_\_\_\_\_ Method: programme/algorithm/model, author

Output directory in research drive: ressci202000017-dprc\_diff\_vis/Archive/NECTAR\_data/LENORE/derivatives/groups/F0/’PAR\_NAME’/dwi

PAR\_NAME = participant ID, e.g., sub-ADPRC0001F0

**0. ‘Pre-steps’** (organise files/directories, define variables, etc.)

combined\_sub-ADPRC0001F0\_acq\_data\_dwi.nii

**1. Noise correction**(denoising -- MP-PCA)

dsub-ADPRC0001F0\_acq\_data\_dwi.nii

**2. Gibbs ringing correction** (local sub-voxel shift)

gdsub-ADPRC0001F0\_acq\_data\_dwi.nii

**Edit gradient files** (LastB0AddOn – in-house function)

cgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

bcgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

**3. Field distortion** (TOPUP – FSL)

**a) BestB0 pair selection** (BestB0 – in-house function)

bbcgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

**4. Estimate brain mask** (BET – FSL)

brain\_mask\_sub-ADPRC0001F0\_acq\_data\_dwi.nii

**5. Eddy current distortions** (Eddy – FSL)

ebbcgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

**a) Run eddy quality control**(eddy\_quad)

**/eddyqc**

**6. Bias field correction** (ANTs -- N4BiasFieldCorrect)

**(Run twice)** (dwi2mask)

febbcgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

f2ebbcgdsub-ADPRC0001F0\_acq\_data\_dwi.nii

**● Perform group motion (eddy) quality control** (eddy\_squad – FSL)

ressci202000017-dprc\_diff\_vis/Archive/NECTAR\_data/LENORE/derivatives/groups/F0/dwiqc

**\* Most preprocessing steps are deployed through MRtrix3. MRtrix operates only through command-line usage and images can be viewed via *mrview* or if converted, through *fsleyes*. MRtrix preprocessing steps are detailed here:** [**https://mrtrix.readthedocs.io/en/0.3.16/workflows/DWI\_preprocessing\_for\_quantitative\_analysis.html**](https://mrtrix.readthedocs.io/en/0.3.16/workflows/DWI_preprocessing_for_quantitative_analysis.html)

[**https://mrtrix.readthedocs.io/en/latest/fixel\_based\_analysis/mt\_fibre\_density\_cross-section.html**](https://mrtrix.readthedocs.io/en/latest/fixel_based_analysis/mt_fibre_density_cross-section.html)