ANTS RS-fMRI

Date: September 24, 2012

Developers: John Pluta, Brian Avants

Description: ANTs RS-fMRI is a set of scripts and utilities that facilitates a graph-theoretical approach to functional connectivity data. It runs completely from the command line and all required software is available for free. Scripts are designed for both ease-of-use and flexibility, so the user can tailor the analysis however they desire.

Dependencies: R (>=2.15.0), ANTs (>= XX)

Contact: jpluta@mail.med.upenn.edu

Table of Contents

Preprocessing scripts:

|  |  |  |
| --- | --- | --- |
|  | ANTs\_fmriToT1.sh |  |
|  | ANTs\_rsfmri\_pre.sh |  |
|  | ANTs\_rsfmri\_filter.sh |  |

Group analysis scripts:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

Utilities:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

ANTs\_fmriToT1.sh

Description:

Performs motion correction on functional image series and coregisters with anatomical image. Anatomical data (binary brainmask, ROI file, and 3 tissue segmentations) are transformed to functional image space. All images (except for the functional image series) should be in the space of the T1 image.

Usage:

$>./ANTs\_fmriToT1.sh -i 4DtimeSeries.nii.gz -t T1img.nii.gz -r T1roi.nii.gz -b T1brainmask -c T1csfpriorimage -g T1gmpriorimage -w T1wmpriorimage -o outputdir/outputprefix

Arguments:

-i : the 4D functional image series . Note that BLANK UTIL can be used to concatenate a series of 3D images into a 4D series.

-o : output prefix, prepended to all output files.

-t : the T1 anatomical image .

-r : file containing the ROIs for which connectivity will be measure. Each ROI should have a unique integer value.

-c : Probability map of the cerebro-spinal fluid.

-w : Probability map of the white matter.

-g : Probability map of the gray matter.

-b : binary image masking the brain.

Output:

-Brainmask, ROI image, and 3 tissue segmentations in T2 space. These are named ${out}INPUTIMGNAME\_T2.nii.gz, unless ${out} matches the head of the INPUTNAME string. In this case, the images are only appended with *T2, e.g.* INPUTIMGNAME\_T2.nii.gz.

-Average functional image. The average image of the functional image time-series after motion correction, named ${out}avg.nii.gz.

-The motion corrected time-series, named ${OUT}.nii.gz. This is a 4-dimensional file.

-The mapping between T1 and T2 space, named ${out}Translation0.mat.

Example:

$>./ANTs\_fmriToT1.sh –i sub01\_event.nii.gz –t sub01\_t1.nii.gz –r sub01\_ROI.nii.gz –b sub01\_brainmask.nii.gz –c sub01\_prob\_0.nii.gz –g sub01\_prob\_1.nii.gz –w sub01\_prob\_2.nii.gz –o ./sub01

Notes:

The file ${out}Translation0.mat can be used to transform any files from T1-space to functional image space, with the following command:

ANTs\_rs\_fmri\_pre.sh

Description: