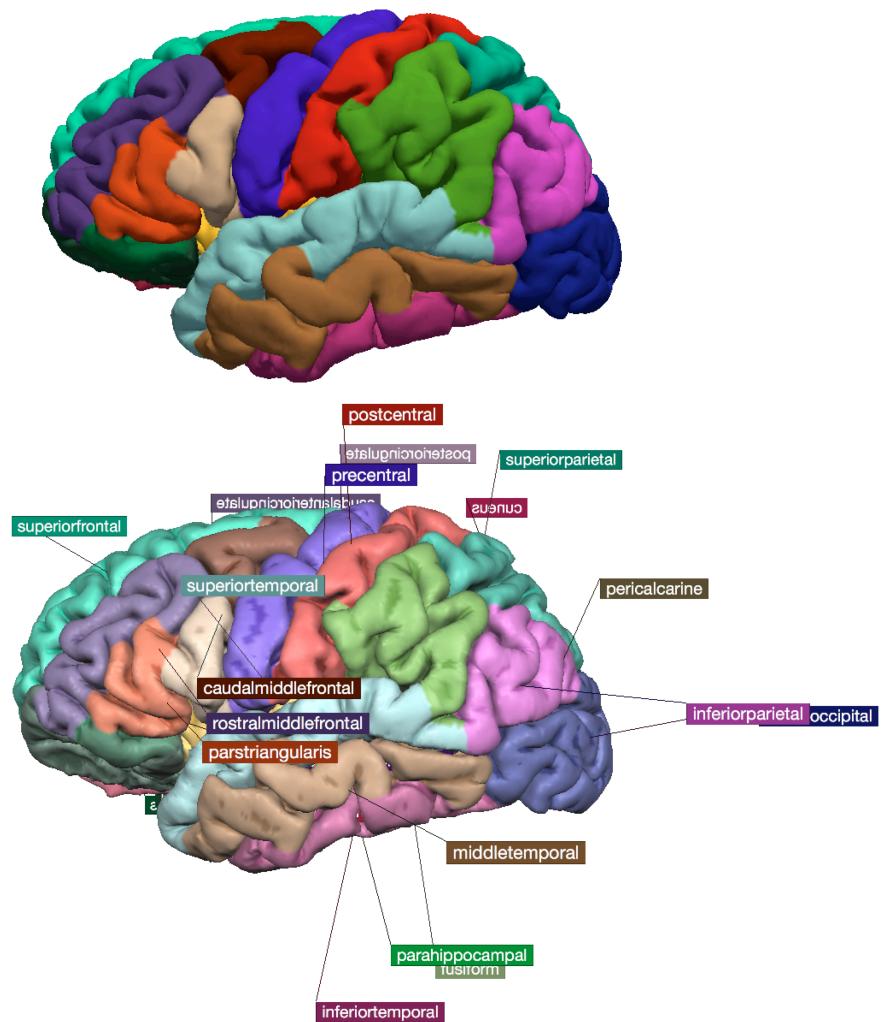


Converting Freesurfer Surfaces and Atlases to BrainVoyager

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General description

The Matlab program fsSurf2BV converts freesurfer-generated surfaces and atlases to BrainVoyager surfaces (srf) and patches of interest (poi). Among other options the program can be configured with respect to which surfaces to generate and which atlases to use.

Prerequisites

FreeSurfer:	https://surfer.nmr.mgh.harvard.edu/fswiki
Surfing Toolbox	Welcome.html">http://surfing.sourceforge.net>Welcome.html
NeuroElf	http://neuroelf.net

Usage

fsSurf2BV(subjName, varargin)

With default options creates BrainVoyager files for a given participant in subdirectory <subjName>:

brain.vmr
<subjName>_lh_inflated.srf
<subjName>_lh_pial.srf
<subjName>_lh_smoothwm.srf
<subjName>_lh_sphere.srf
<subjName>_rh_inflated.srf
<subjName>_rh_pial.srf
<subjName>_rh_smoothwm.srf
<subjName>_rh_sphere.srf
<subjName>_lh_aparc.a2009s.annot.poi
<subjName>_lh_aparc.DKTatlas40.annot.poi
<subjName>_lh_Yeo2011_7Networks_N1000.annot.poi
<subjName>_rh_aparc.a2009s.annot.poi
<subjName>_rh_aparc.DKTatlas40.annot.poi
<subjName>_rh_Yeo2011_7Networks_N1000.annot.poi
if not yet existing, creates freesurfer annotation files in subject space:
SUBJECT_DIR/<subjName>/label/lh.Yeo2011_17Networks_N1000.annot
SUBJECT_DIR/<subjName>/label/rh.Yeo2011_17Networks_N1000.annot

Configurable:

Cfg.FREESURFER_HOME	path to freesurfer on your machine. Default is /Applications/freesurfer
Cfg.SUBJECTS_DIR	path to freesurfer generated segmentations. Default is /Applications/freesurfer/subjects
Cfg.projectDir	path to current project. Default is the current directory or ‘.’
Cfg.hemis	cell array of hemispheres to process. Default is {'lh', 'rh'}
Cfg.surfaceTypes	cell array of which surfaces to convert. Default is {'inflated', 'pial', 'smoothwm', 'sphere'}

Cfg.atlas	Cell array of atlas names that are available in fsaverage space. This should also work if you have created an atlas yourself. Creates the annot file in subject space on the fly if it does not yet exist. Default {'BA.annot', 'aparc.a2009s.annot', 'aparc.DKTatlas40.annot', 'Yeo2011_7Networks_N1000.annot', 'Yeo2011_17Networks_N1000.annot'}
Cfg.nSubClusters	Each region can be subdivided into nSubClusters using spatial kmeans clustering. Creates an additional poi-file ◇_clustered.poi. Default 10.

Example calls

```
%for creating all default conversions of freesurfer's subject bert  
fsSurf2BV('bert') %requires write permission to  
$FREESURFER_HOME/subjects/bert/label  
  
%for creating just the inflated surfaces and pois for bert and the DK40 atlas  
Cfg.surfaceTypes = {'inflated'};  
Cfg.atlas = {'aparc.DKTatlas40.annot'};  
fsSurf2BV('bert', Cfg)  
  
%for creating just the inflated surfaces and pois for a list of subjects  
%in a given SUBJECTS_DIR whose IDs all start with 'subj_',  
%and restricting poi-creation to the DK40 atlas  
Cfg.SUBJECTS_DIR = '~/MRI/myProject/subjects'; %directory  
and file conventions according to  
freesurfer  
Cfg.surfaceTypes = {'inflated'};  
Cfg.atlas = {'aparc.DKTatlas40.annot'};  
fsSurf2BV('subj_', Cfg)
```

Issues:

- A vmr generated in BrainVoyager and the vmr (brain.vmr) derived from freesurfer's T1.mgz are off by 1mm in the y-direction. However, this does not matter if you want to later operate in ACP or TAL space because of an additional coregistration step, see below. It only matters if you want native space. I need to check where the problem is.
- The reference vertex for a given poi may not be optimally chosen such that the label sticks out to the wrong side.

Todos:

Write program for creating transformation parameters such that freesurfer generated files are in the same space as brainvoyager files (native, ACPC, TAL)

Here is the pedestrian method for freesurfer-brains in talairach space:

- Coregister freesurfer-brain (brain.vmr) to a structural of the same subject created in BrainVoyager in ACPC space (aBrainVoyagerStructural_IIHC_ACPC.vmr).
- Open aBrainVoyagerStructural_IIHC_ACPC.vmr
- In 3D volume tools, Talairach tab: load aBrainVoyagerStructural.tal
- Switch to surface module
- Load the surface that you want to bring to talairach space, e.g. <subjectName>_lh_pial.srf
- Meshes ->Spatial Transformations
- Load TRF brain-TO-aBrainVoyagerStructural_IIHC_ACPC.trf
- Click apply button
- If you want, save the ACPC surface as <subjName>_ACPC.srf
- Now click ACPC->TAL button
- save the resulting surface as <subjName>_LH_pial_TAL.srf (this is the freesurfer generated surface in BrainVoyager's Talairach-space).
- The same procedure should be applicable to other surfaces (such as smoothwm and probably also to inflated).

Further todos:

Document how to transform statistical maps.