BrainScape Quick Start Guide

Installing brainScape

(1) Download and install the 64-bit MATLAB Runtime installer, R2016a on your PC (if you haven't done so previously). This is the link where you can download this library:

http://www.mathworks.com/products/compiler/mcr

(2) Unzip the installation package brainScape.zip.

(3) In File Explorer (or Windows Explorer for older Windows versions) navigate to the unzipped brainScape folder.

(4) Click on Autorun.bat (or setup.bat - they are equivalent) to run brainScape installation.

(5) When the license GUI comes up it will display a public product ID in an edit box labeled "Public Key:". Beneath it is an edit box labeled "License Key String". If that edit box has a license key string, then simply click the 'Submit' button to finish installation.

(6) If "License Key String" is blank then email to jdubb@nmr.mgh.harvard.edu (the instructions on obtaining the license key string also appear in the in the GUI) with subject line "License Key" to obtain the license key string. While waiting to receive a reply you can either leave the License Key GUI up or click the button "Install Later".

(7) When you receive the email containing the license key, rerun the setup.bat (if you previously quit the GUI by clicking "Install Later"). Copy and paste the license key from the email reply to the GUI edit box "License Key String" and click "Submit" button.

(8) If it installed correctly, you should get a popup box notifying you of successful installation. If it says otherwise contact jdubb@nmr.mgh.harvard.edu. There should be a brainScape icon on your desktop.

Running brainScape

(1) Click on the brainScape icon.

(2) When the GUI comes up, it will ask if the Polhemus digitizer is on and connected. Click yes and follow instructions in the next popup message on how to hold the stylus pen, then click "Okay".

(3) Select subject folder. A Windows Explorer search window appears. Navigate to a subject folder. This is the folder which typically contains the subject probe .SD file, and also where the results of digitization will be written and from where any saved results for this subject can be loaded.

(4) Select an .SD file containing the probe geometry that you want to digitize.

(5) Digitize the head reference points, Nz, Iz, LPA, RPA, and Cz. The brainScape GUI comes up marking in red the current reference point that it is asking to digitize. Hold the stylus pen to each reference point on the head and click the button on the pen.

NOTE: When digitizing, be careful to hold the stylus as steady as possible and fully click the button before moving the stylus to the next head location. If the stylus is moved before fully clicking the button there is a chance of getting bad digitization. A bad digitization will make the head appear misshapen.

(6) After the 5 head reference points are digitized, the registered head will appear. You are now ready to register the flat probe on the head. To do that, click on the button “Digitize Checked Optodes” on the lower right. The flat probe will be displayed with a red outline around the current optode to digitize. Use the stylus to digitize each optode.

Viewing Fluence and Sensitivity

(1) To view fluence on the cortex corresponding to a digitized optode, click on the optode with the mouse, either on the the 2D probe geometry display or the 3D head display.

Another way to select an optode is to enter it’s number in the “Select Src and Det:” edit box at the top of the GUI. This edit box take two numbers: source # and detector # in that order.

To select a source, enter <src #> 0 in the edit box.
To select a detector, enter 0 <det #> in the edit box.

(2) To view sensitivity on the cortex corresponding to a digitized source/detector pair, click on one optode, press SHIFT + mouse click on a second optode, either on the 2D probe geometry display or the 3D head display. Make sure that if the first clicked optode is a detector, then the second optode is a source and vice versa.

Another way to select a source/detector pair is to enter the optode numbers in the "Select Src and Det:" edit box at the top of the GUI.

To select a source/detector pair, enter <src #> <det #> in the edit box.

(3) To view fluence on the cortex corresponding to random points on the head click on the “Localization” button at the bottom right of the GUI. Then use the stylus to click on any location desired on the subject’s head. A fluence display will appear on the cortex and the MNI coordinates of the approximate center of the corresponding fluence will display in the Localization text boxes at the top.

To end Localization mode, either click again on “Localization” button or click the “Cancel” button at the top of the GUI.

(4) To view the location of a specific MNI point on the cortex, enter the MNI coordinates in the “Target” edit boxes and it will be marked on the cortex of the 3D head display with a dark red dot.

Saving Work

The digitized points which include the reference points and any digitized optodes can be saved in a text file. If saved in the file name “digpts.txt” in the subject folder, then the next time brainScape is launched it will detect the presence of digpts.txt and ask the user if they want to load it. Thereby restoring the registered atlas with the digitized reference points.

If the user also selects the same probe .SD file at startup, as the one that corresponds to the digitized optodes in digpts.txt then the digitized optodes will also be restored and displayed on the head.

Selecting Any Atlas Anatomy

BrainScape can use any anatomy as it’s working atlas other than the default (currently Colin), provided that it is in an AtlasViewer-brainScape compatible format. Please note that this feature exists starting with AtlasViewer, v2.5.12 and brainScape, v2.4.1 or later versions.

SPM registration of atlas to MNI Template

When importing a new atlas in AtlasViewer format, brainScape will first look for a registration file called for *headvol2ref.txt* in the atlas' anatomical folder. This is simply a transformation matrix which maps the new atlas coordinates to an MNI template when the user selects various points on the atlas cortical surface. If brainScape does not find *headvol2ref.txt* in the atlas folder it will try to generate it using an SPM12 batch executable script, *my_spm coreg_batch.exe,* which is included with a brainScape installation.

NOTE on modifying *my_spm coreg_batch.exe*: If the user is proficient with SPM and has access to MATLAB, you can modify and recompile *my_spm coreg_batch.exe*. Normally the user should NOT need to do this - and we recommend against it - unless the user is proficient with SPM. For those who are proficient, the option to modify the existing *my_spm coreg_batch* or write your own version of *my_spm coreg_batch* that better suits your MNI registration needs, does exist. The source code for SPM12 and *my_spm coreg_batch.exe* are freely distributed with brainScape, and can be modified and recompiled under the terms of the GNU GPL license. See the *README.txt* file for instructions on how to do this in the brainScape installation folder: *c:/users/public/brainscape/my_spm coreg_batch*

Converting MRI files in NIFTI or MGH format to AtlasViewer-brainScape format:

AtlasViewer is a free MRI and fNIRS imaging tool available at

https://www.nitrc.org/projects/homer2

as part of the homer2 package. AtlasViewer can import and convert MRI files in NIFTI or MGH formats to AtlasViewer.

To download and install homer2, see the homer2 instructions page

https://www.nitrc.org/plugins/mwiki/index.php/homer2:MainPage

For instructions on importing MRI anatomies in AtlasViewer, go to

https://www.nitrc.org/plugins/mwiki/index.php/homer2:Importing_Subject-Specific_Anatomy_Importing

Selecting any atlas anatomy in AtlasViewer-brainScape format:

There are 3 ways to select an atlas other than the default that brainScape automatically uses (currently Colin):

(1) Modify the value of the parameter "Source Atlas" in the brainScape config file,

C:\Users\Public\brainScape\brainScape.cfg

By default, after brainScape installation, the value of "Source Atlas" is the path

C:\Users\Public\brainScape\Colin

Change the path to the folder of any anatomy that is in AtlasViewer-brainScape format.

(2) Use the File menu: File → Select Atlas and choose the folder of the anatomy you want to use as your atlas.

(3) Manually move the folder (e.g., in a file browser) of the anatomy you want to use as your atlas to the subject folder. BrainScape will treat the this folder as a subject-specific anatomy and load it as it's working anatomy.

Note on Viewing MNI coordinates when Fluence files aren't Available

When using anatomies other than the default for atlas, fluence files might not be available for that particular anatomy. In this case fluence and sensitivity cannot be viewed. However the projection of points on the head surface to the cortex and the MNI coordinates of the cortical location can still be viewed.