Jan 16, 2020

Orawing ROIs in ITK-Snap

DOI

dx.doi.org/10.17504/protocols.io.8nvhve6

Courtney Comrie¹

¹University of Arizona

Courtney Comrie University of Arizona





DOI: dx.doi.org/10.17504/protocols.io.8nvhve6

Protocol Citation: Courtney Comrie 2020. Drawing ROIs in ITK-Snap. protocols.io <u>https://dx.doi.org/10.17504/protocols.io.8nvhve6</u>

License: This is an open access protocol distributed under the terms of the <u>Creative Commons Attribution License</u>, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Protocol status: In development We are still developing and optimizing this protocol

Created: October 23, 2019

Last Modified: January 16, 2020

Protocol Integer ID: 29109

Introduction

1 This protocol will show you two different methods for drawing ROIs in ITK-SNAP. The first method will be drawing ROIs manually and the second method will show the automatic ROI with the snake tool.

Note: The example in this protocol uses the Fornix Fimbria in a ferret brain as the ROI.



Manual ROIs

2 Open up ITK-SNAP by typing:

Command

cd /rsgrps/hutchinsone/Singularity_Containers
module load singularity
singularity run nklab-neurotools-v0.4.sif itksnap

- 3 Open NIFTI file on ITK-SNAP.
- 3.1 Identify the ROI you want to segment on your brain.

There are resources on the internet, and in lab to help identify the tracts. For this protocol a Brain Atlas of the Ferret was utilized.

Zoom into the brain until you are satisfied with your view.
 To zoom in select the "Zoom/Pan Mode" button, and then the up arrow boxed in the image below.



5 Select the "Polygon Mode" and on your ROI trace an outline.



Once you are happy with your shape select the accept button in the bottom right hand corner.

- 6 Continue the previous step through the slices till your ROI is finished.
- 7 Lastly, save your ROI as a NIFTI file, and open it in ITK-SNAP to ensure there are no mistakes.



7.1 Save the ROI by clicking on Segmentation>Save Segmentation Image.

Title your ROI and make sure to delete the ".gz" at the end. You want a ".nii" file, not a ".nii.gz" file.

Auto ROIs

8 Open up ITK-SNAP by typing:

Command

```
cd /rsgrps/hutchinsone/Singularity_Containers
module load singularity
singularity run nklab-neurotools-v0.4.sif itksnap
```

- 9 Open NIFTI file on ITK-SNAP.
- 10 Select the snake tool in the top left corner.



Then select the Segment 3D button.

11

FT38_DTI_proc_DRBUDDI_final.nii - New Segmentation - ITK-SNA File Edit Segmentation Workspace Tools Help ITK-SNAP Toolbox Segment 3D S Main Toolbar Current Stage 5 8 5 1 \$ In Step 1/3 Presegmentation ø Д . - del * * 📮 🖗 Actions Cursor Inspector Presegmentation mode: Thresholding -15 0 = 9 Cursor position (x,y,z): Clustering 51 80 38 Edge Attraction Intensity under cursor: Layer Intensity FT38_DTI_pr... ■ 1.058... Speed Image ■ 0.9867 Lower threshold: 79577 -38 of 80 51 of 104 Upper threshold: zoom to fit n to fit 159155 🗘 С Label under cursor: 00 Ø 0 Clear Label **(** Segmentation Labels Active label: Label 1 Paint over: Overall label opacity: More 3D Toolbar Next 3 10 0 1 Cancel Segmentation update 30 😰 🗸 zoom to fit 80 of 160

Change the Presegmentation mode to Classification from Thresholding.

- 12 Zoom into the brain until you are satisfied with your view.To zoom in select the "Zoom/Pan Mode" button, and then the up arrow boxed in the image below.
- 13 Starting with Label 1, use **either** the polygon or paintbrush mode mark the tract/ROI.



The labels are identified by color on the right hand side of the above image. Create another label, and mark an area that is **not** your ROI. Select "Train Classifier."

13.1 The goal is to completely single out your tract/ROI onto a single ROI from the surrounding grey matter (and other white matter tracts). This is achieved by adding labels to the area surrounding the ROI and updating the "Train Classifier" until the desired effect is achieved.

Typically you will end up using 3-5 labels, but that is dependent on the brain and selected ROI.

- 13.2 Note: Should for any reason you wish to clear the marks after training the classifier, select "Clear Examples" to delete marks made with the brush or polygon mode.
- 14 Once you are happy with the trained classifier, select "Next" in the bottom right hand corner.
- 15 Move the cursor to your ROI on the image and select "Add Bubble at Cursor." Ensure that your bubble is correctly sized and placed on the desired region. Select Next.
- 15.1 Grow the bubble by selecting the play button.

As the bubble grows, you can select update at the bottom of the left hand corner to see a 3D visualization of your ROI.

- 15.2 Select Finish.
- 16 Lastly, save the ROI by clicking on Segmentation>Save Segmentation Image.

Title your ROI and make sure to delete the ".gz" at the end. You want a ".nii" file, not a ".nii.gz" file.



Above is the Snake-Tool ROI.