

ITK-SNAP Training Class Final Program
BRB II/III Seminar Room 251
8:30 am to 4:30 pm
August 23, 2013

Organized by the Penn Image Computing and Science Laboratory

Main Contact: Paul Yushkevich, Ph.D., pauly2@mail.med.upenn.edu

Overview. ITK-SNAP is a free, open-source software tool for interactive segmentation of 3D image volumes. It is used by thousands of researchers to label structures of interest in different imaging modalities, including MRI, CT, 3D ultrasound, and others. It includes both manual and automatic segmentation functionality, and it designed to be easy to learn and use. Since 2006, ITK-SNAP has contributed to over 500 publications, spanning a wide range of biomedical applications and imaging modalities.

Objectives. The class is aimed at both novice and experienced ITK-SNAP users. Attendees who complete the morning session will be able to use ITK-SNAP autonomously to perform common operations, such as image viewing, manual segmentation and semi-automatic segmentation. Attendees of the afternoon session will be able to develop image data processing and analysis workflows that integrate ITK-SNAP and the companion Convert3D 3D image processing tool. To meet these objectives, the training session will combine presentations by ITK-SNAP experts with guided exercises. Attendees must bring their own laptop to the session.

Website. <http://www.itksnap.org/pmwiki/pmwiki.php?n=Main.Training>

Start Time	Duration	Topic	Presenter
8:30 AM	10	General Introduction and Logistics * ITK-SNAP does in a nutshell * materials and handouts * plan for the day	Paul Yushkevich
8:40 AM	20	Session 1: Installing ITK-SNAP * walk through installing on Windows, MacOS and Linux * quickly go over the contents of the data folder	Paul Yushkevich
9:00 AM	10	Coffee Break * during the break, help users install	
9:10 AM	20	Session 2: Theory: Working with 3D Medical Images * how ITK-SNAP represents images * how segmentations are represented * types of layers in ITK-SNAP * file formats and meta-data	Paul Yushkevich
9:30 AM	60	Session 3: Hands on Image Navigation (Follow-Along Session) * loading a NIFTI format grayscale image * cursor positioning, looking up coordinates * different zoom modes (linked zoom, specifying zoom level) * contrast adjustment, color map * loading a segmentation image * volumes and statistics * loading an overlay * working with two open sessions * small exercise to reinforce material	Paul Yushkevich
10:30 AM	15	Coffee Break	

Start Time	Duration	Topic	Presenter
10:45 AM	60	Session 4: Manual Segmentation (Lecture + Exercise) * polygons: drawing, editing, pasting, undo, etc. * advantages of tracing in three slice planes * adding and modifying labels * paint brush: plain and adaptive * undo and redo * practical exercise: hippocampal subfields in a postmortem MRI. Exercise will reinforce above skills, as well as loading and saving segmentations, computing volumes.	John Pluta
11:45 AM	20	Session 5: Automatic Segmentation: Theory * intuitive, hands-on explanation of concepts in automatic segmentation * active contour evolving according to forces * speed images generated by thresholding and edge detection * automatic merging of contours * what sorts of problems does this segmentation work for	Alison Pouch
12:05 PM	25	Session 6: Automatic Segmentation: Practice * hands-on exercise to segment 3D ultrasound data * experiment with parameter tuning, region and edge-based modes	Alison Pouch
12:30 PM	60	Lunch (on your own)	
1:30 PM	30	Session 7: 3D Navigation and Editing * manipulating segmentation in 3D with cut-plane tools * exercise: users will be provided with initialization and speed images for automatic segmentation of the ventricles; will run automatic segmentation, then split the ventricles into left, right and third ventricle.	John Woo
2:00 PM	15	Session 8: Convert3D: Introduction and Installation * overview of the tool and how it integrates with ITK-SNAP * install c3d programs for Win/Mac/Linux users (handout)	Phillip Cook
2:15 PM	15	Coffee Break	
2:30 PM	70	Session 9: Convert3D Basics (Interleaves Lecture and Exercises) * image arithmetic, basic image processing * slicing, stacking, resampling, transformations, cropping, etc. * analyzing and comparing segmentations, computing overlaps * batch application of ITK-SNAP automatic segmentation	Phillip Cook
3:40 PM	30	Session 10: Convert3D and ITK-SNAP Advanced Usage * lecture and a take-home exercise * working with functional MRI, different image headers, etc. * preparing image data for publication * examples of advanced C3D scripts (loops, -mcs, -oli, etc)	Sandhitsu Das
4:10 PM	20	Session 11: Preview of ITK-SNAP 3.0 and Wrap-Up * new user interface * multi-component image support * multi-component automatic segmentation * better DICOM support * how to obtain	Paul Yushkevich
4:30 PM		Dismissal	