MIST

Medical Image Segmentation Tool

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Goals

- A simple tool to perform manual segmentation
- Avoid dependencies as much as possible (eg. vtk)
- Use CImg library for basic image processing www.cimg.eu
- Multiplatform
- free of charge
- Easily extendable (eg. student project)

Getting started

- Clone GitHub project : ‘git clone https://github.com/BenjaminGilles/MIST.git ‘
  - issues
  - pull requests
- MIST/bin : binaries for MacOS/linux/windows
- MIST/src/mist.pro : QT project
- MIST/data : sample data

Usage

- load a 3d image
- preprocess it (resample, crop..)
- segment it
  - make a selection using one of the tool
  - add/remove selection to a segmentation label
- convert segmentation to 3d mesh

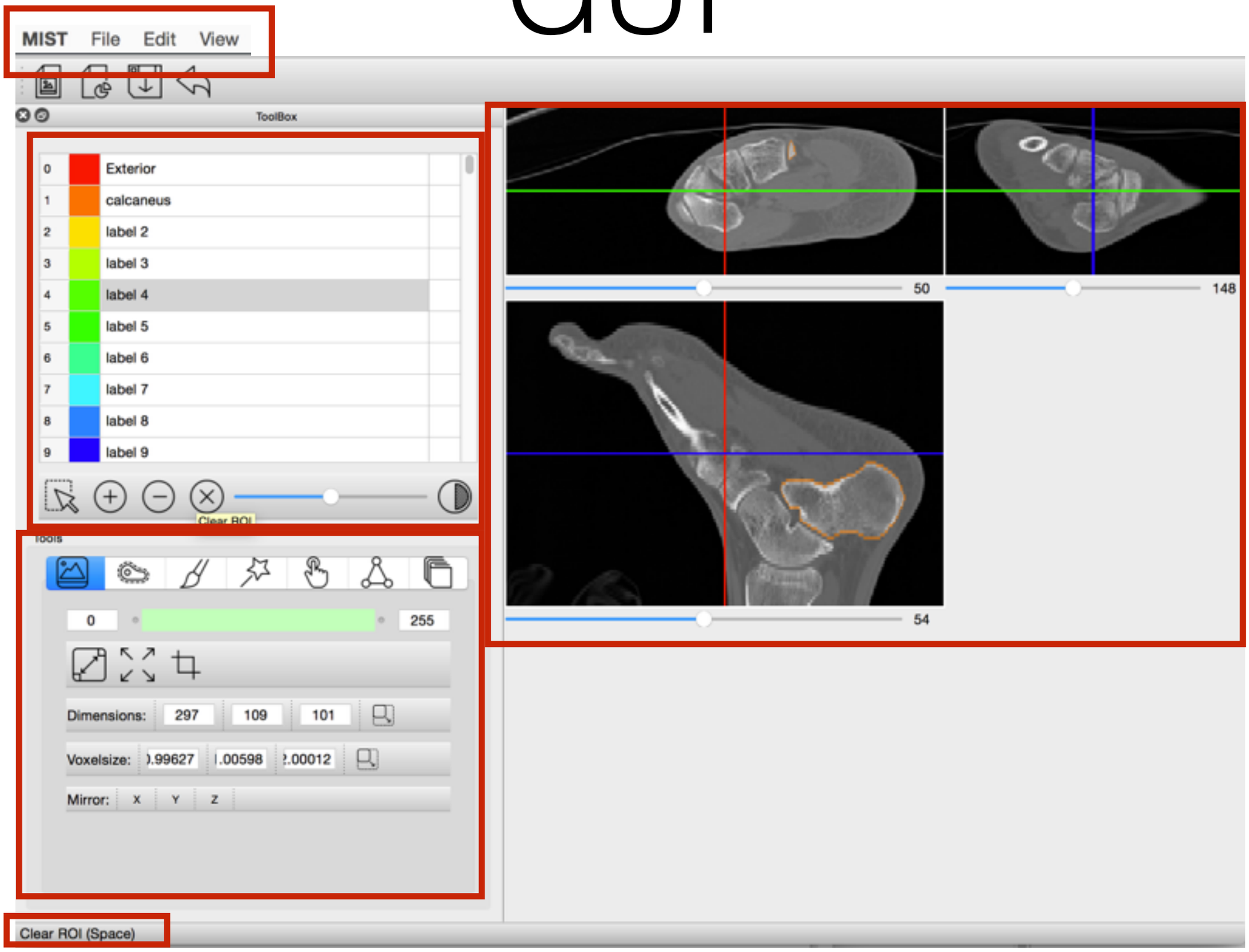
GUI

menu

labels

tools

tip



MPR view

IO

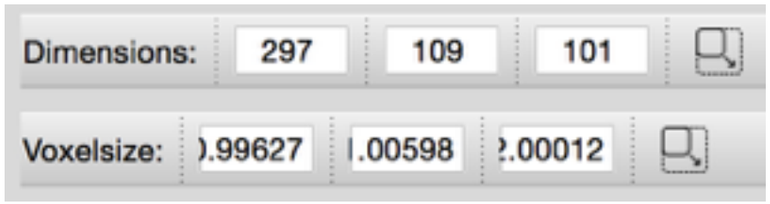
- handle standard 3D and 2D formats (hdr, mhd, png..)
- DICOMs need to be converted first (eg. using MRIConvert)
- Can stack volumes along z (histology)
- Pixel type = short (16bits, [–32767, +32767])

Navigation

- Show/hide MPR slices in menu
- Show/hide MPR slice traces in menu
- Navigate through slices: wheel, slider or ^up/down
- point to a position: Right Click
- Zoom in/out in image tool 
- Change min/max intensity 

Image preprocessing

- Resampling



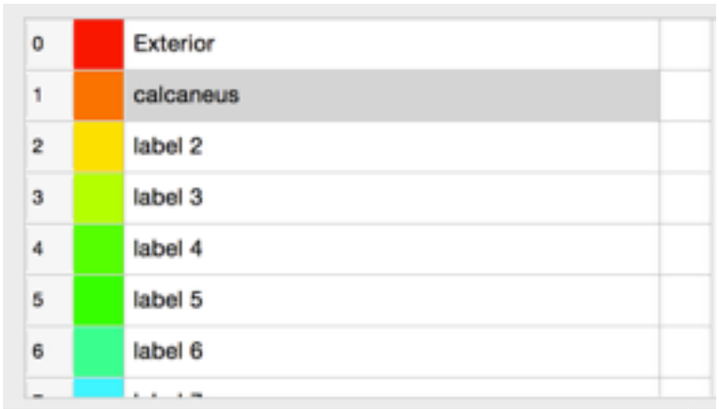
- Mirroring

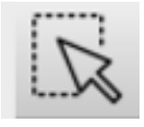
- Crop (given a current zoomed region) 

- can be easily extended (eg. using CImg filters)

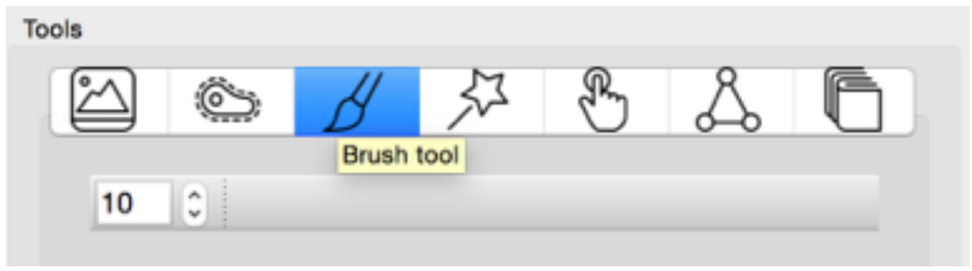
Labels

- 256 labels maximum (8bits image)
- Can edit name/color (double click)
- Protect labels



- Plain/contour visualization 
- Copy label to selection (show in blue) 
- add/remove selection to label 
- clear selection 

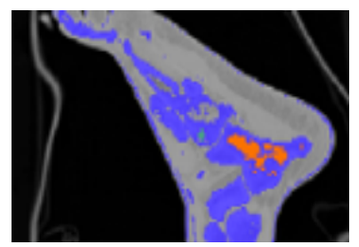
Brush tool



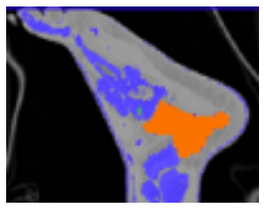
- Paint a selection over image using Left click w/wo shift
- Change brush size

Region Growing

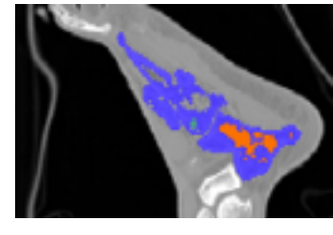
- Select pixels in an intensity range from a seed (green point selected using Left click)



- Restrict selection to the seed label



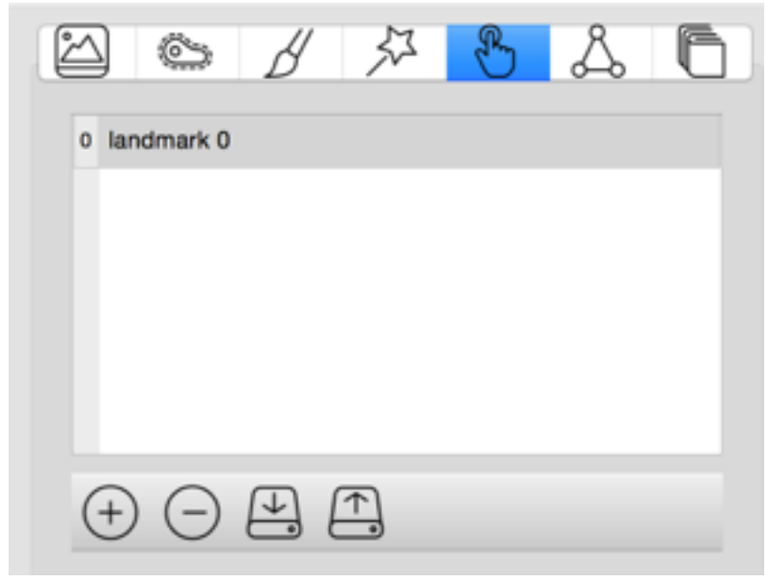
- Restrict selection to pixels connected with the seed



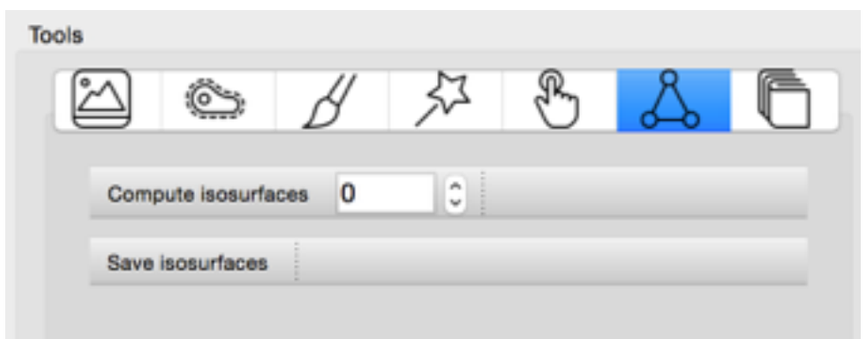
- Restrict selection in 2D

Landmarks

- Add/remove landmarks
- Left click on images to place them
- Save/load in text files
- Use absolute positions



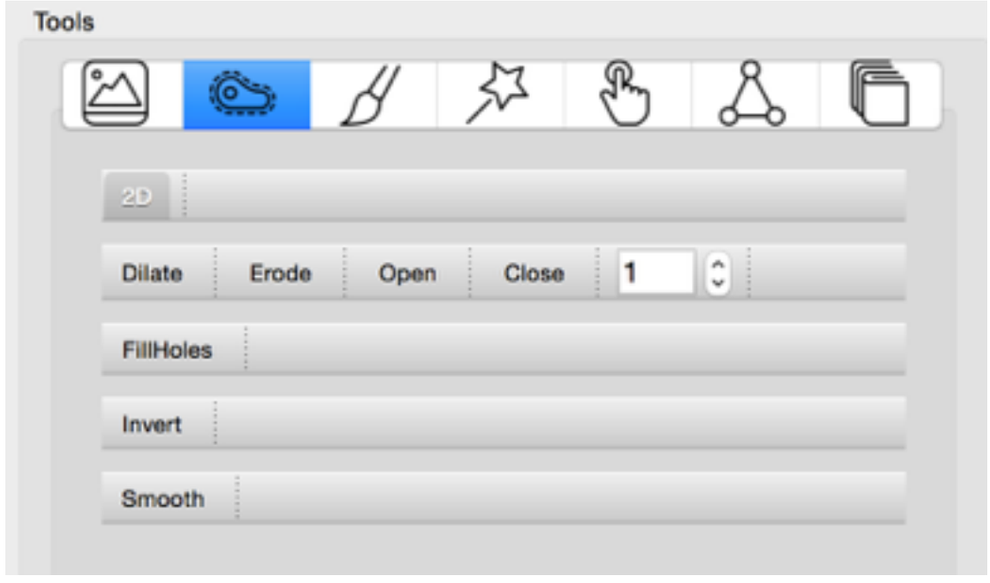
Mesh tools



- Convert labels to meshes using marching cubes
- Can use a number of subdivisions to limit size
- Save one ‘obj’ file per label
- Visualize and post-process outside (eg. using meshlab)

Morphological operations

- dilate/erode selection given the size of the structuring element
- fill holes
- invert
- smooth
- can be done in 2D/3D



for developers

- mainwindow.*: GUI handling
- imageview.* : MPR visualisation
- image.h : data storage and processing
- tools/ : one class for each tool
- widgets/ : additional widgets

contribute to code

- implement a function in image.h
- copy one class from /tools
- add widgets and bind functions in mytool.h
- add tool to mainwindow.h like others