**Step 0: Setting up Folders**

* Copy *lgemri.nrrd*, *laendo\_no\_veins.nrrd*, *lawall.nrrd* into desktop
* Run nrrd2jpg.py
* Run 1-predictLARA\_ROI.py
* Run 2-predictLARA\_EndoEpi.py (set is\_endo = False)
* Remove the *lgemri.nrrd*, *laendo\_no\_veins.nrrd*, *lawall.nrrd* files

**ctrl:** negative shading **alt:** straight line **ctrl i:** interpolate active shading

**Step 1: Cavity Dilation**

Make 2 labels in this order:

Exterior (Default)

Inside (Default)

LA

RA

Process:

* Load all data into Amira through drag and drop, go to segmentation environment (3rd tab).
* Create a new segmentation and add labels in the above order (first two are default).
* Use thresholding tool (5th tab at the bottom left) with a range of 1-1 (to select only pixels with a value of 1) and select the laendo and lawall by changing the Image Data (top left).
* Add the LAendoNoVeins and LAwall data to LA. Then lock layer.
* This gives initial RA region. Then remove and add the cavity manually using the brush and blow tools.
* For tricuspid valve, add more cavity than what is needed. Then use the brush tool and interpolation on the excess material to get a gradual straight line. Then remove this from the RA selection.

Points of note:

* The tricuspid valve (TV) should be smooth just like the mitral valve in Utah, and is achieved by interpolating between only 2 lines (1 at very top of TV and 1 at very bottom of TV which is usually the bottom of the RA) obtain a continuous contour. Should also be extended as far as possible to the opening of the left ventricle (LV), or extend past the LV on the top slices to compensate
* Remove all roofs and RA data with no cavity (but has wall)
* Top of RA should appear gradually, and may either start far away from the SVC or next to it
* IVC should be 1-2 slices before the bottom of the RA appears
* SVC should be 5-6 slices after the top of the RA disappears
* Pericardium & coronary sinus should not be counted in RA.

Then:

* After it is decent, save the mask in a folder named CavityMask and save this under the directory with all other data for the same scan.
* In CavityDialation.m select the range where the RA if open if using erins data. (~ line 89)
* Run CavityDialation.m in matlab and put the output into amira to begin step 2.

**Step 2: Remove Tricuspid Valve**

Make 5 labels in this order:

Exterior (Default)

Inside (Default)

Septum

Remove

RA

LA

Process:

* First load the new output of CavityDialation.m. Use thresholding in amira to add values of 2 and 4 to the LA. Lock LA.
* Then use threshold to add 1 to RA (do not add 3 and do not lock yet).
* Go to brush load the original MRI data and select "select only current material"
* Go over all the excess material where the opening should be. Add this selection to the "Remove" label. Make sure the valve opens in a continuous manner between slices. Then lock Remove.
* Now add 3 to the RA label via thresholding using the cavity dilation output data and then lock RA.

**Step 3: Connect Septum**

Process:

* Continue from the last step and select "Exterior" and in brush choose "select only current material".
* Cover the septum area (it will be easy because all the surrounding regions are locked and labelled)
* Septum should be small, narrow, and always have one piece per layer (never two separated)
* Add the selection to septum.

Then:

* Export as tif to a folder named "SeptumConnection" under the directory for this heart.
* Run ConnectSeptum.m

**Label Values**

**1 – RA Wall**

**2 – LA Wall**

**3 – RA Cavity**

**4 – LA Cavity**

**5 – Septum**