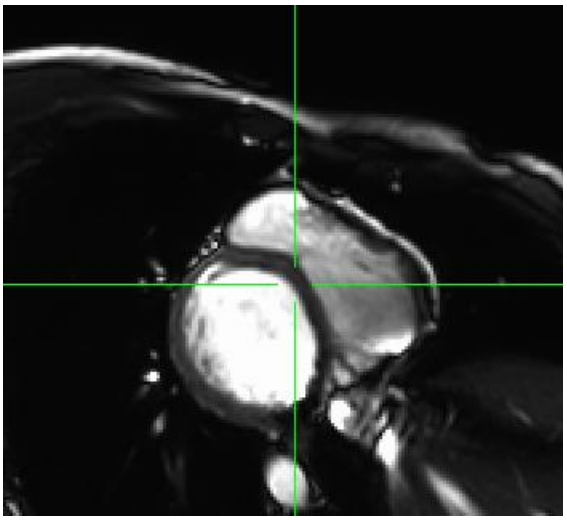
CS463/516 Assignment 3: left ventricle segmentation

Due Tuesday July 12th at 11:59 PM

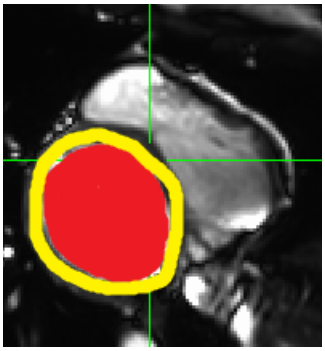
The left ventricle of the heart collects and expels blood towards the periphery. An MRI image of the left ventricle is below (bright circle just below and to left of crosshair).



In this assignment, your goal is to quantify the left ventricle throughout the cardiac cycle by segmenting two sections:

1. The bright interior of the left ventricle (contains mostly blood)
2. The dark outer ring (composed of muscular tissue)

The two structures of interest are shown in red and yellow respectively below:



The cardiac image provided for this assignment is 4d. this means that you will need to run your segmentation algorithm on multiple time points (see the assignment video outline).

Your output for this assignment will be two separate time series, one for each segment:

1. Time series of *total left ventricle area* (basically the number of pixels contained in the red circle)

2. Time series of *mean myocardium thickness* (basically the thickness of the dark outer ring averaged across the entire ring).

Display your two outputs as separate time series in your report, along with any relevant code and explanations detailing how you arrived at your result. The time series should have an x-axis as time (arbitrary units, but the entire cardiac cycle is roughly 1 second) and the y-axis should be in millimeters (mm^2 for part 1, and mm for part 2).

Check the explanation video for more detailed instructions.

This segmentation challenge will also be part of the final project, so its worth taking the time to make sure your results are robust.