Computer Vision
Assignment-1

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1 Step 1: Smoothening

I have tried a few smoothening techniques like Average, Gaussian Filter and Median Filter. Out of these, the Median Filter worked well. The reason for that can be explained as the image has salt and pepper noise and at the walls of the Galbladder the variation is large, Gaussian, Average filters might flatten the boundary which makes it difficult for us to identify.

2 Step 2: Converting it to a Binary Image

2.1 Insight:

This step involves taking the smoothened image and then converting it to a binary image. This was done by iterating over all the pixels in the image and then seeing if the the pixel value falls the windows that was set based on it's histogram. If yes, them make that pixel white (255) else make it black (0).

2.2 Choice of bounds:

I have tried various techniques for fixing the upper and lower boundary of the window (mentioned earlier) but the one that worked best is as follows. I have fixed the lower bound as 5, the upper bound is fixed by the selecting one from **{62, 0.75*(MFP), mean-0.78*standard-deviation}** where MFP is Most Frequent Pixel value. I have used the standard deviation to select.

3 Step 3: Selecting the required component

I have used *ConnectedComponentsWithStats* method in cv2 library and sorted the components based on their sizes in descending order. I have iterated over these components list and selected that component which has a set pixel in the centre column (I have assumed that the galbladder must be in both the halfs of the image). After selecting the component, I have divided it into 7 parts and made it a convex shape (as the reference masks) by using *convexHull, fillConvexPoly* methods. I have divided into parts because, if the component has major curves (as in 0009.png mask given) there will be a huge error.

4 Result on Validation Set of Images

I have obtained an average score of 0.827 (82.7%) over all the 10 images.