Assignment 1

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The Final scores on the val data are as follows:

Number of images: 10
Number of detections: 10
Number of ground truths: 10
IoU for image val\img\0000.jpg = 0.7425219801223242
IoU for image val\img\0001.jpg = 0.8387765505522515
IoU for image val\img\0002.jpg = 0.906730980048235
IoU for image val\img\0003.jpg = 0.8014385395696109
IoU for image val\img\0004.jpg = 0.8226963801300936
IoU for image val\img\0005.jpg = 0.7642167381974249
IoU for image val\img\0006.jpg = 0.8225434692555259
IoU for image val\img\0007.jpg = 0.6258462848626783
IoU for image val\img\0008.jpg = 0.913021451331209
IoU for image val\img\0009.jpg = 0.7268365510993148
Average IoU = 0.7964628925168669

Methods Used (and Tried):

In the pre-processing of the image, I tried some smoothening/blurring techniques such as Median Blur, Gaussian Blur and Bilateral Filter. I also tried a combination of one or more of these, but the overall difference in the scores was quite minimal, in the range of $\pm 2\%$. This might be because after all, the basic idea behind these methods are to minimize noise and smoothen the image. Therefore, I chose the Bilateral filter in my final implementation as it gave a slightly better score.

After the pre-processing, I applied the separate thresholds on the image and tried to find and draw the contours for them. The final mask is a union of these as different thresholds will give different contours for the same image. I assumed that the superposition would handle the parts left out by other contours since the threshold might omit the parts in different ways. The final mask assumes the area of the Convex Hull of required portion, in this case the gall bladder, to be within a certain range and the values for these areas are hard-coded. So, it might not be able to provide good results in case the required portion is too small or to large.

Finally, to remove the portions of the masks generated by the trapezium-like structure outside the required portion, which was a common property of the provided images, I created a separate padded image and took a bitwise-and operation between the two images so that only the part of the gall bladder remained. I could have also removed these structures by finding the centroid and comparing it with a certain value/hyperparameter, but I was not sure that it could work in all the cases since in real case-scenarios it is quite possible that the centroid doesn't lie in the given range.