

Image Segmentation



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2017CS10360

Introduction

In this assignment we use classical computer vision techniques to segment real ultrasound images and extract Gall Bladder from the images.

Techniques Used

For the image segmentation, we are using a series of thresholding. Then we find closed contours in the images. In the images we notice that the largest contour is formed by the curves on the boundary and the second largest closed contour is the Gallbladder, that we want. In this I tried several variation techniques to make this work well.

Code Flow

- RawImage
- Sharpening
- GaussianBlur
- Threshold
- Take Bitwise And with Raw Image
- Threshold
- Close the open contours using MORPH_CLOSE
- Find Closed contours and pick the second largest one

Techniques Tried

I tried several other approaches, before coming to this final code structure. Other techniques which I tried were:

- Watershed Algorithm
- Canny edge detector
- Laplacian of Gaussian (LoG) edge detector
- Adaptive Thresholding

Of course, none of the above techniques were able to surpass the technique finally used here.

Results

On the validation set, the average IOU is: *0.7623344553319458*

[Details]

Number of images: 10

Number of detections: 10

Number of ground truths: 10

IoU for image img/0000.jpg = 0.7233911954626925

IoU for image img/0001.jpg = 0.8209175952675747

IoU for image img/0002.jpg = 0.8514002443379382

IoU for image img/0003.jpg = 0.8499851889467225

IoU for image img/0004.jpg = 0.81443763518385

IoU for image img/0005.jpg = 0.783661161368855

IoU for image img/0006.jpg = 0.7386243991760129

IoU for image img/0007.jpg = 0.5810126582278481

IoU for image img/0008.jpg = 0.880874951606659

IoU for image img/0009.jpg = 0.579039523741305