Coursework1 Report

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1 White Matter Segmentation

To choose the ROI region I use the drawfreehand to select the region and then create Binary image and show the grayscale image and ploy the histogram of ROI (using the imhist to get the counts and levels for pixels) and finally select the different thresholds and apply the binary image.

The picture following shows the process of draw the histogram of ROI.

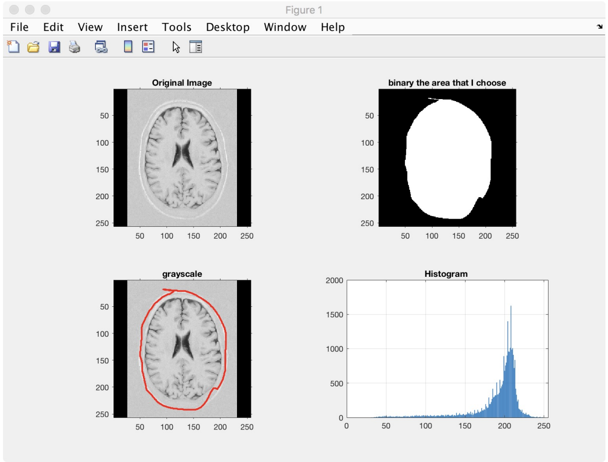
Figure 1
File Edit View Insert Tools Desktop Window Help
Original Image
binary the area that I choose
grayscale
Histogram
50
100
150
200
250
0
500
1000
1500
2000

Figure 1: The Histogram for Brain

We can see that from the histogram, the count of pixels increased at level approximate 150 which is about 0.6 and increased much faster when levels get 210. the threshold can be shown as the picture following:

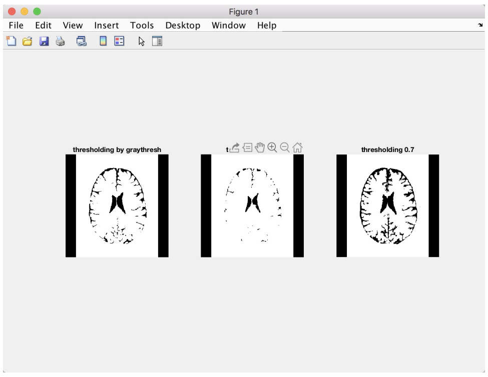
Figure 1
File Edit View Insert Tools Desktop Window Help
thresholding by graythresh
t
thresholding 0.7

Figure 2: The Threshold for Brain

The first is the threshold that computer choose. The level that computer choose is 0.6007 which is about level 0.6*255 as the threshold by the graythresh function (Otsu algorithm which minize the interclass variance of the black and white pixels and maximize the variance between two classes). The second and the third is the threshold that choosed by myself as 0.4 and 0.7. We can see from the picture that if the threshold is lower than the 0.6007, the are of brain image will lose some. Bu contract, if the threshold is higher, the are will be more.

This also happened the same to the Tray.pgm. We can see from the picture:

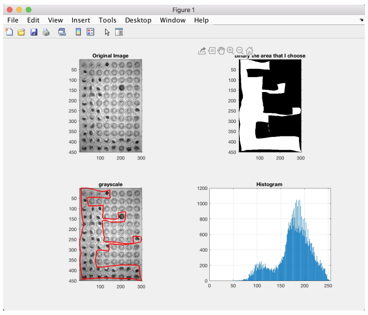

Figure 3: The Tray

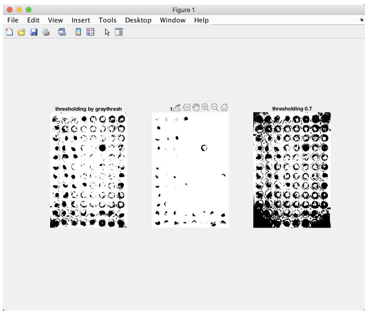
Figure 1
File Edit View Insert Tools Desktop Window Help
thresholding by graythresh
thresholding 0.7

Figure 4: The Tray

The threshold that computer choose for tray is 0.6196.

To conclude for those image that their backgorund and foreground, the method that maximize the variance between classes would not success. So we should do the preprocess for the image that I use the filter smoothing to the original gray image. After that, the image will be extracted by subtract from the original then use the adjust for histogram equalization the enhance the initial segmentation.

I choose the filter kernel named wiener2 filter and the result can be seen like this picture:

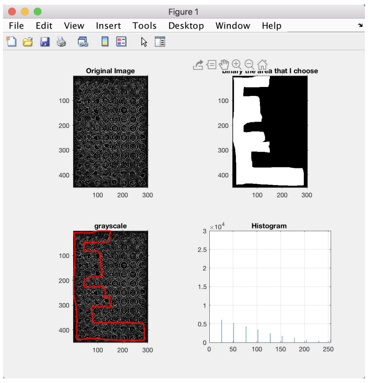

Figure 5: The enhance Tray

And the threshold after filter kernel is shown like the picture that:

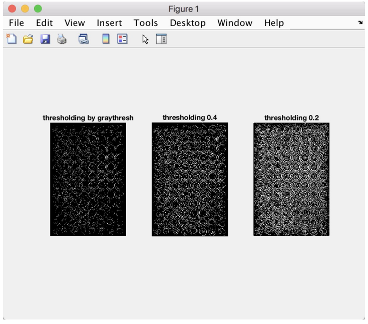
Figure 1
File Edit View Insert Tools Desktop Window Help
thresholding by graythresh
thresholding 0.4
thresholding 0.2

Figure 6: The enhance threshold Tray

The threshold the computer choose is 0.2697 and the threshold I choose is 0.2 and 0.4

We can see obvious that the iamge which is preprocessed by kernel function perform better than the image which is not preprocess especially for the image that has the approximately same background and object.The wiener2 operation filtered pixel according to its neighborhood that work well removing randomly Gaussian noise