DIP Homework-5 **Songyang Zhang(52289120)**
Prof. Zheng Rui Due Date: 18/12/2018

1 Edge Detection Combined with Smoothing and Thresholding

The results image as shown in Figure 1

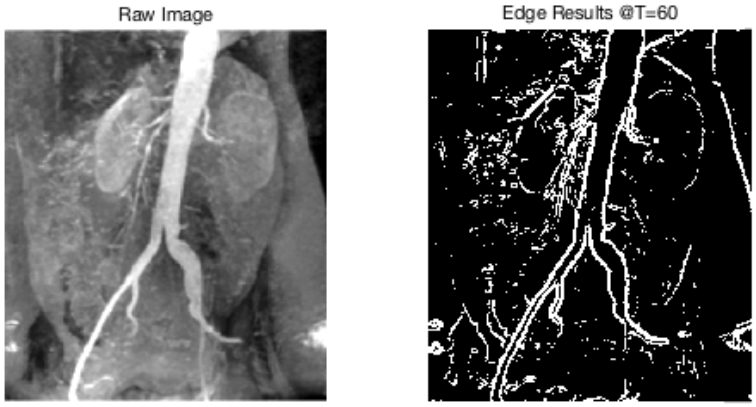

Figure 1: Left is the original Image and the right is the edge detection results at threshold is 60.

```
function [grad, mask] = DetectEdge(img, T)

% Define mask
sobel_x = [-1, -2, -1;
            0, 0, 0;
            1, 2, 1];
sobel_y = [-1, 0, 1;
            -2, 0, 2;
            -1, 0, 1];

% Apply it
g_x = conv2(double(img), sobel_x,'same');
g_y = conv2(double(img), sobel_y,'same');


% Compare it with threshold
grad = abs(g_x) + abs(g_y);
```

```
mask = grad>T;

end
```

2 Global Threshold

```
function [threshold] = GlobalThresh(img, init_threshold)


threshold = init_threshold;

while 1
    mask = img<=threshold;
    imask = not(mask);
    g1 = sum(sum(img(mask))) / sum(mask(:));
    g2 = sum(sum(img(imask))) / sum(imask(:));
    new_threshold = (g1+g2)/2;
    if new_threshold==threshold
        return
    else
        threshold=new_threshold;
    end
end

end
```

Results are shown in Figure 2

3 Region Growing

Results are shown in Figure 3, Figure 4 and Figure 5.

```
function [rmask] = RegionGrow(image, mask)


dx = [-1,-1,-1, 0,
       0, 1, 1, 1,];
dy = [-1, 0, 1, -1,
       1, -1, 0, 1];

seeds = [541 162;
         530 186;
         99 518;
         343 287;
         339 214;
         541 162;
         530 186;
```

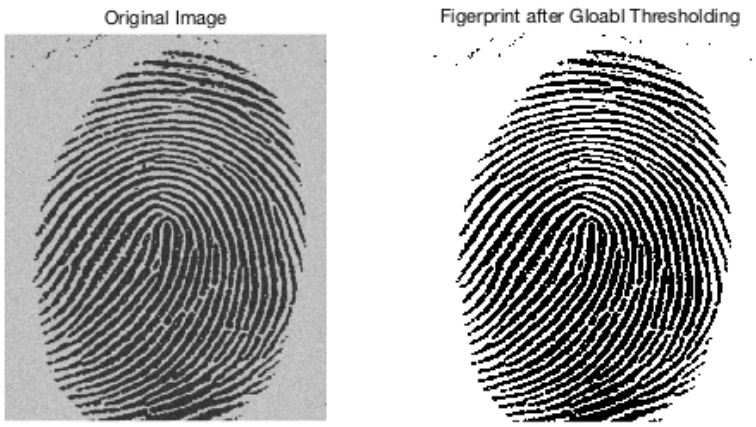

Figure 2: Left is the original Image and the right is image with global thresholding.

```
16          228  374;
17          271  531];
18
19 rmask = zeros(size(img));
20 props = zeros(size(img));
21
22 rmask(530,186)=1;
23 rmask(228,374)=1;
24 rmask(271,531)=1;
25
26 rmask(99,518)=1;
27 rmask(343,287)=1;
28 rmask(339,214)=1;
29 rmask(541,162)=1;
30
31
32 count=0;
33
34 while 1
35     count=count+1;
36     flag = 0;
37     for i=1:size(seeds,1)
38          x = seeds(i,1);
39          y = seeds(i,2);
40          if props(x,y)==1
```

```
                continue
            end
            for dx=-1:1
                for dy=-1:1
                nx = x+dx;
                ny = y+dy;
                if nx<1 | nx>size(image,1) | ny<1 | ny>size(image,2) | mask(nx,
                    continue;
                end
                seeds = vertcat(seeds,[nx,ny]);
                rmask(nx,ny)=1;
                flag=1;
                end
            end
            props(x,y)=1;
        end
        if not(flag) | count>100
            break;
        end
    end

end
```

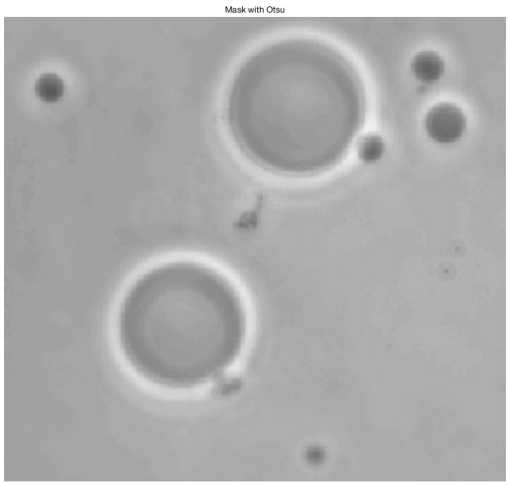

Figure 3: Original Image.

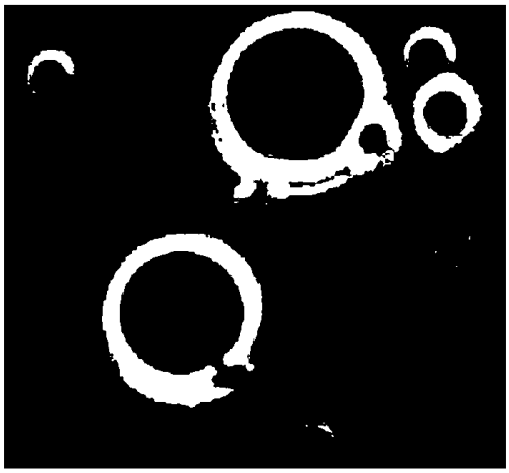

Figure 4: Otsu' applied mask image.

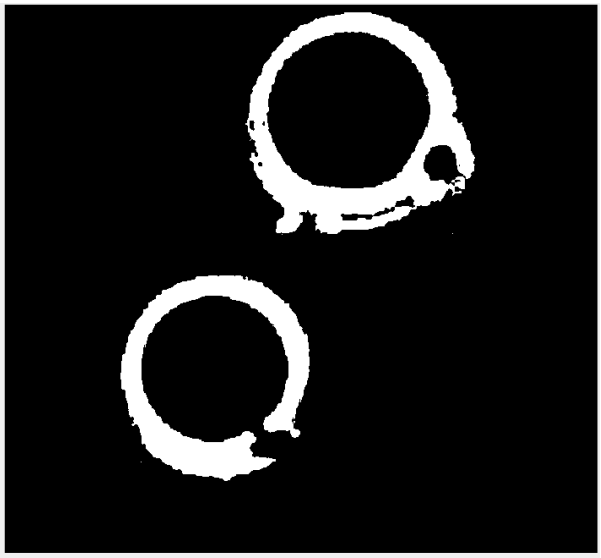

Figure 5: Region Grow with 3*3 kernel.