Homework 5 for **Kun**

Introduce to image process

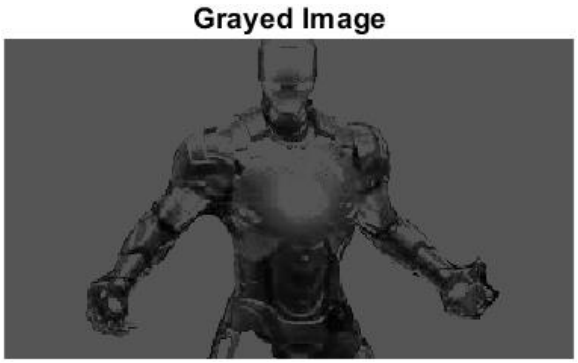
All codes are attached on the last page.

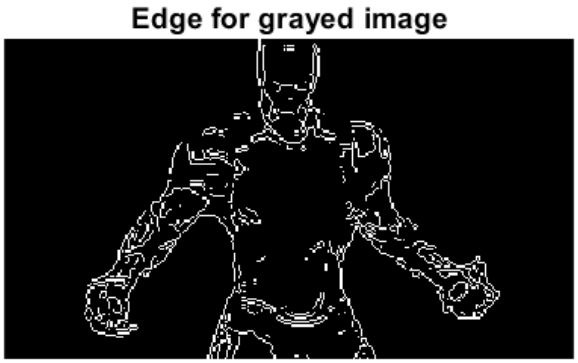
Q1

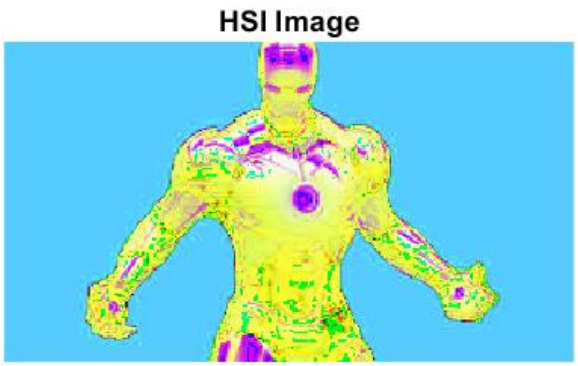
```
% Q1
C = im2uint8(imread("ironman.jpg"));
imshow(C), title("Original Image");

I = im2uint8(avgGray(C));
imshow(I), title("Grayed Image");

gray_edge = edge(I,"Sobel");
imshow(gray_edge), title("Edge for grayed image");

HSI = rgb2hsv(C);
imshow(HSI), title('HSI Image');

hsi_edge_i = edge(HSI(:,:,3),"Sobel");
imshow(hsi_edge_i), title("Edge for HSI image in I field");

hsi_edge_h = edge(HSI(:,:,1),"Sobel");
imshow(hsi_edge_h), title("Edge for HSI image in H field");
```

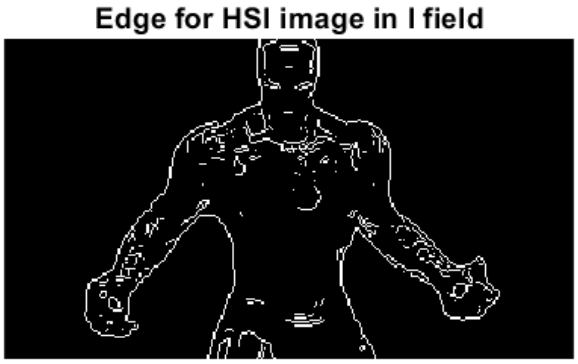
```
function out=avgGray(img)
    R=img(:,:,1);
    G=img(:,:,2);
    B=img(:,:,3);
    out = (R+G+B)/3;
end
```

Res:

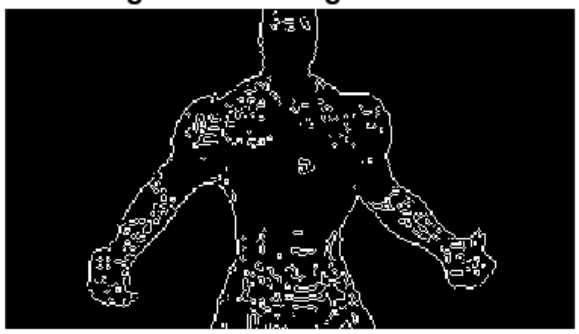








Edge for HSI image in H field



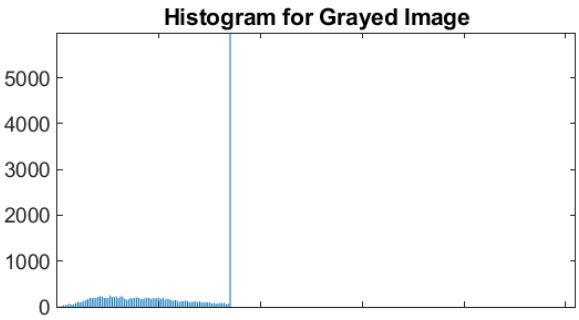
So, just average the RGB channel then get the edge is not very efficient, also work in hue field not. We can find finding edge in I field is more efficient. I guess because I field in edge can have larger gap thus Sobel can be effective.

Q2

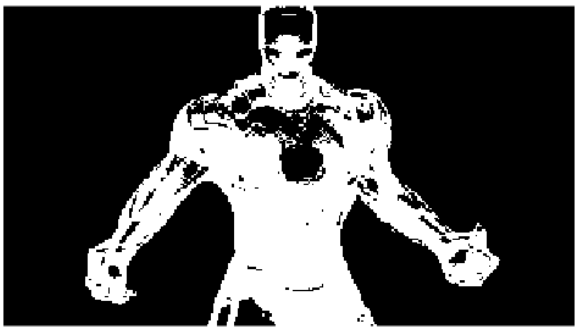
A

```
20    % Q2
21    % a
22    imhist(I), title("Histogram for Grayed Image");
23    B1 = uint8(1*(I<85));
24    imshow(B1,[0 1]), title("Mask for low field");
25    B2 = uint8(1*(I==85));
26    imshow(B2,[0 1]), title("Mask for high field");
27    seg_c = C.*B1;
28    imshow(seg_c), title("Cutted for low field");
29    seg_bac = C.*B2;
30    imshow(seg_bac), title("Cutted for high field");
```

Res



Mask for low field



Mask for high field

Cutted for low field

Cutted for high field

So, just calculate the threshold on the average RGB channel can not have a good

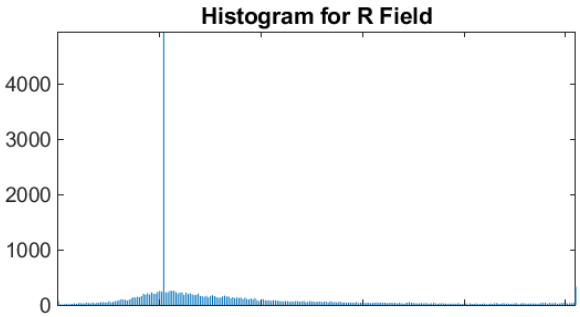
segmentation. Because in average grayed image, background do have similar intensitive value with the object.

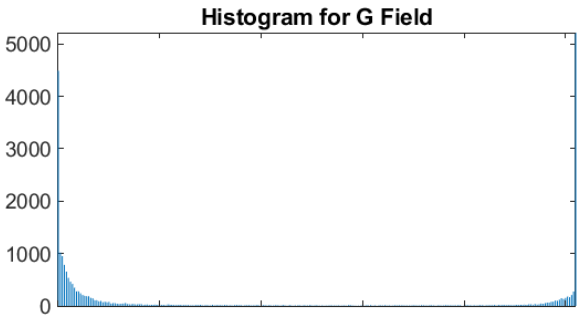
B

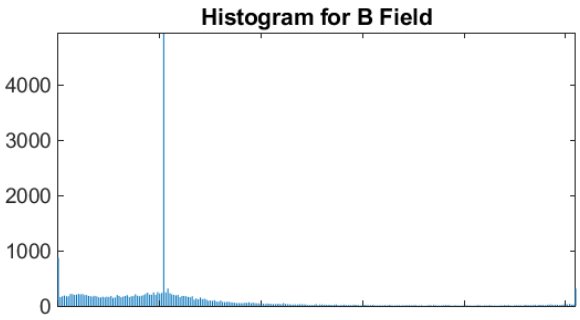
```
% b
imhist(C(:,:,1)), title("Histogram for R Field");
imhist(C(:,:,2)), title("Histogram for G Field");
imhist(C(:,:,3)), title("Histogram for B Field");
BR = uint8(1*(C(:,:,1)<findThr(C(:,:,1))));
BG = uint8(1*(C(:,:,2)<findThr(C(:,:,2))));
BB = uint8(1*(C(:,:,3)<findThr(C(:,:,3))));
imshow(BR,[0 1]), title("Object mask for R Field");
imshow(BG,[0 1]), title("Object mask for G Field");
imshow(BB,[0 1]), title("Object mask for B Field");
seg_r = C.*BR;
seg_g = C.*BG;
seg_b = C.*BB;
imshow(seg_r), title("Cutted for R field mask");
imshow(seg_g), title("Cutted for G field mask");
imshow(seg_b), title("Cutted for B field mask");
```

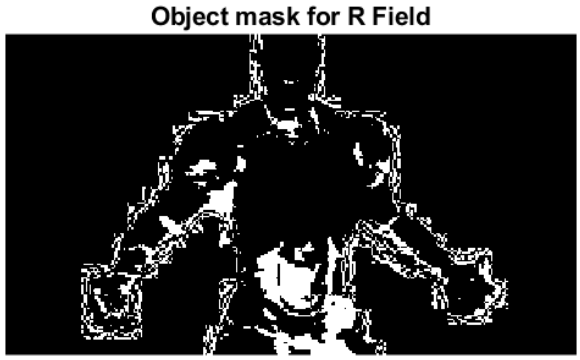
```
function val=findThr(img)
    val = mode(img,'all');
end
```

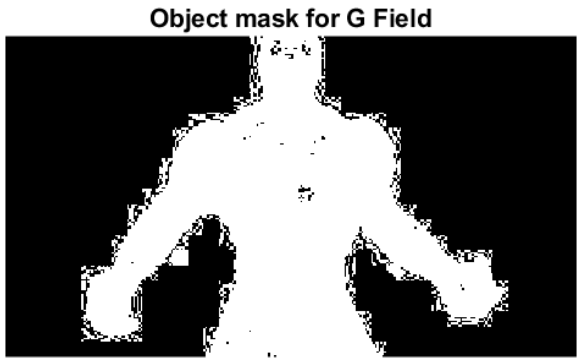
Res

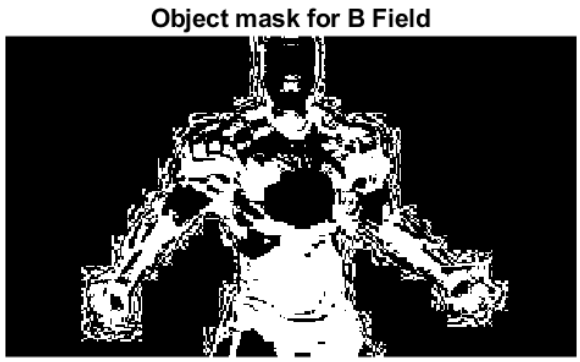












Cutted for R field mask

Cutted for G field mask

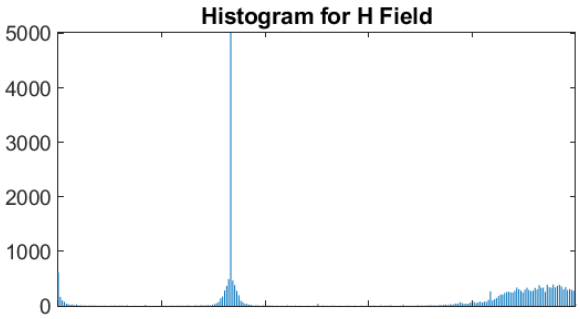
Cutted for B field mask

So, segment with individual RGB channel thresholds can be effective. For instance, separate with G channel can do a great segmentation!

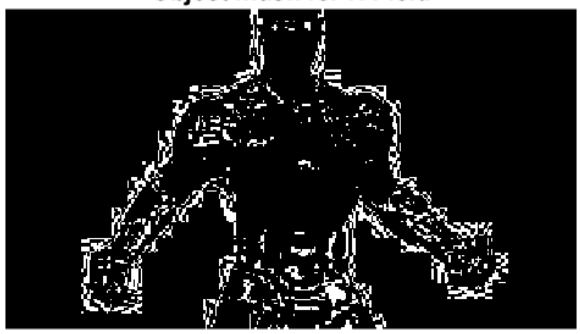
C

```
47
48  % c
49  imhist(HSI(:,:,1)), title("Histogram for H Field");
50  BH = uint8(1*(HSI(:,:,1)<findThr(HSI(:,:,1))));
51  imshow(BH,[0 1]), title("Object mask for H Field");
52  seg_h_hsi = HSI.*double(BH);
53  seg_h = hsv2rgb(seg_h_hsi);
    imshow(seg_h), title("Cutted for H field mask");
```

Res



Object mask for H Field



Cutted for H field mask

So, just separate with hue field can not have effect result, because in this picture, every place has a similar hue value. Compared to RGB cannels segmentation, it more likely segment the edge.

```
% Q1
C = im2uint8(imread("ironman.jpg"));
imshow(C), title("Original Image");


I = im2uint8(avgGray(C));
imshow(I), title("Grayed Image");


gray_edge = edge(I,"Sobel");
imshow(gray_edge), title("Edge for grayed image");


HSI = rgb2hsv(C);
imshow(HSI), title('HSI Image');


hsi_edge_i = edge(HSI(:,:,3),"Sobel");
imshow(hsi_edge_i), title("Edge for HSI image in I field");


hsi_edge_h = edge(HSI(:,:,1),"Sobel");
imshow(hsi_edge_h), title("Edge for HSI image in H field");


% Q2
% a
imhist(I), title("Histogram for Grayed Image");
B1 = uint8(1*(I<85));
imshow(B1,[0 1]), title("Mask for low field");
B2 = uint8(1*(I==85));
imshow(B2,[0 1]), title("Mask for high field");
seg_c = C.*B1;
imshow(seg_c), title("Cutted for low field");
seg_bac = C.*B2;
imshow(seg_bac), title("Cutted for high field");
% b
imhist(C(:,:,1)), title("Histogram for R Field");
imhist(C(:,:,2)), title("Histogram for G Field");
imhist(C(:,:,3)), title("Histogram for B Field");
BR = uint8(1*(C(:,:,1)<findThr(C(:,:,1))));
BG = uint8(1*(C(:,:,2)<findThr(C(:,:,2))));
BB = uint8(1*(C(:,:,3)<findThr(C(:,:,3))));
imshow(BR,[0 1]), title("Object mask for R Field");
imshow(BG,[0 1]), title("Object mask for G Field");
imshow(BB,[0 1]), title("Object mask for B Field");
seg_r = C.*BR;
seg_g = C.*BG;
```

```
seg_b = C.*BB;
imshow(seg_r), title("Cutted for R field mask");
imshow(seg_g), title("Cutted for G field mask");
imshow(seg_b), title("Cutted for B field mask");
% c
imhist(HSI(:,:,1)), title("Histogram for H Field");
BH = uint8(1*(HSI(:,:,1)<findThr(HSI(:,:,1))));
imshow(BH,[0 1]), title("Object mask for H Field");
seg_h_hsi = HSI.*double(BH);
seg_h = hsv2rgb(seg_h_hsi);
imshow(seg_h), title("Cutted for H field mask");
```

```
function out=avgGray(img)
    R=img(:,:,1);
    G=img(:,:,2);
    B=img(:,:,3);
    out = (R+G+B)/3;
end


function val=findThr(img)
    val = mode(img,'all');
end
```