Contents

1   Assignment 1

1.1   Negative of an image

```matlab
1  a=imread('Lenna.png');
2  figure
3  [row,col,s]=size(a);
4  imshow(a);
5  for i=1:row
6      for j=1:col
7          for k=1:3
8              a(i,j,k)=255-a(i,j,k);
9          end
10     end
11 end
12
13 figure
14
15 imshow(a);
```


(a) Original Image

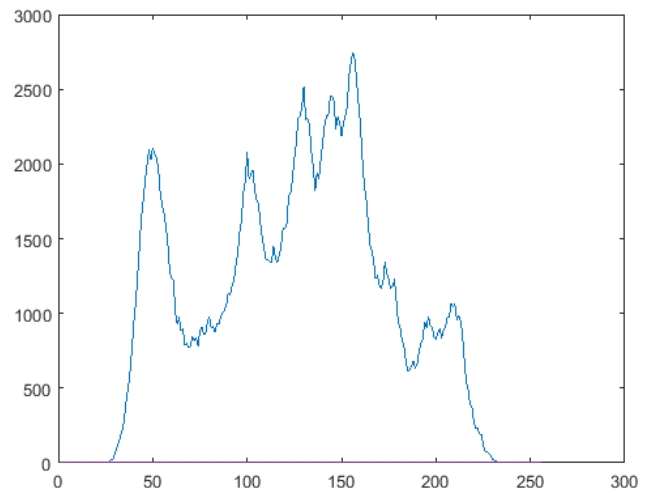(b) Negative Image

Figure 1: a normal and a negative image

2   Assignment 2

2.1   Plotting the histogram of an image

```
1  a=imread('Lenna.png');
2  b=rgb2gray(a);
3  [row,col]=size(b);
4  arr=zeros(256);
5  for i=1:row
6      for j=1:col
7          arr(b(i,j)+1)= arr(b(i,j)+1)+1;
8      end
9  end
10 plot(arr);
```
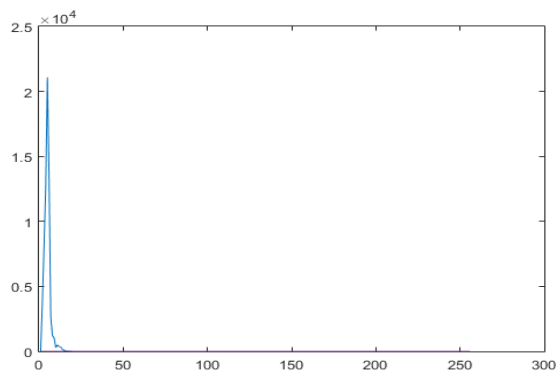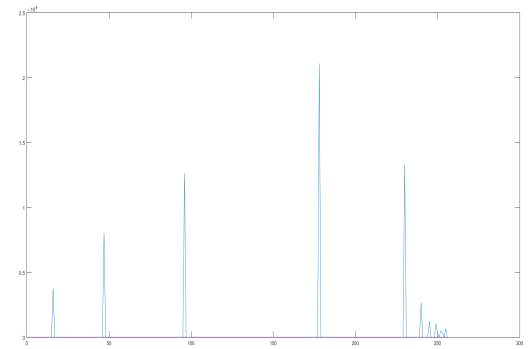
(a) Original Image

(b) Histogram of the Image

Figure 2: Image & histogram of the image

2.2   Histogram equalization

```matlab
a=imread('Lenna.gif');
b=(a);
[row,col]=size(b);
arr=zeros(256);
for i=1:row
    for j=1:col
        arr(b(i,j)+1)= arr(b(i,j)+1)+1;
    end
end
plot(arr);
pr=zeros(256);
pr1=zeros(256);
for k=1:256
    pr(k) = arr(k)/(row*col);
end
k=0;
for l=1:256
     k=k+pr(l);
     pr1(l)= pr1(l)+k;
end
for i=1:row
    for j=1:col
        b(i,j)=pr1(b(i,j)+1)*255;
    end
end
arr1=zeros(256);
for i=1:row
    for j=1:col
        arr1(b(i,j)+1)= arr1(b(i,j)+1)+1;
    end
end
imwrite(b,'C:\Users\ratul\Desktop\myGray.png')
imtool(b);
```

(a) Original Histogram

(b) Histogram after equalization

Figure 3: Histograms of the images

(a) Original Low contrast Image

(b) Equalized image

Figure 4: Image & histogram of the image

3   Assignment 3

3.1   Mean Filter

```
1  p = imread('Lenna.png');
2  b=rgb2gray(p);
3  imwrite(b,'C:\Users\ratul\Desktop\grayscale.png');
4  [row,col]=size(b);
5  c1=zeros(row,1);
6  imr1 =[c1,b,c1];
7  r1=zeros(1,col+2);
8  imr = [r1;imr1;r1];
9  p2=imr;
10 imr=double(imr);
```

```matlab
11  [r,c]=size(imr);
12  mask=ones(3,3)/9;
13  for i=2:r-1
14      for j=2:c-1
15          sum=0;
16          for k=-1:1
17              for l=-1:1
18                  sum = sum + p2(i+k,j+l)*mask(k+2,l+2);
19              end
20          end
21          imr(i,j)=sum;
22      end
23  end
24  imtool(uint8(imr));
25  imwrite(imr,'C:\Users\ratul\Desktop\myGray.png')
```


(a) Original Image   (b) Mean filtered image

Figure 5: Normal & Filtered Image

3.2 Median Filter

```matlab
 1  a=imread('LennaNoise.jpg');
 2  b=rgb2gray(a);
 3  %m = imnoise(M,'salt & pepper',0.5);
 4  figure
 5  imshow(b);
 6  [row,col]=size(b);
 7  c1=zeros(1,col);
 8  r1=zeros(row+2,1);
 9  imr=[c1;b;c1];
10  imr2=[r1,imr,r1];
11  [r,c]=size(imr2);
12  imr3=imr2;
13  for i = 2:r-1
14      for j = 2:c-1
15          M=imr3(i-1:i+1,j-1:j+1);
16          V=sort(M(:));
17          imr2(i,j)=V(5);
18      end
19  end
20  figure
21  imshow(imr2);
```


(a) Original Image   (b) Median filtered image

Figure 6: Noisy & Filtered Image

3.3 Min & Max Filter

```
1  p = imread('C:\Users\ratul\Desktop\matlab\document\
      grayscale.png');
2  b=p;
3  [row,col]=size(b);
4  c1=zeros(row,1);
5  imr1 =[c1,b,c1];
6  r1=zeros(1,col+2);
7  imr = [r1;imr1;r1];
8  imr=double(imr);
9  [r,c]=size(imr);
10 imr3=zeros(r,c);
11 imr4=zeros(r,c);
12
13 for i=2:r-1
14     for j=2:c-1
15         M =imr(i-1:i+1,j-1:j+1);
16         imr3(i,j)=max(M(:));
17         imr4(i,j)=min(M(:));
18     end
19 end
20
21 imtool(uint8(imr3));
22 imtool(uint8(imr4));
```


(a) Original grayscale image   (b) Max filtered Image   (c) Min filtered Image

Figure 7: Min & Max Filtered Images

4   Assignment 4

4.1   Edge Detection

```
1
2  a= imread('C:\Users\ratul\Desktop\matlab\document\
      grayscale.png');
3  b=a;
4
5  [row,col]=size(b);
6
7  c1=zeros(1,col);
8  r1=zeros(row+2,1);
9  imr=[c1;b;c1];
10 imr2=[r1,imr,r1];
11 imr2=double(imr2);
12
13 mask1=[1 0 -1;1 0 -1;1 0 -1];
14 mask2=[1 1 1;0 0 0;-1 -1 -1];
15 [r,c]=size(imr2);
16 imr3=zeros(r,c);
17 imr4=zeros(r,c);
18
19 for i = 2:r-1
20     for j = 2:c-1
21       val=0;
22       val1=0;
23         for i1 = -1:1
24             for j1 = -1:1
25                 val = val + imr2(i+i1,j+j1)*mask1(i1
                      +2,j1+2);
26                 val1 = val1 + imr2(i+i1,j+j1)*mask2(
                      i1+2,j1+2);
27             end
28         end
29         imr3(i-1,j-1)=val;
30         imr4(i-1,j-1)=val1;
31     end
32 end
```
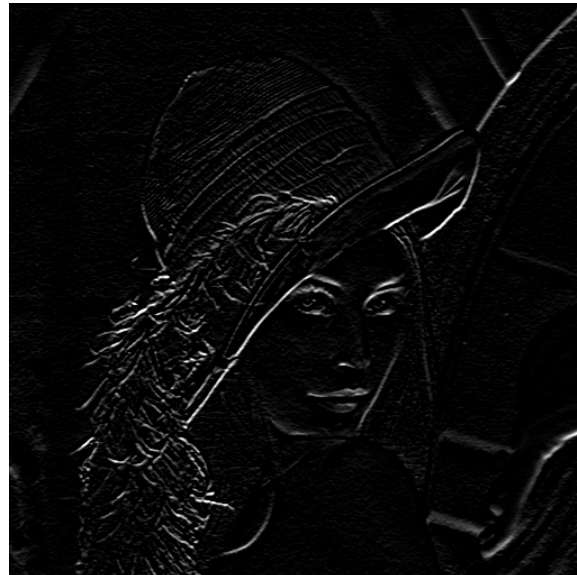
```
33
34 subplot(2,2,1), imshow(b);
35 title('Original');
36 subplot(2,2,2), imshow(uint8(imr3));
37 title('Horizontal edge using Prewitt');
38 subplot(2,2,3), imshow(uint8(imr4));
39 title('Vertical edge using Prewitt');
```


(a) Original grayscale image   (b) Horizontal edge

(c) Vertical edge

Figure 8: Horizontal & Vertical edge detection

4.2   Segmentation

```
1
2  a=imread('C:\Users\Public\Pictures\Sample Pictures\
       balls.jpg');
3  b=rgb2gray(a);
4
5  [row,col]=size(b);
6  r1=zeros(row,col);
7  r2=zeros(row,col);
8  b=double(b);
9  t=200;
10 count1=0;
11 count2=0;
12 sum1=0;
13 sum2=0;
14 diff=70;
15
16 while(lt(diff,90))
17     for i=1:row
18         for j=1:col
19             if gt(b(i,j),t)
20                 r1(i,j)=b(i,j);
21                 count1=count1+1;
22             end
23             if lt(b(i,j),t)
24                 r2(i,j)=b(i,j);
25                 count2=count2 + 1;
26             end
27         end
28     end
29     for i=1:256
30         for j=1:256
31             sum1=sum1+r1(i,j);
32             sum2=sum2+r2(i,j);
33         end
34     end
35
36     mean1=sum1/count1;
37     mean2=sum2/count2;
```
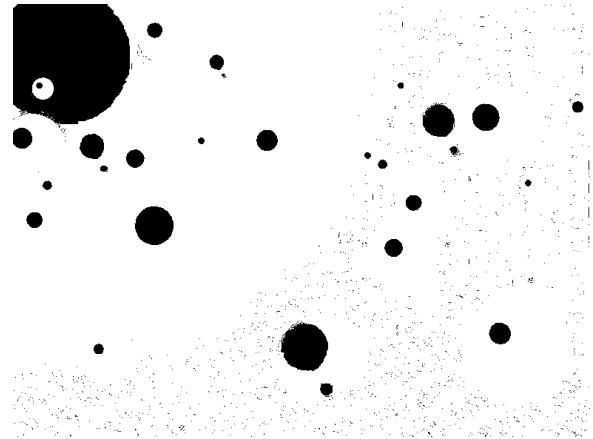
```
38        avg=(mean1)/2+(mean2)/2;
39
40        diff=abs(avg-t);
41
42  end %while loop ends
43
44  subplot(2,2,1), imshow(uint8(b));
45  subplot(2,2,2), imshow(r1);
46  subplot(2,2,3), imshow(r2);
```
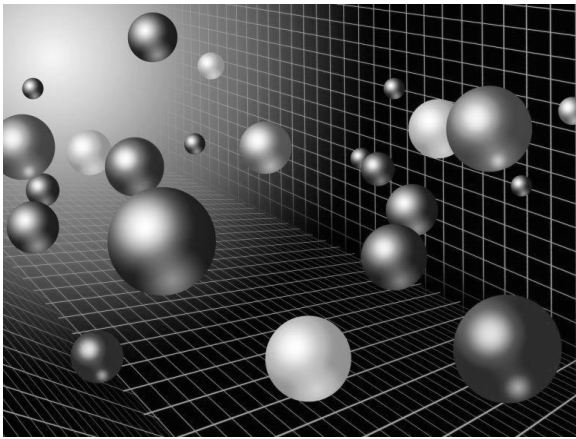

(a) Original grayscale image

(b) Foreground region

(c) foreground object region

Figure 9: Segmentation