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# 1 Assignment 1

## 1.1 Negative of an image

```
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

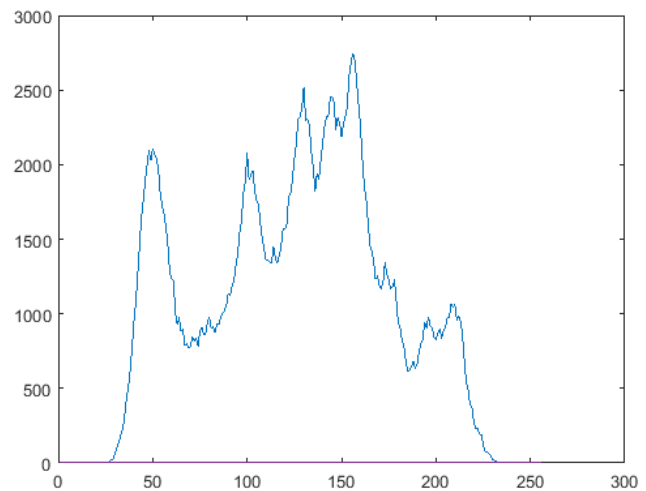
```

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

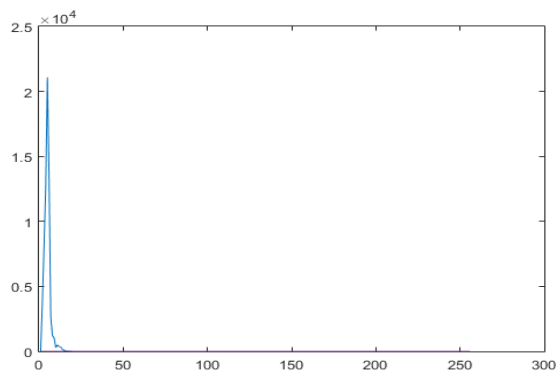


(b) Histogram of the Image

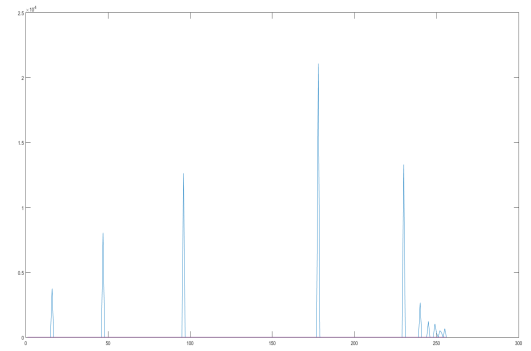
Figure 2: Image & histogram of the image

## 2.2 Histogram equalization

```
1 a=imread('Lenna.gif');
2 b=(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);
11 pr=zeros(256);
12 pr1=zeros(256);
13 for k=1:256
14     pr(k) = arr(k)/(row*col);
15 end
16 k=0;
17 for l=1:256
18     k=k+pr(l);
19     pr1(l)= pr1(l)+k;
20 end
21 for i=1:row
22     for j=1:col
23         b(i,j)=pr1(b(i,j)+1)*255;
24     end
25 end
26 arr1=zeros(256);
27 for i=1:row
28     for j=1:col
29         arr1(b(i,j)+1)= arr1(b(i,j)+1)+1;
30     end
31 end
32 imwrite(b,'C:\Users\ratul\Desktop\myGray.png')
33 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 &amp; 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);

```

```
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 &amp; Filtered Image

## 3.2 Median Filter

```
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

```

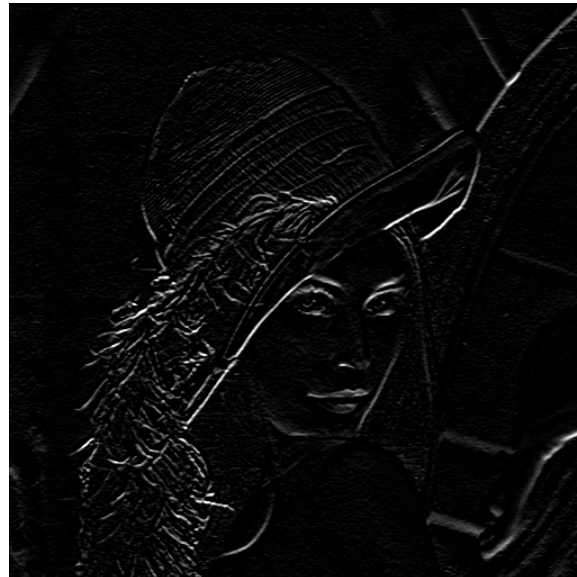
```
33 |
34 | subplot(2,2,1), imshow(b);
35 | title('Original');
36 | subplot(2,2,2), imshow(uint8(imr3));
37 | title('Horizontal_edge_using_Prewitt');
38 | subplot(2,2,3), imshow(uint8(imr4));
39 | title('Vertical_edge_using_Prewitt');
```



(a) Original grayscale image



(b) Horizontal edge



(c) Vertical edge

Figure 8: Min &amp; Max Filtered Images

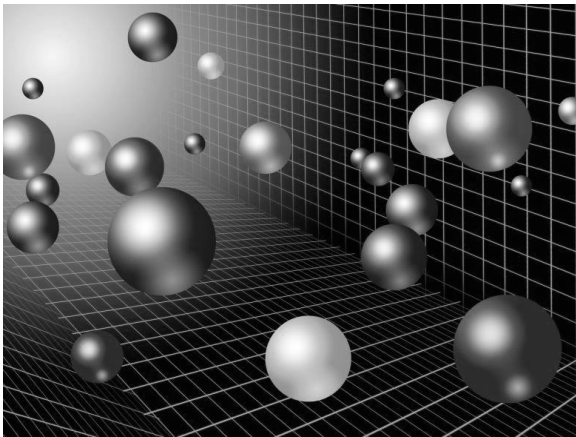
## 4.2 Segmentation

```
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;
```

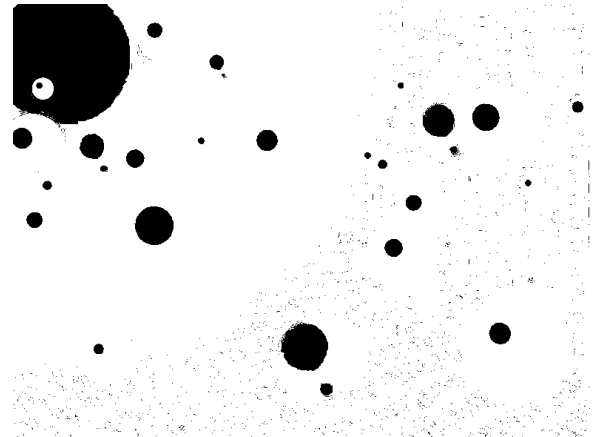
```

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: Min &amp; Max Filtered Images