BCSE0131: Digital Image Processing Lab

Name: Saksham Sharma

University Roll.No: 191500698

Sec/Class Roll.No: C/23

Experiment 01: Create command to familiarize with MATLAB & create the matrices and perform the various operations on them.

```
[1 2 3]
1:5
1:2:5
a = [1 2 3 ; 4 5 6; 7 8 9]

a(2,3)
a(1,2)
a( :, 2)
a(2,:)
a(:,3)
a(3,:)

a(2:3, 2:3)
a(1:2:3, 2:3)
```

```
%mathematical functions:
%1. zeros()
%2. ones()
%3. eye()
%4. diag()
%5. size(a)
%6. length(a)
%7. det(a)
%8. inv(a)
%9. eig(a)
%10. rank(a)

a=[1 2; 3 4]
b=[2 2; 3 1]

c=a./b
d=a.*b
e=a.^2
f=a.^b
```

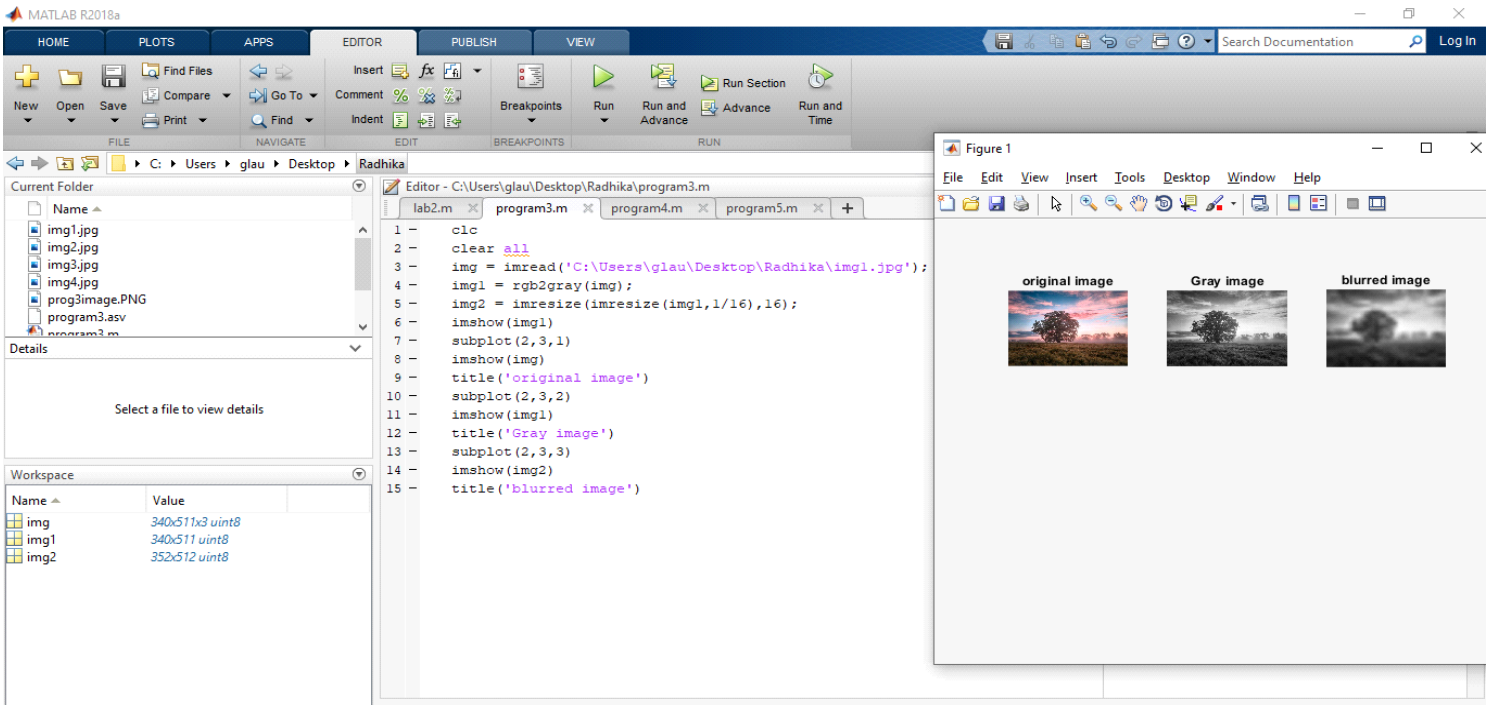
```
A = [1 2 3; 4 5 6; 7 8 9]
B = [-1 3 10; -9 5 25; 0 14 2]
S = [1 8 5 6 3]
T = [7 ; 0 ; 11]
```

```
a = A.+B
b = S.-T
e = inv(A)
c = A.*e    %  A x (inverse of A)  != I
d = S.*S
A(2:3, 2:3)

g=min(min(A))
h=min(min(B))
i=min(min(S))
j=min(min(T))
k=max(max(A))
l=max(max(B))
m=max(max(S))
n=max(max(T))

%1.
abs(A)

%2.
sign(A)

%3.
sin(0)

%4.
cos(90)

%5. for exponent
exp(13)

%6.
round(mean(S))

%7.
floor(15.46)

%8.
ceil(15.46)

%9.
sort(S)

%10.
sum(S)

%11.
prod(S)

%12.
mean(S)

%13.
median(S)
```

Experiment 2: Understanding image basic “image resize, image type conversion, extraction of color band, creating a synthesic image, pseudocolor image

```
clc
clear all
img = imread('C:\Users\glau\Desktop\Radhika\img1.jpg');
img1 = rgb2gray(img);
img2 = imresize(imresize(img1,1/16),16);
imshow(img1)
subplot(2,3,1)
imshow(img)
title('original image')
subplot(2,3,2)
imshow(img1)
title('Gray image')
subplot(2,3,3)
imshow(img2)
title('blurred image')
```

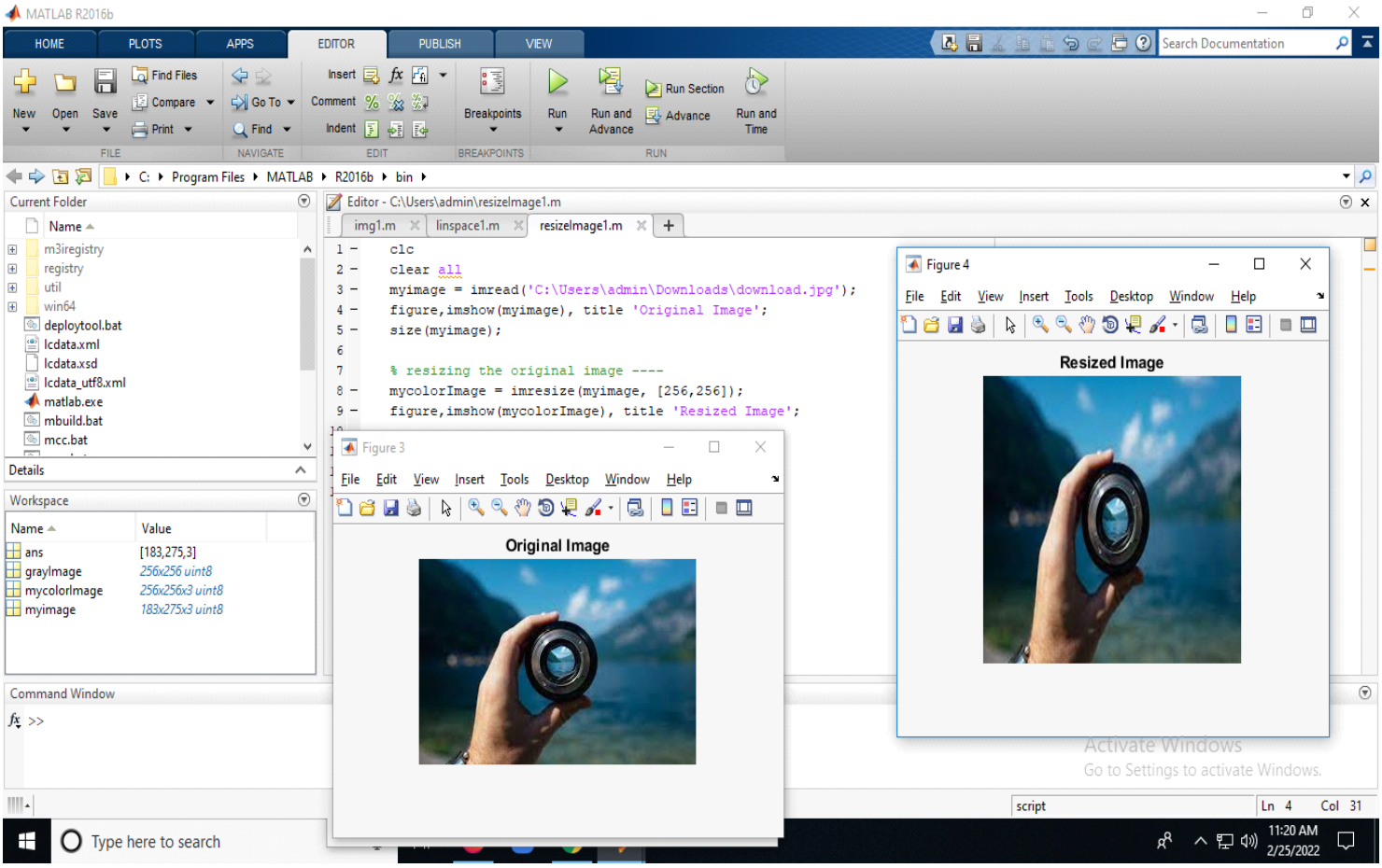
OUTPUT:-




```
% Resizing the image----------
clc
clear all
myimage = imread('C:\Users\admin\Downloads\download.jpg');
figure,imshow(myimage), title 'Original Image';
size(myimage);

% resizing the original image ----
```

```
mycolorImage = imresize(myimage, [256,256]);
figure,imshow(mycolorImage), title 'Resized Image';
```

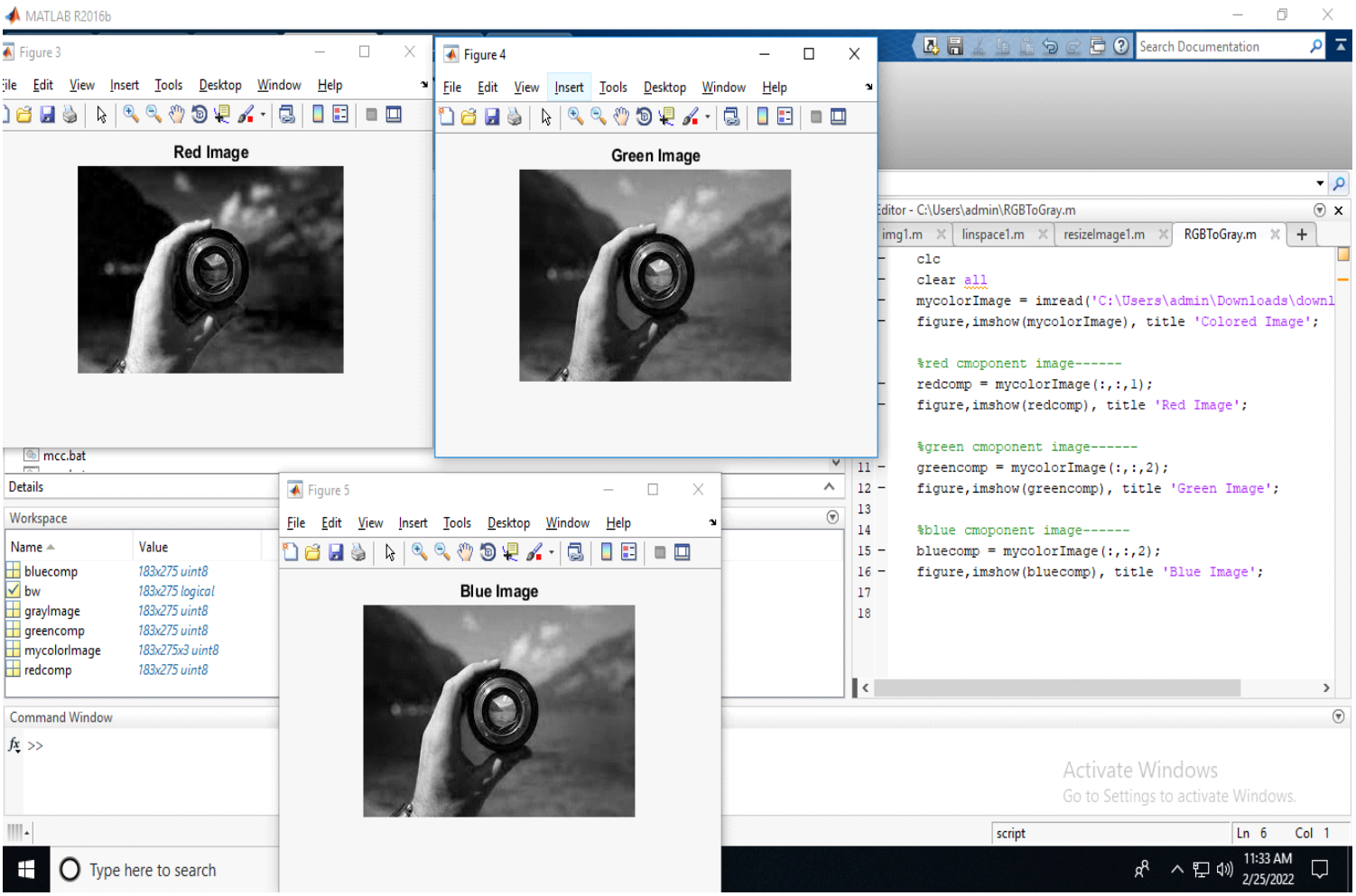
OUTPUT:-




```
% bw, redcomp,grencomp,. bluecomp, -------

clc
clear all
mycolorImage = imread('C:\Users\admin\Downloads\download.jpg');
figure,imshow(mycolorImage), title 'Colored Image';

%black and white image------
bw = im2bw(mycolorImage);
figure,imshow(bw), title 'bw Image';

%red cmoponent image------
redcomp = mycolorImage(:,:,1);
figure,imshow(redcomp), title 'Red Image';

%green cmoponent image------
greencomp = mycolorImage(:,:,2);
figure,imshow(greencomp), title 'Green Image';
```

```
%blue cmoponent image------
bluecomp = mycolorImage(:,:,2);
figure,imshow(bluecomp), title 'Blue Image';
```

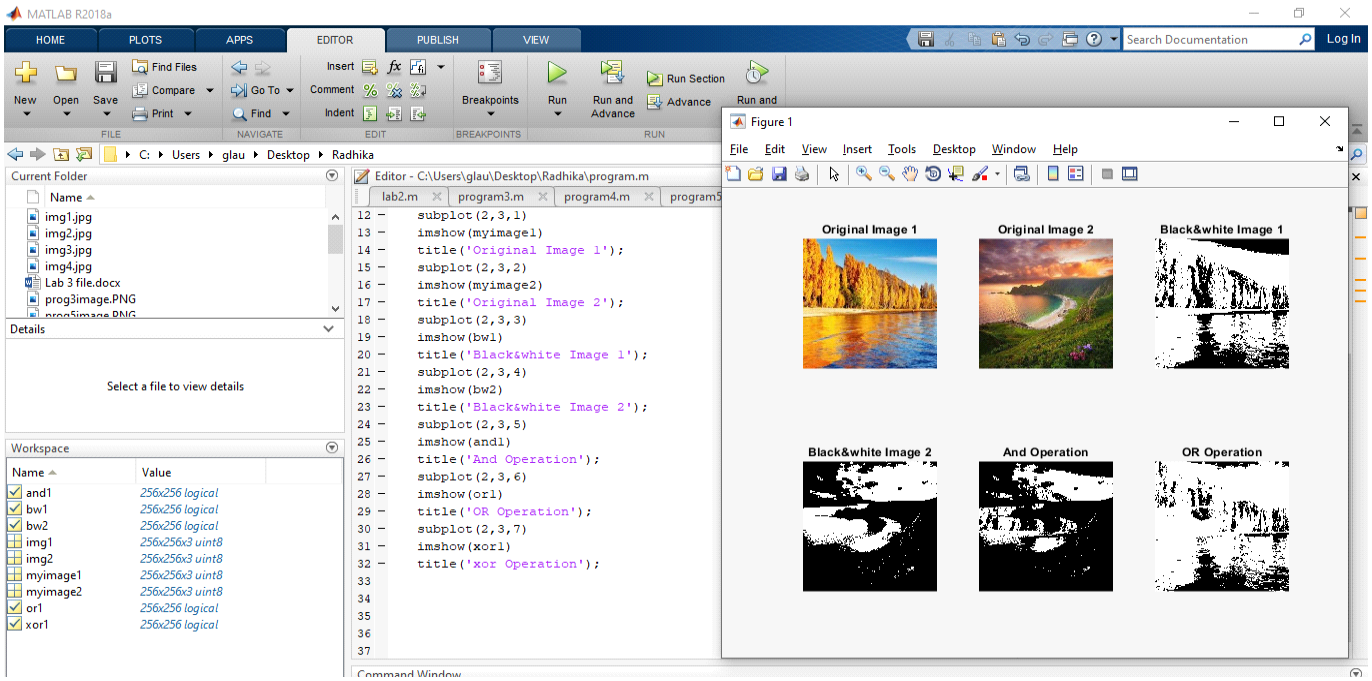
OUTPUT:-



Experiment No 3: Perform various arithmetic operation logical operation (NOT, OR and XOR) on images

```
clc
clear all
img1 = imread('img3.jpg');
myimage1 = imresize(img1,[256,256])
img2 =imread('img4.jpg');
myimage2 = imresize(img2,[256,256])
bw1 = im2bw(myimage1);
bw2 = im2bw(myimage2);
and1 = bw1 & bw2;
or1 = bw1 | bw2;
xor1 = xor(bw1,bw2);
subplot(2,3,1)
imshow(myimage1)
title('Original Image 1');
subplot(2,3,2)
imshow(myimage2)
title('Original Image 2');
subplot(2,3,3)
imshow(bw1)
title('Black&white Image 1');
subplot(2,3,4)
imshow(bw2)
title('Black&white Image 2');
subplot(2,3,5)
imshow(and1)
title('And Operation');
subplot(2,3,6)
imshow(or1)
title('OR Operation');
subplot(2,3,7)
imshow(xor1)
title('xor Operation');
```

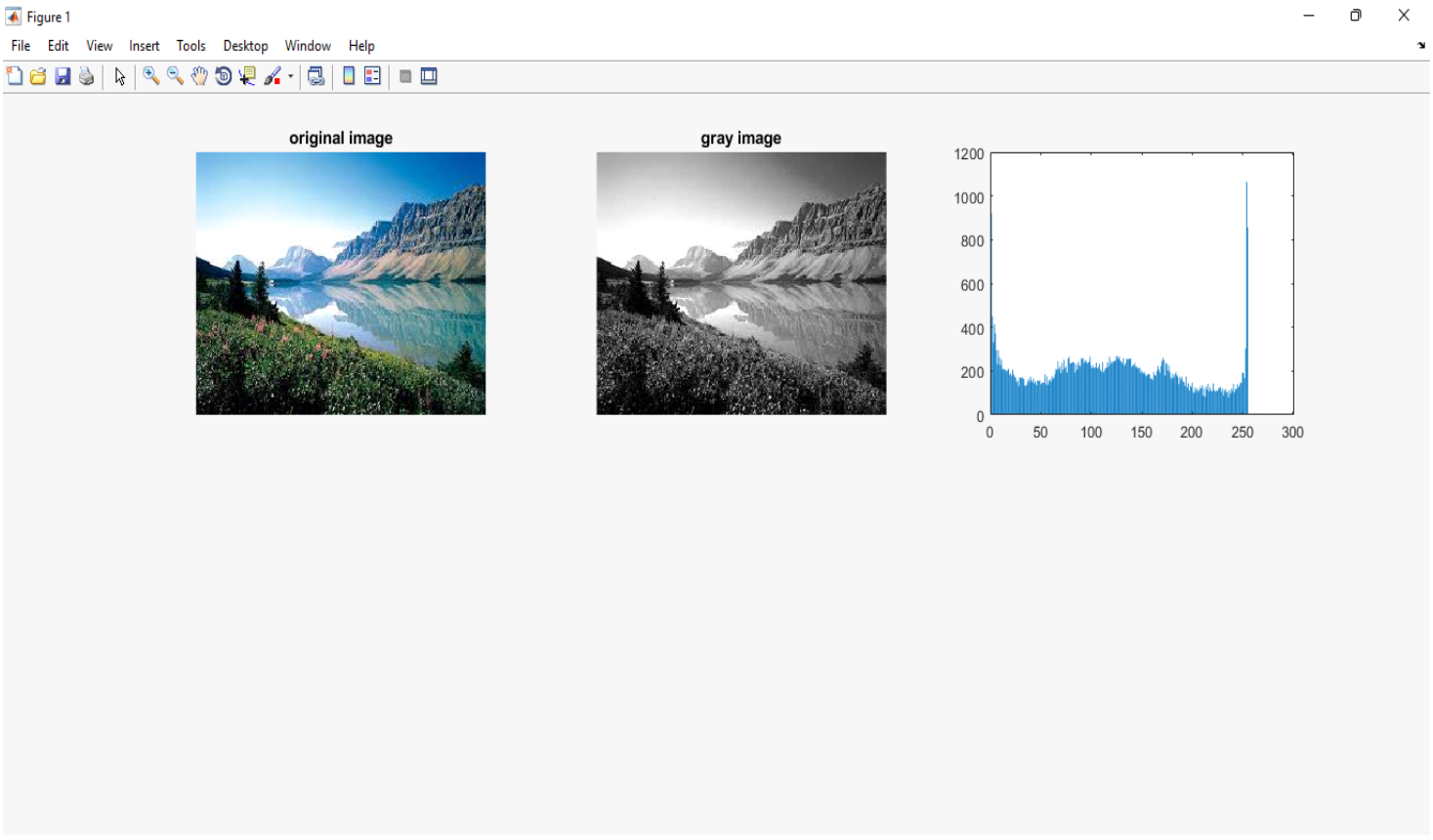
OUTPUT:-



Experiment No 4: Perform contrast operations, create histogram and perform histogram equalization.

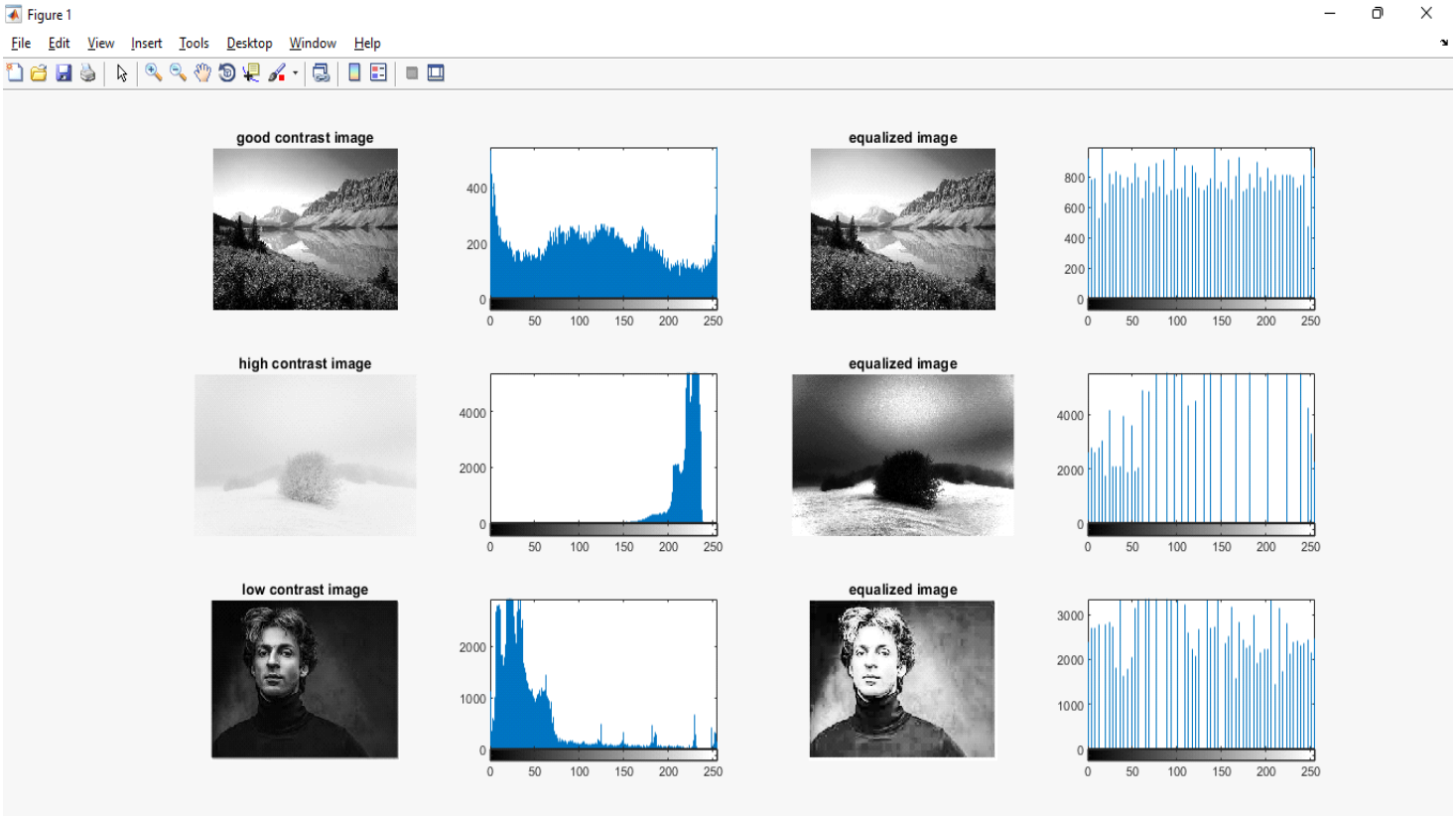
```
% histogram using of loop.........
clc
clear all
gd = imread('C:\Users\GLAU\Downloads\goodContrast.jpg');
img1 = rgb2gray(gd);
h = zeros(1,300);
[r,c]=size(img1);

for i=1:r
    for j=1:c
        if(img1(i,j) == 0)
            img1(i,j) = 1;

        end
    end
end
for i=1:r
    for j=1:c
        t = img1(i,j);
        h(t) = h(t)+1;

    end
end
subplot(2,3,1); imshow(gd), title 'original image';
subplot(2,3,2); imshow(img1), title 'gray image';
subplot(2,3,3),bar(h);
```

OUTPUT:-



```
% Histogram Equalization.........
clc
clear all

goodC = imread('C:\Users\GLAU\Downloads\goodContrast.jpg');
img1 = rgb2gray(goodC);
subplot(3,4,1); imshow(img1), title 'good contrast image';
subplot(3,4,2); imhist(img1);
img2 = histeq(goodC);
subplot(3,4,3); imshow(img2), title 'equalized image';
subplot(3,4,4); imhist(img2);


highC = imread('C:\Users\GLAU\Downloads\poorContrast.jpg');
subplot(3,4,5); imshow(highC), title 'high contrast image';
subplot(3,4,6); imhist(highC);
img3 = histeq(highC);
subplot(3,4,7); imshow(img3), title 'equalized image';
subplot(3,4,8); imhist(img3);

poorC = imread('C:\Users\GLAU\Downloads\highContrast.jpg');
subplot(3,4,9); imshow(poorC), title 'low contrast image';
subplot(3,4,10); imhist(poorC);
img4 = histeq(poorC);
subplot(3,4,11); imshow(img4), title 'equalized image';
subplot(3,4,12); imhist(img4);
```

OUTPUT:-



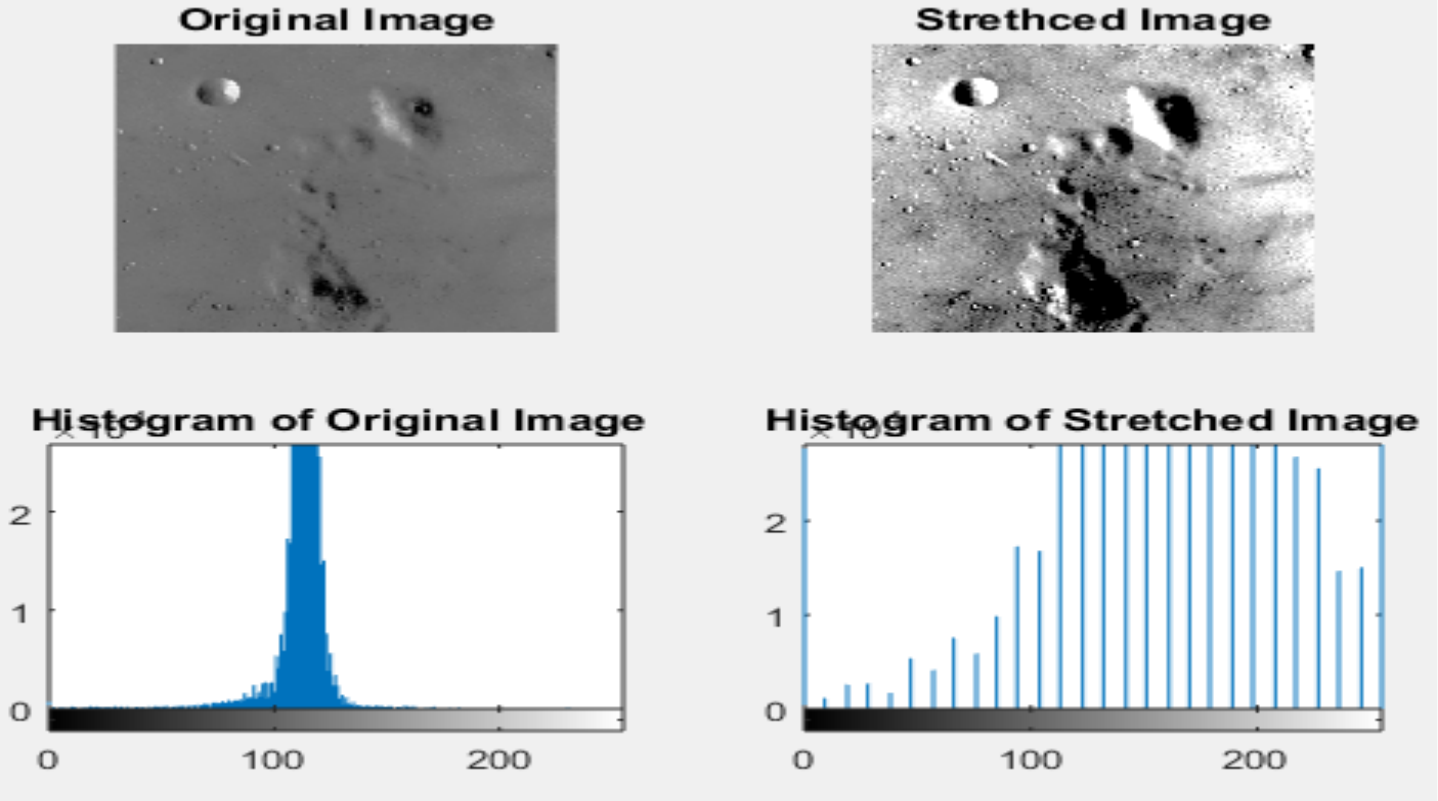
```
clc
clear all
img1 = imread('C:\Users\glau\Desktop\Radhika\img1.jpg');
img2 = rgb2gray(img1);
h = zeros(1,300);
[r c] = size(img2);
for i = 1:r
    for j = 1:c
        if(img2(i,j)==0)
            img2(i,j)=1;
        end
    end
end

for i = 1: r
    for j = 1:c
        t=i*j;
        t = img2(i,j);
        h(t) = h(t)+1;
    end
end
subplot(2,3,1), imshow(img1);
subplot(2,3,2), imshow(img2);
subplot(2,3,3), imhist(img2);
subplot(2,3,4),bar(h);
```

OUTPUT:-

Experiment No 5: Perform contrast stretching and gamma correction on image.

```
% Contrast stretching of image....

image = imread('satellite_Image.png');
stretched_Image = imadjust(image, stretchlim(image, [0.05, 0.95]),[]);
subplot(2,2,1), imshow(image), title('Original Image');
subplot(2,2,2), imshow(stretched_Image), title('Strethced Image');
subplot(2,2,3), imhist(image), title('Histogram of Original Image');
subplot(2,2,4), imhist(stretched_Image), title('Histogram of Stretched Image');
```

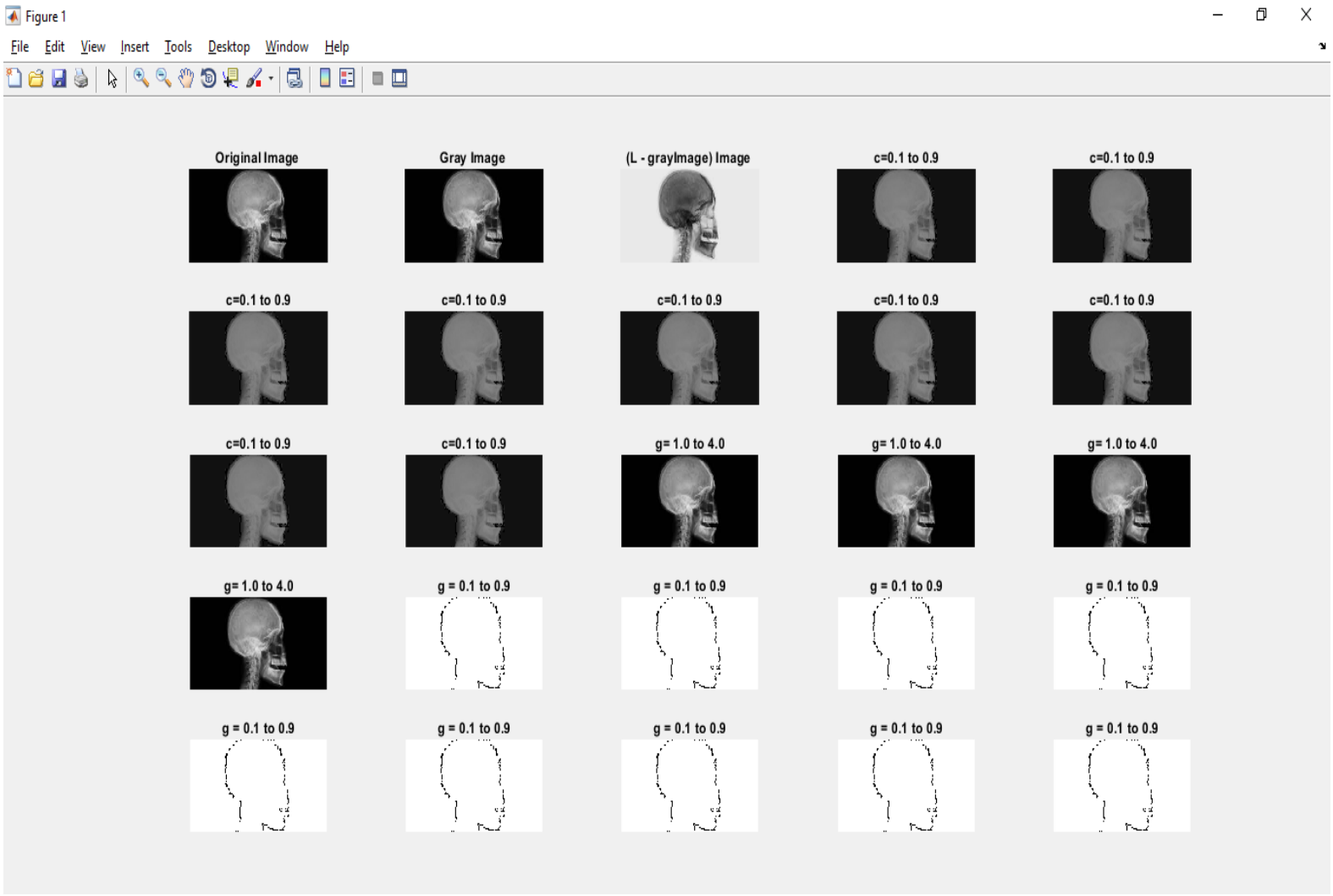
OUTOUT:-




```
% Contrast stretching and gamma correction of an image....


Clc
clear all

img1 = imread('C:\Users\CL224\Downloads\1.jpeg');
img2 = rgb2gray(img1);
L = max(max(img2));
img3 = L - img2;
subplot(5,5,1), imshow(img1), title 'Original Image ';
subplot(5,5,2), imshow(img2), title 'Gray Image ';
subplot(5,5,3), imshow(img3), title '(L - grayimage) Image ';

a = double(img2);
c=1;
r=9;
k=4;

for i=c:r
```

```
    img4 = c ./ 10 .* log(1+a);
    subplot(5,5,k);
    imshow(img4), title 'c=0.1 to 0.9';
    k = k+1;
end

g=1;
c=1
q=4;
k=13;
for i=g:q
    img5 = c .* (img2 .^ g);
    subplot(5,5,k);
    imshow(img5), title 'g= 1.0 to 4.0';
    k = k+1;
end
a = double(img2);
g=1;
q=9;
c=1;
k=17;
for i=g:q
    img5 = c .* (a .^ (g ./ 10));
    subplot(5,5,k);
    imshow(img5), title 'g = 0.1 to 0.9';
    k = k+1;
end
```

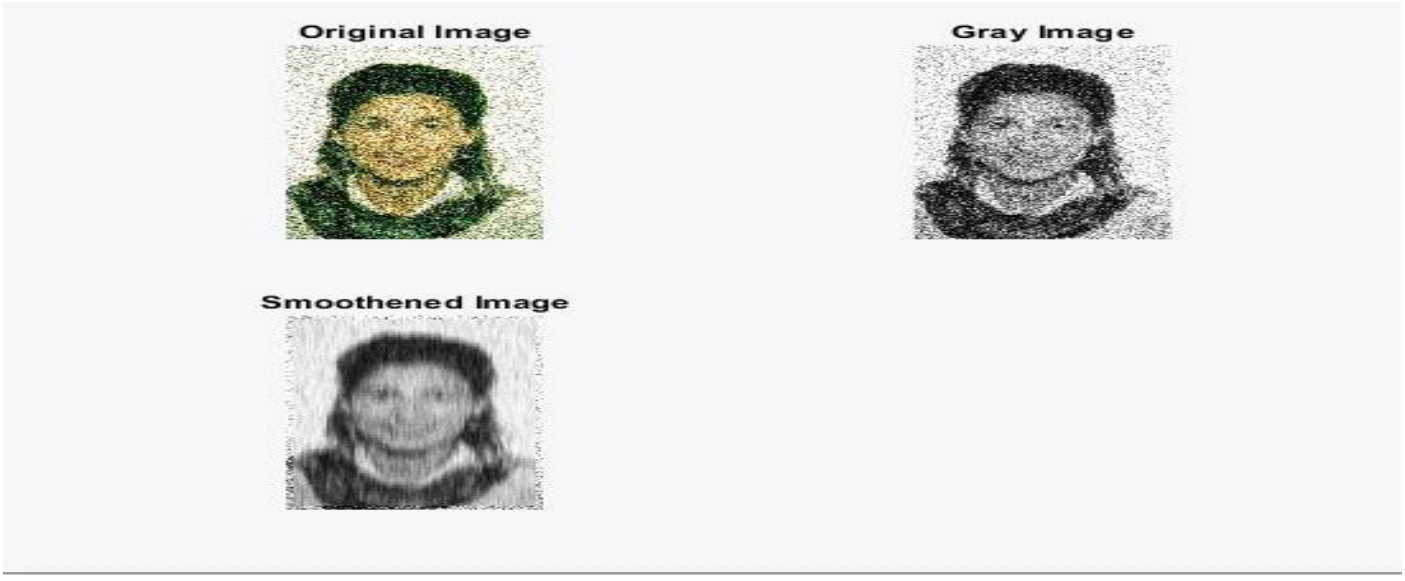
OUTPUT:-



Experiment No 6: Perform Smoothing using linear and order statistics filter min, amx and med of various sizes and sharpen an image using Laplacian filter.

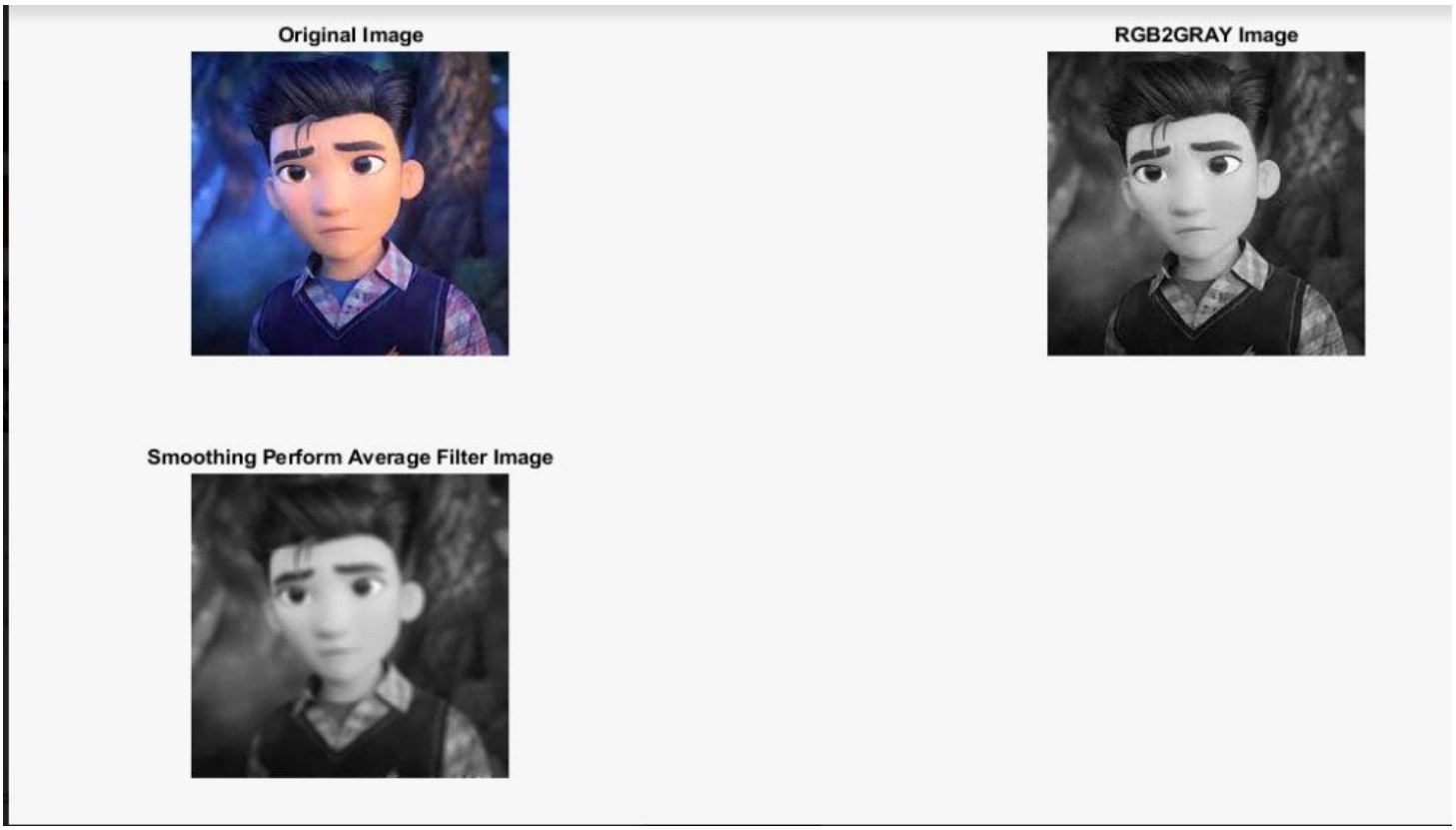
```
% Smoothing an image using linear filter....
clc
clear all
img1 = imread('C:\Users\glau\Desktop\Radhika\noisy.jpg');
img2 = rgb2gray(img1);
[m, n] = size(img2);
img2 = double(img2);
size1 = input('input fiter size');
f = ones(size1);
c = (size1+1)/2;
img3 = img2;
for i = c:m-c+1
    for j = c:n-c+1
        sum = 0;
        for k = 1:size1
            for l = 1:size1
                sum =  sum + img2(i-c+k,j-c+1) * f(k,l);
            end
        end
        img3(i,j) = sum / (size1^2);
    end
end
subplot(2,2,1), imshow(uint8(img1));
title('Original Image');
subplot(2,2,2), imshow(uint8(img2));
title('Gray Image');
subplot(2,2,3), imshow(uint8(img3));
title('Smoothened Image');
```

OUTPUT:-



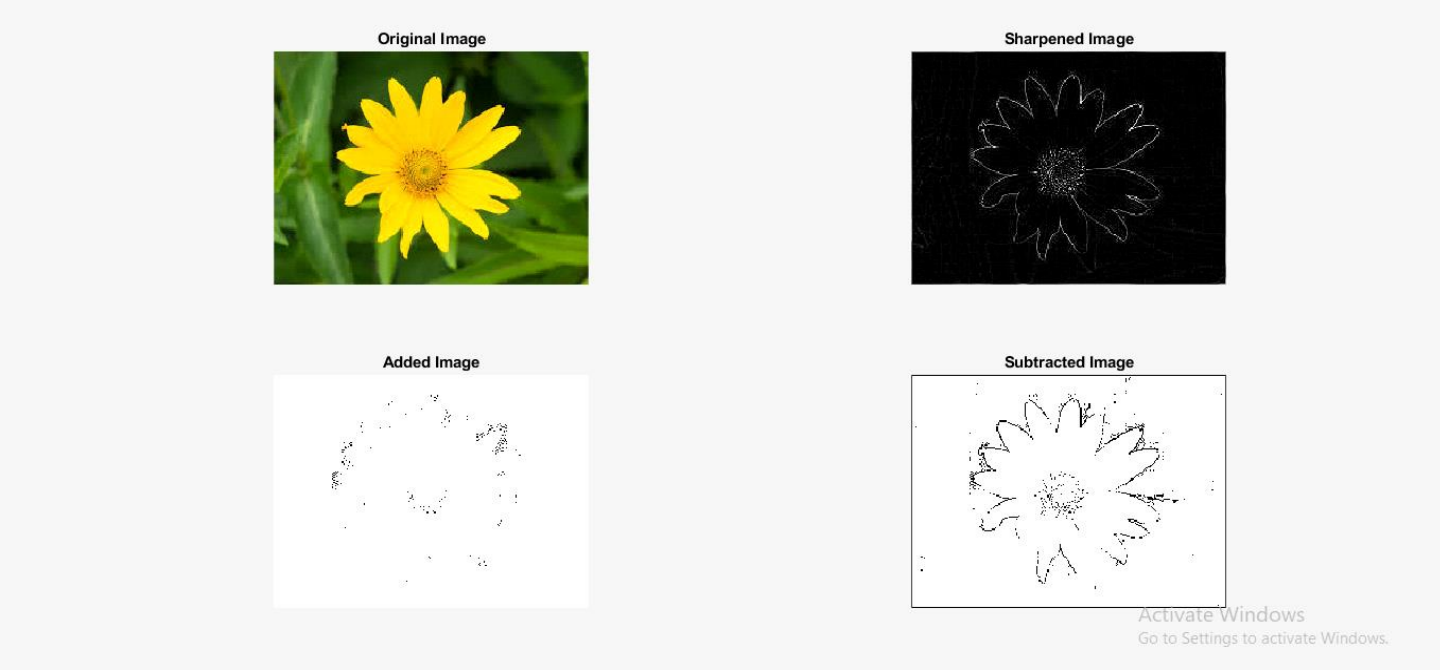
```
% Smoothing of an image using average filter with normal image

clc
clear all
img= imread('C:\Users\CL224\Desktop\prachi\prachi.png');
img2=rgb2gray(img);
[m n] = size(img2);
img2=double(img2);
size1=input('input filter size');
f=ones(size1);
c=(size1+1)/2;
img3=img2;
for i=c: m-c+1
    for j=c: n-c+1
        sum=0;
        for k=1:size1
            for l=1:size1
               %sum=sum+img2(i-c+1,j-c+1)*f(k,l);
                sum=sum+img2(i-c+k,j-c+l)*f(k,l);
            end
        end
        img3(i,j)=sum/(size1^2);
    end
end
subplot(2,2,1),imshow(uint8(img)), title ('Original Image');
subplot(2,2,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,2,3),imshow(uint8(img3)),title ('Smoothing Perform Average Filter Image');
```

OUTPUT:-



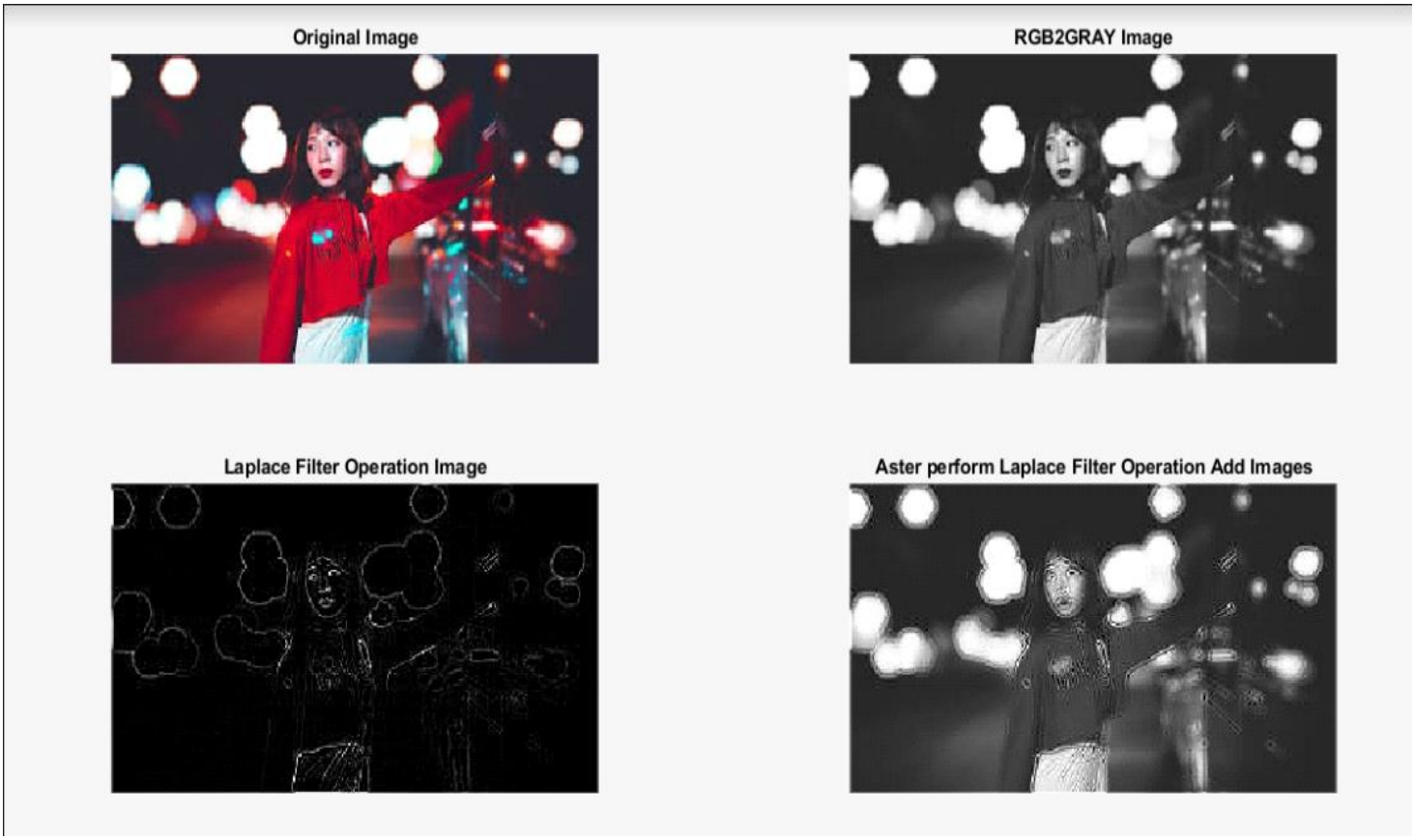
```
% Sharpening the image using Laplacian filter

clc
clear all
img1 = imread('C:\Users\glau\Desktop\Radhika\flower.jpg');
img2 = rgb2gray(img1);
[m, n] = size(img2);
img2 = double(img2);
c = 2;
img3 = img2;
f = [0 1 0;1 -4 1; 0 1 0];
for i = 2:m-1
    for j = 2:n-1
        sum = 0;
        for k = 1:3
            for l = 1:3
                sum = sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j) = sum;
    end
end
subplot(2,2,1), imshow(img1);
title('Original Image')
subplot(2,2,2), imshow(uint8(img3));
title('Sharpened Image')
subplot(2,2,3),imshow(imadd(img2,img3));
title('Added Image')
subplot(2,2,4),imshow(imsubtract(img2,img3));
title('Subtracted Image')
```

OUTPUT:-



```
% Adding RGB2GRAY Image and Laplace Filter Image

img= imread('C:\Users\CL224\Desktop\prachi\prachi.png');

img2=rgb2gray(img);
[r c1]=size(img2);
img2=double(img2);
c=2;
img3=img2;
f=[0 1 0; 1 -4 1; 0 1 0]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:3
            for l=1:3
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j)=sum;
    end
end
subplot(2,2,1),imshow(uint8(img)), title ('Original Image');
subplot(2,2,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,2,3),imshow(uint8(img3)),title ('Laplace Filter Operation Image');
img4=img2;
img4=img3+img2;
subplot(2,2,4),imshow(uint8(img4)),title ('After perform Laplace Filter Operation Add
Images');
```

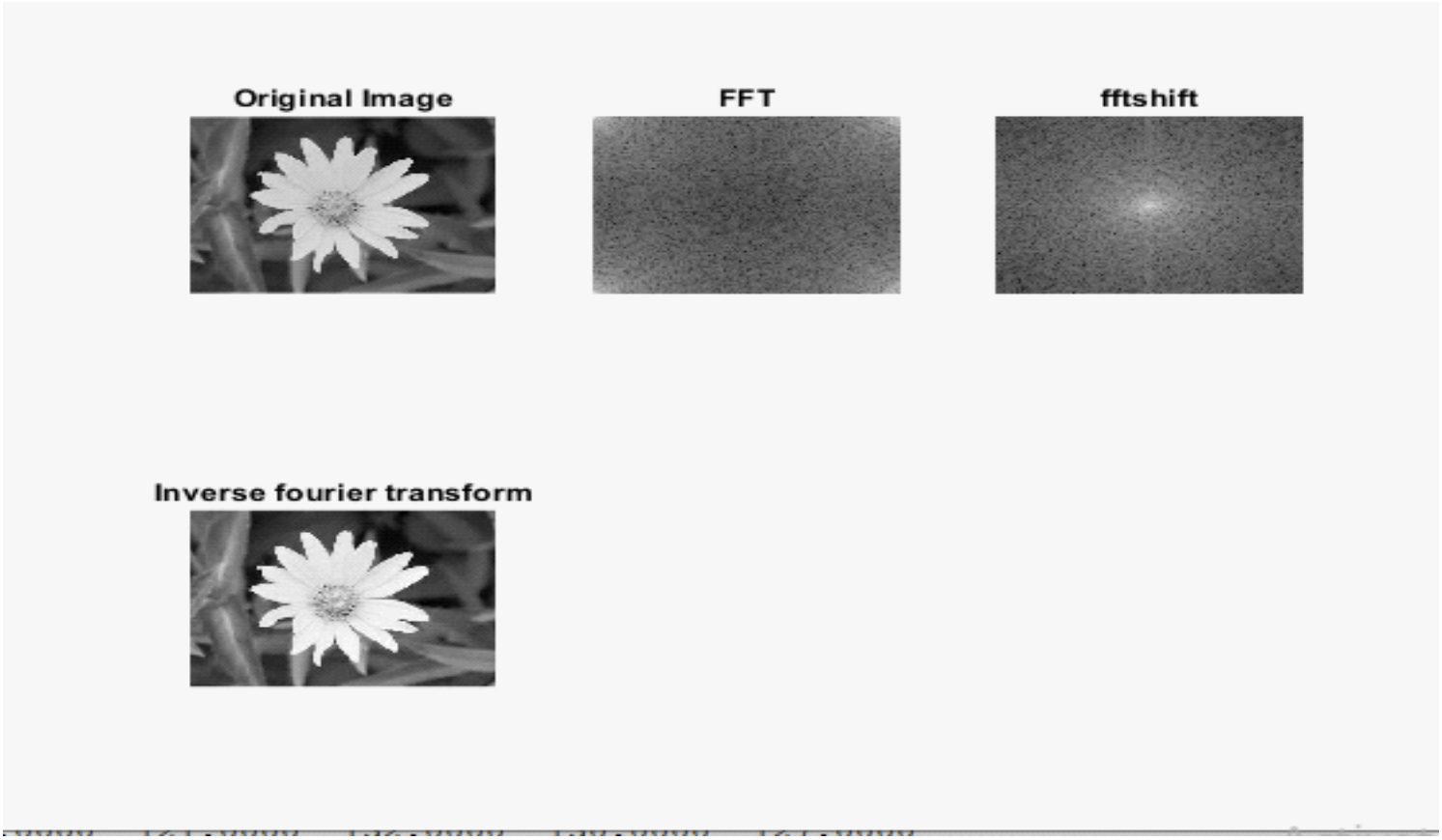
OUTPUT:-



Experiment 7: Perform various Fast Fourier Transformations (FFT) and frequency domain filtering on image using MATLAB.

```
% Inverse Fourier Transformation...

I  = imread('C:\Users\glau\Desktop\Radhika\flower.jpg');
G = rgb2gray(I);
F = fft2(G);
lF = log(1+abs(F))

sf = fftshift(F)
slf  = log(1+abs(sf))

ift = ifft2(F)

subplot(2,3,1);
imshow(G),title('Original Image');
subplot(2,3,2);
imshow(lF,[]),title('FFT');
subplot(2,3,3);
imshow(slf,[]),title('fftshift');
subplot(2,3,4);
imshow(ift,[]),title('Inverse fourier transform');
```

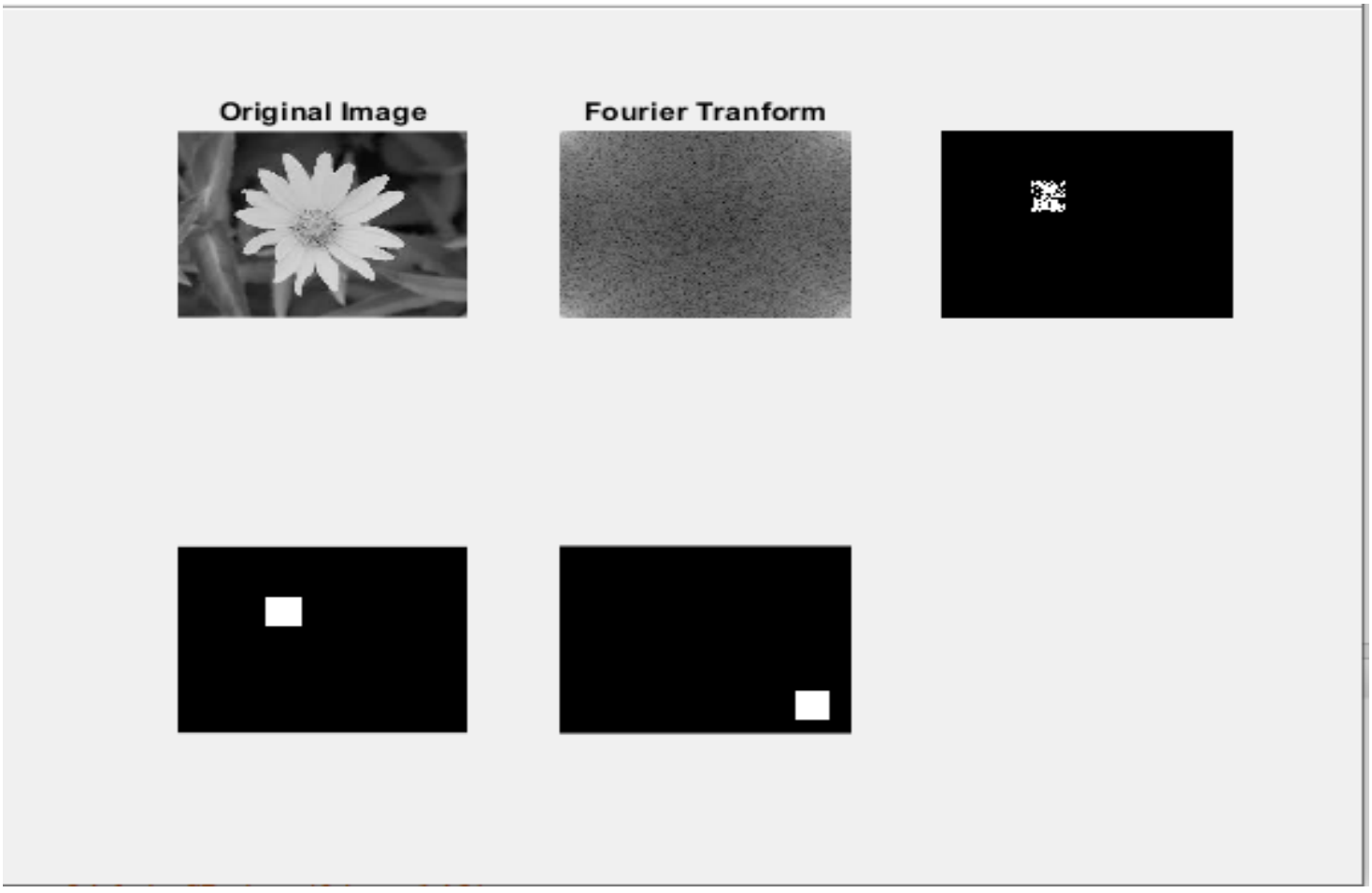
Output:-



```
%LOW PASS FILTERING USING FOURIER TRANSFORM.....
```

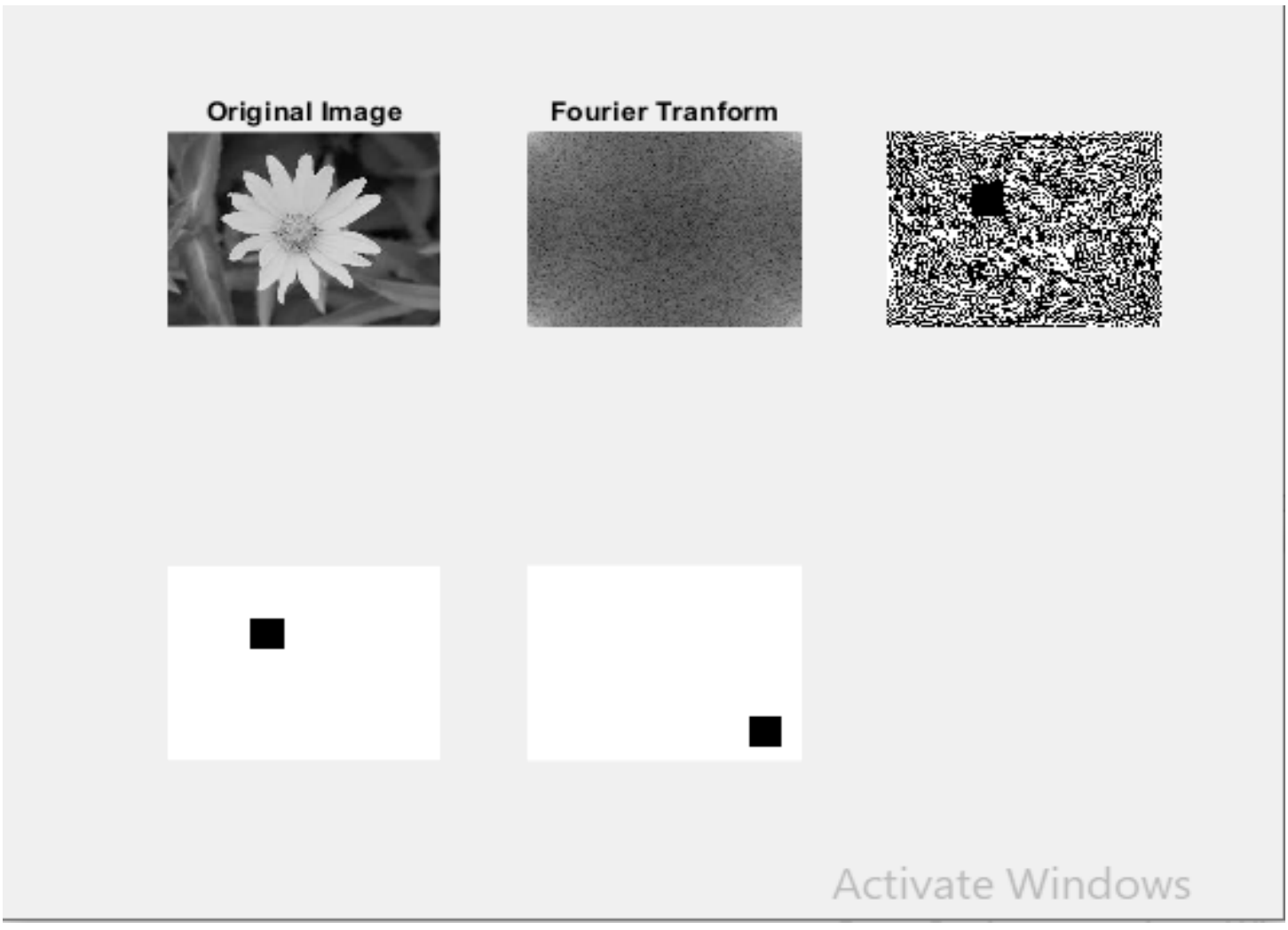
```
I = imread('C:\Users\glau\Desktop\Radhika\flower.jpg');
A = rgb2gray(I);
B = fft2(A);
lb = log(1+abs(B))
[m, n] = size(A)
mask = zeros(m,n)
for i = 150:180
    for j = 210:240
        mask(i,j) = 1;
    end
end
C = fftshift(mask);
D = B .*C;
E = abs(D)
subplot(2,3,1),imshow(A),title('Original Image');
subplot(2,3,2),imshow(lb,[]),title('Fourier Tranform');
subplot(2,3,3),imshow(D);
subplot(2,3,4),imshow(E);
subplot(2,3,5),imshow(mask);
```

Output:-



```
%HIGH PASS FILTERING IN FOURIER TRANSFORM.....

I = imread('C:\Users\glau\Desktop\Radhika\flower.jpg');
A = rgb2gray(I);
B = fft2(A);
lb = log(1+abs(B))
[m, n] = size(A)
mask = ones(m,n)
for i = 150:180
    for j = 210:240
        mask(i,j) = 0;
    end
end
C = fftshift(mask);
D = B .*C;
E = abs(D)
subplot(2,3,1),imshow(A),title('Original Image');
subplot(2,3,2),imshow(lb,[]),title('Fourier Tranform');
subplot(2,3,3),imshow(D);
subplot(2,3,4),imshow(E);
subplot(2,3,5),imshow(mask);
```

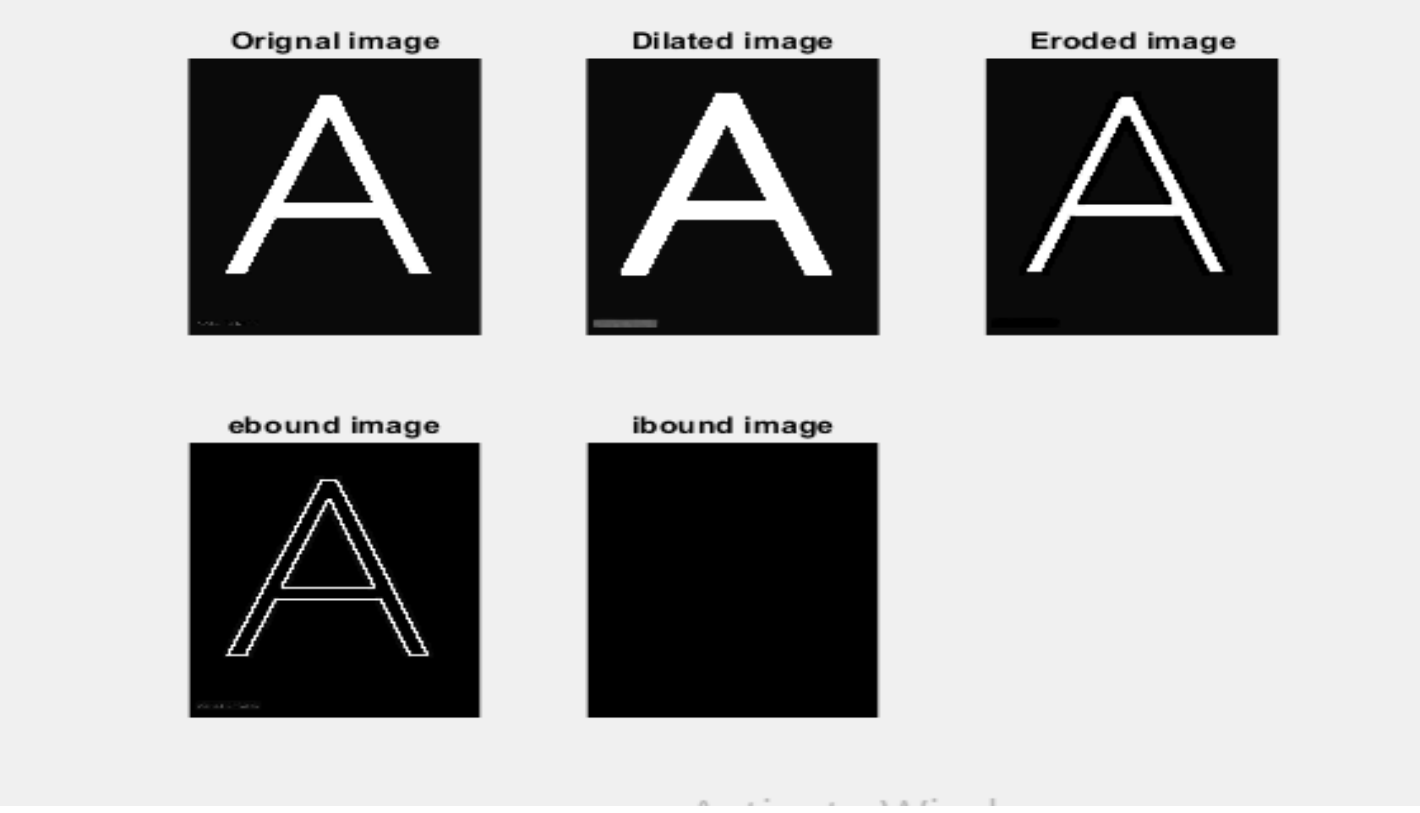
Output:-



Experiment 8: Perform various Morphological operations dilation, erosion, internal and external boundary extraction, thinning, thickening and skeletonizing of image and perform dilation, erosion, boundary extraction without using direct functions.

```
% EXTRACTING INTERNAL AND EXTERNAL BOUNDARIES FROM THE DILATED AND ERODED IMAGE

% Dilation is used to expand the image pixels
%Taking a b&w image
orgimg = imread('C:\Users\glau\Desktop\Radhika\Alphabet.jpg');
se = strel('square',15);%to define structuring element
%Applying dilation function
 dilimg = imdilate(orgimg,se)
 %Performing erosion
 eroimg = imerode(orgimg,se)
subplot(2,3,1),imshow(orgimg),title('Orignal image');
subplot(2,3,2),imshow(dilimg),title('Dilated image');
subplot(2,3,3),imshow(eroimg),title('Eroded image');
ebound = imsubtract(orgimg, eroimg)
ibound = imsubtract(orgimg, dilimg)
subplot(2,3,4),imshow(ebound),title('External Boundary image');
subplot(2,3,5),imshow(ibound),title('Internal boundary image');
```

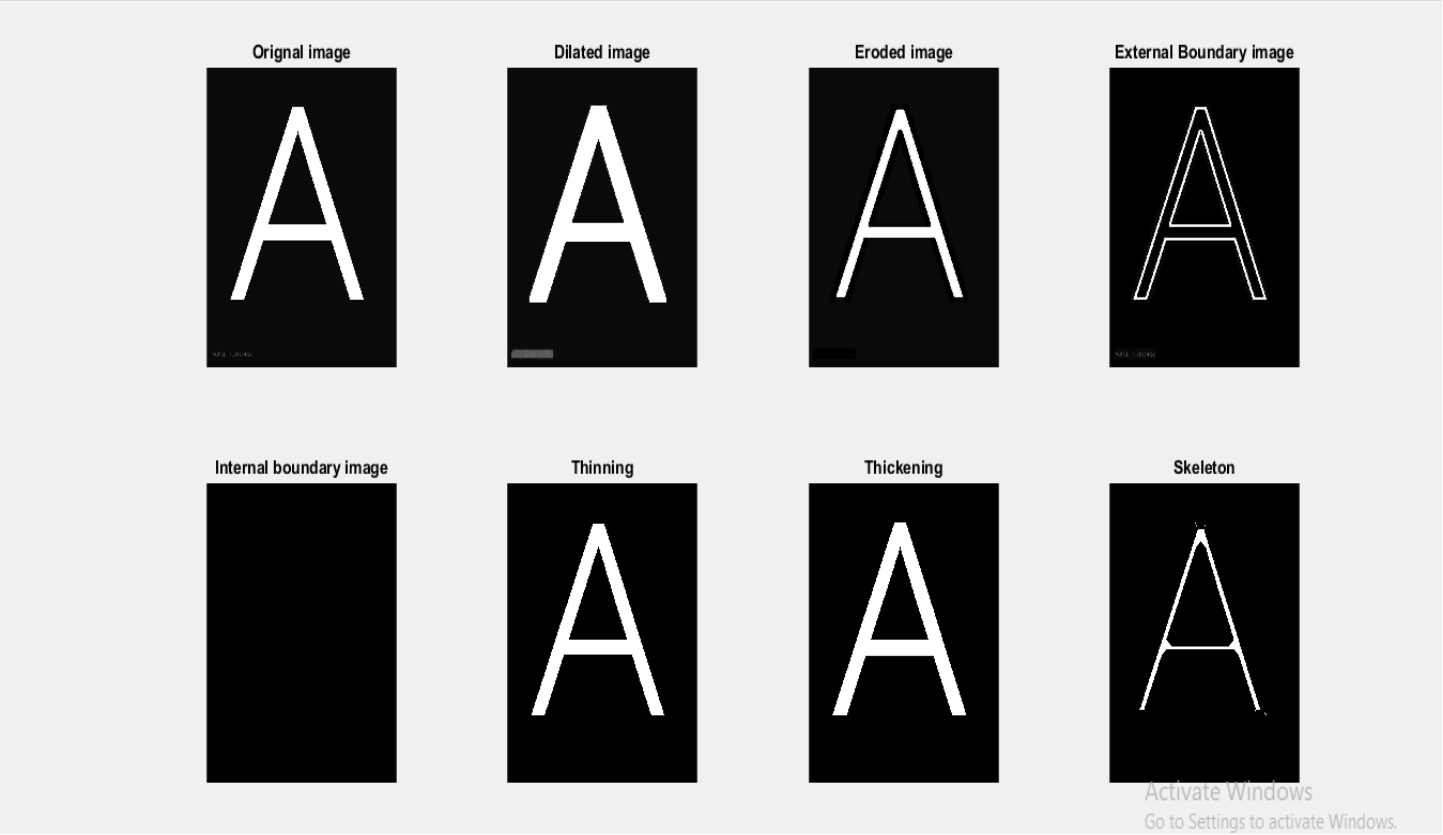
output



% Performing Morphological Operations on the image(Thinning, thickening,skeleton)

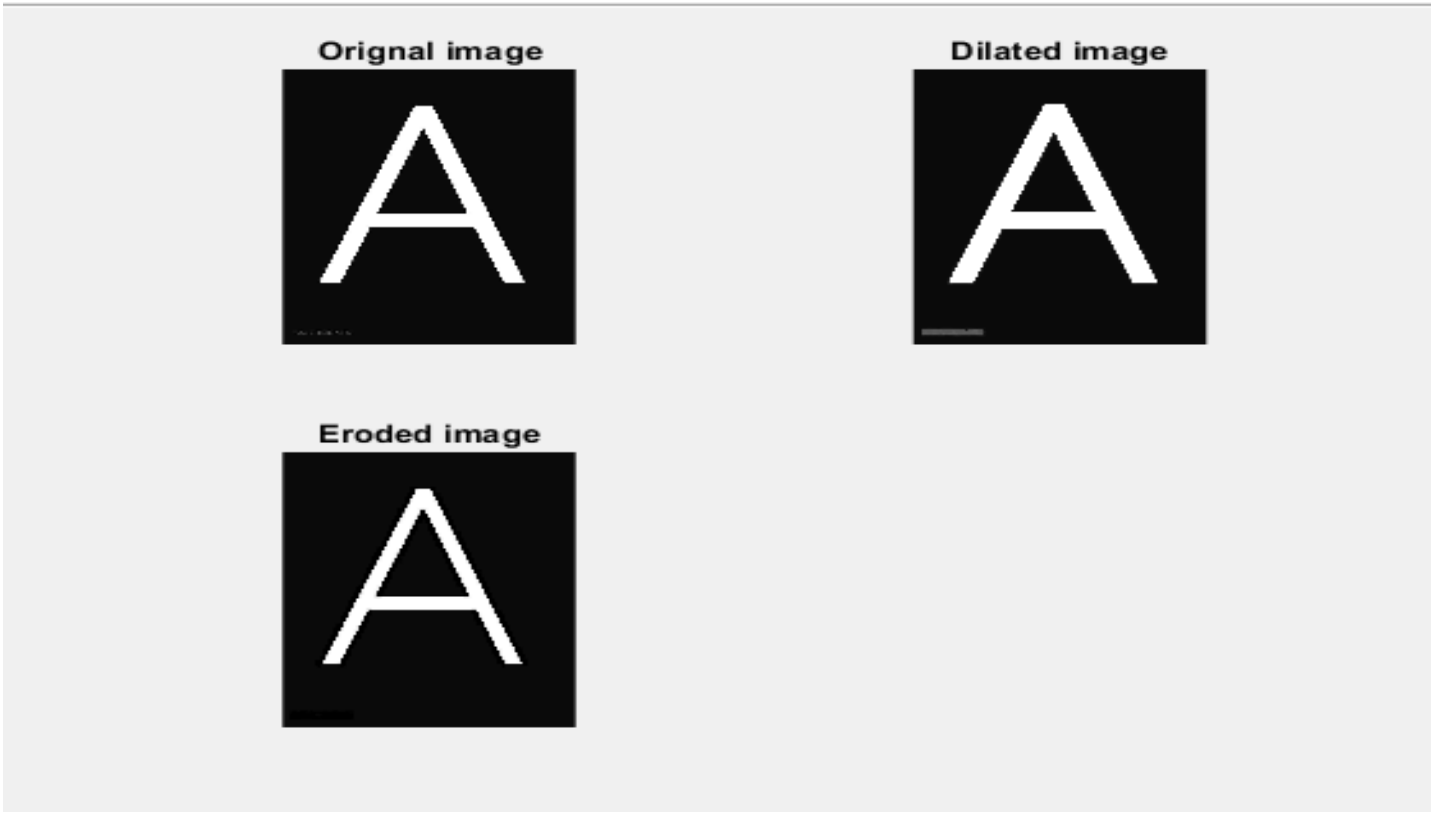
```
% Dilation is used to expand the image pixels
%Taking a b&w image
orgimg = imread('C:\Users\glau\Desktop\Radhika\Alphabet.jpg');
se = strel('square',15);%to define structuring element
%Applying dilation function
 dilimg = imdilate(orgimg,se);
 %Performing erosion
 eroimg = imerode(orgimg,se);
subplot(2,4,1),imshow(orgimg),title('Orignal image');
subplot(2,4,2),imshow(dilimg),title('Dilated image');
subplot(2,4,3),imshow(eroimg),title('Eroded image');
ebound = imsubtract(orgimg, eroimg);
ibound = imsubtract(orgimg, dilimg);
subplot(2,4,4),imshow(ebound),title('External Boundary image');
subplot(2,4,5),imshow(ibound),title('Internal boundary image');
%Thinning of the image
morphthin = bwmorph(im2bw(orgimg),'thin');
subplot(2,4,6),imshow(morphthin),title('Thinning');
%Thickening of the image
mthick = bwmorph(im2bw(orgimg),'thicken');
subplot(2,4,7),imshow(mthick),title('Thickening');
%Skeleton of the image
mskel = bwmorph(im2bw(orgimg),'skel',20);
subplot(2,4,8),imshow(mskel),title('Skeleton');
```

OUTPUT:-



```
% Dilation is used to expand the image pixels
%Taking a b&w image
orgimg = imread('C:\Users\glau\Desktop\Radhika\Alphabet.jpg');
se = strel('square',9);%to define structuring element
%Applying dilation function
 dilimg = imdilate(orgimg,se)
 %Performing erosion
 eroimg = imerode(orgimg,se)
subplot(2,2,1),imshow(orgimg),title('Orignal image');
subplot(2,2,2),imshow(dilimg),title('Dilated image');
subplot(2,2,3),imshow(eroimg),title('Eroded image');
```

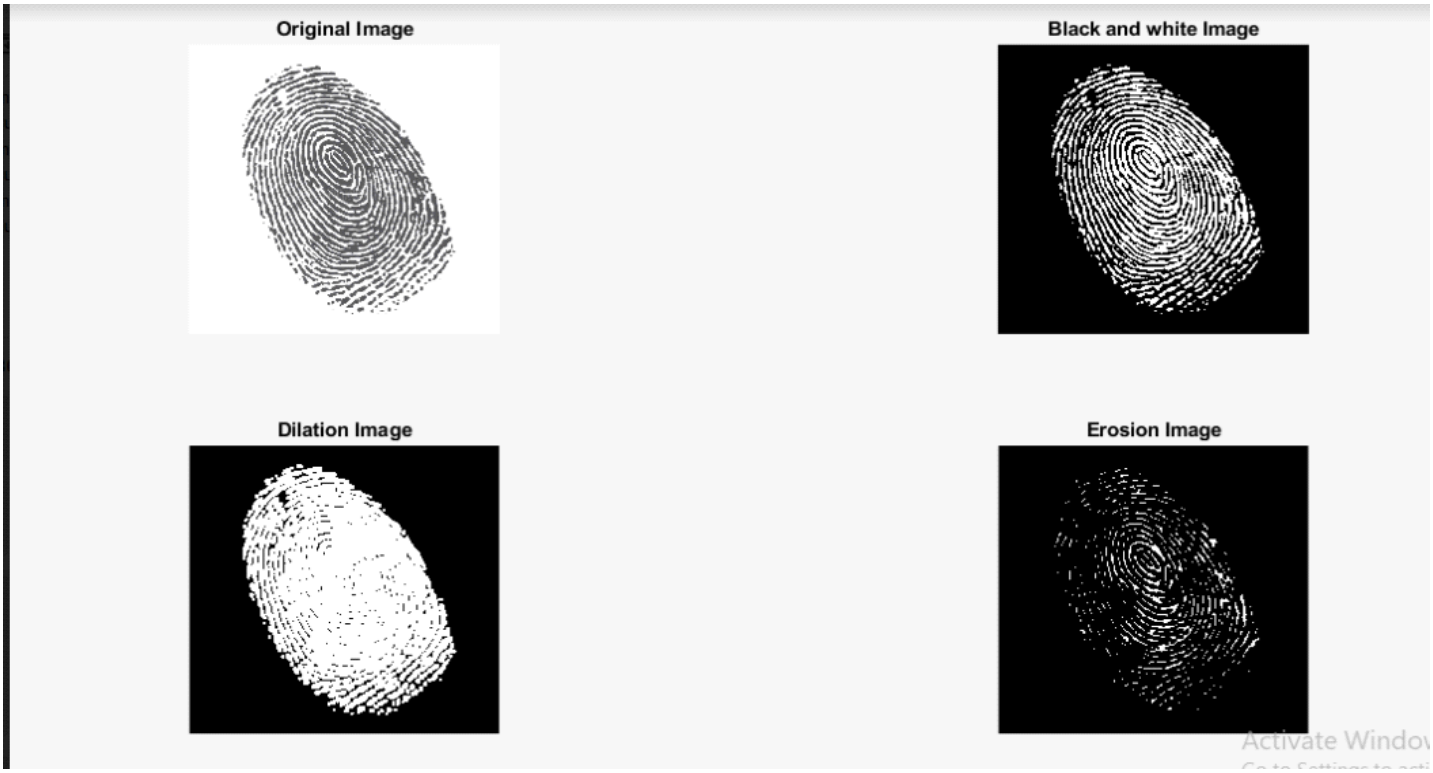
Output:-




```
% Apply Erosion and Dilation in a black and white image using
complement sign (~)

clc
clear all
img=imread('C:\Users\CL224\Desktop\prachi\fingerprint.png');
img=imresize(img,[512,512]);
subplot(3,3,1),imshow(img),title("Original Image");

img1=~im2bw(img);
subplot(3,3,2),imshow(img1),title("Black and white Image");
sc=strel('square',4);
dilimg=imdilate(img1,sc);
subplot(3,3,3),imshow(dilimg),title("Dilation Image");
```

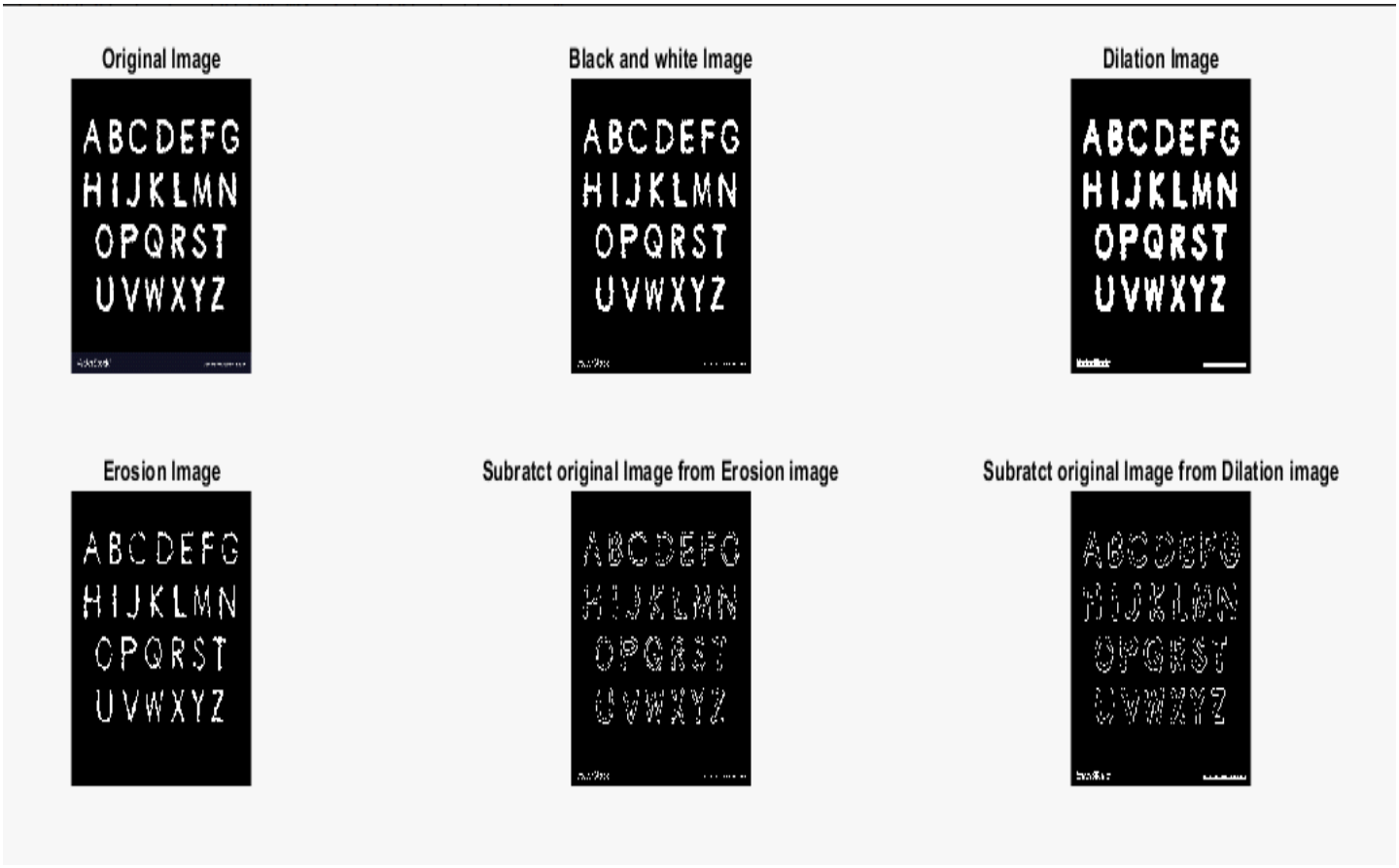
```
eroing=imerode(img1,sc);
eroing=imresize(eroing,[512,512]);
subplot(3,3,4),imshow(eroing),title("Erosion Image");
```

OUTPUT:-




```
% Apply Erosion and Dilation in a black and white image

clc
clear all
img=imread('C:\Users\CL224\Desktop\prachi\alphabet.png');
img=imresize(img,[512,512]);
subplot(3,3,1),imshow(img),title("Original Image");

img1=im2bw(img);
subplot(3,3,2),imshow(img1),title("Black and white Image");
sc=strel('square',4);
dilimg=imdilate(img1,sc);
subplot(3,3,3),imshow(dilimg),title("Dilation Image");

eroing=imerode(img1,sc);
eroing=imresize(eroing,[512,512]);
subplot(3,3,4),imshow(eroing),title("Erosion Image");

ebound=imsubtract(img1,eroing);
subplot(3,3,5),imshow(ebound),title("Subratct original Image from Erosion image");
dbound=imsubtract(dilimg,img1);
subplot(3,3,6),imshow(dbound),title("Subratct original Image from Dilation image");
```

OUTPUT:-

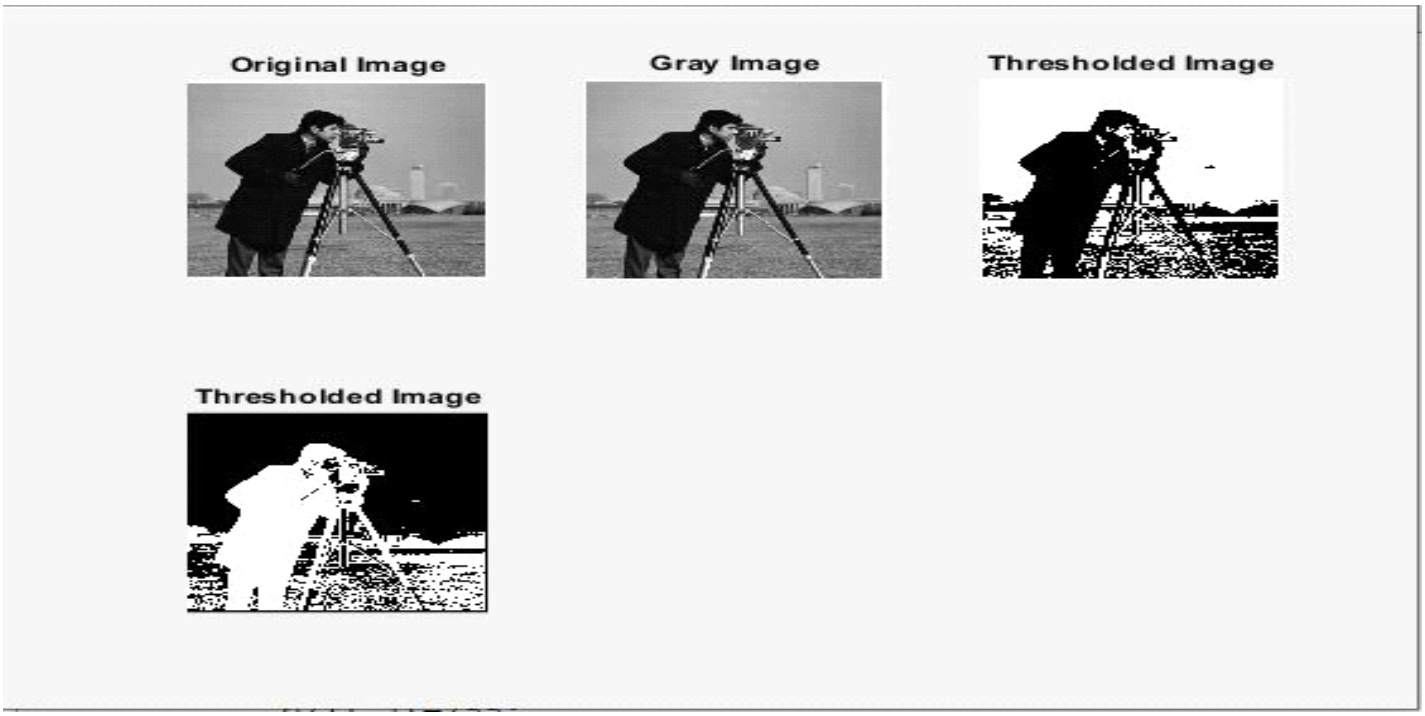


Experiment 9:- Image Segmentation using Thresholding Function *(Simple, Multiple, Adaptive and Optimal Thresholding).*

```
% Image Segmentation using Thresholding Function.....

clc
clear all
A = imread('jupiter.jpg');
subplot(2,3,1),imshow(A),title('Original Image');
img2 = rgb2gray(A);
subplot(2,3,2),imshow(img2),title('Gray Image');
threshold = 128;
[r c] = size(img2);
for i=1:r
    for j=1:c
        if img2(i,j) <= threshold
            b(i,j)=0;

        else
            b(i,j)=255;
```

```
        end
    end
end
subplot(2,3,3),imshow(b),title('Thresholded Image');
for i=1:r
    for j=1:c
        if img2(i,j) <= threshold
            b2(i,j)=255;

        else
            b2(i,j)=0;
        end
    end
end
subplot(2,3,4),imshow(b2),title('Thresholded Image');
```

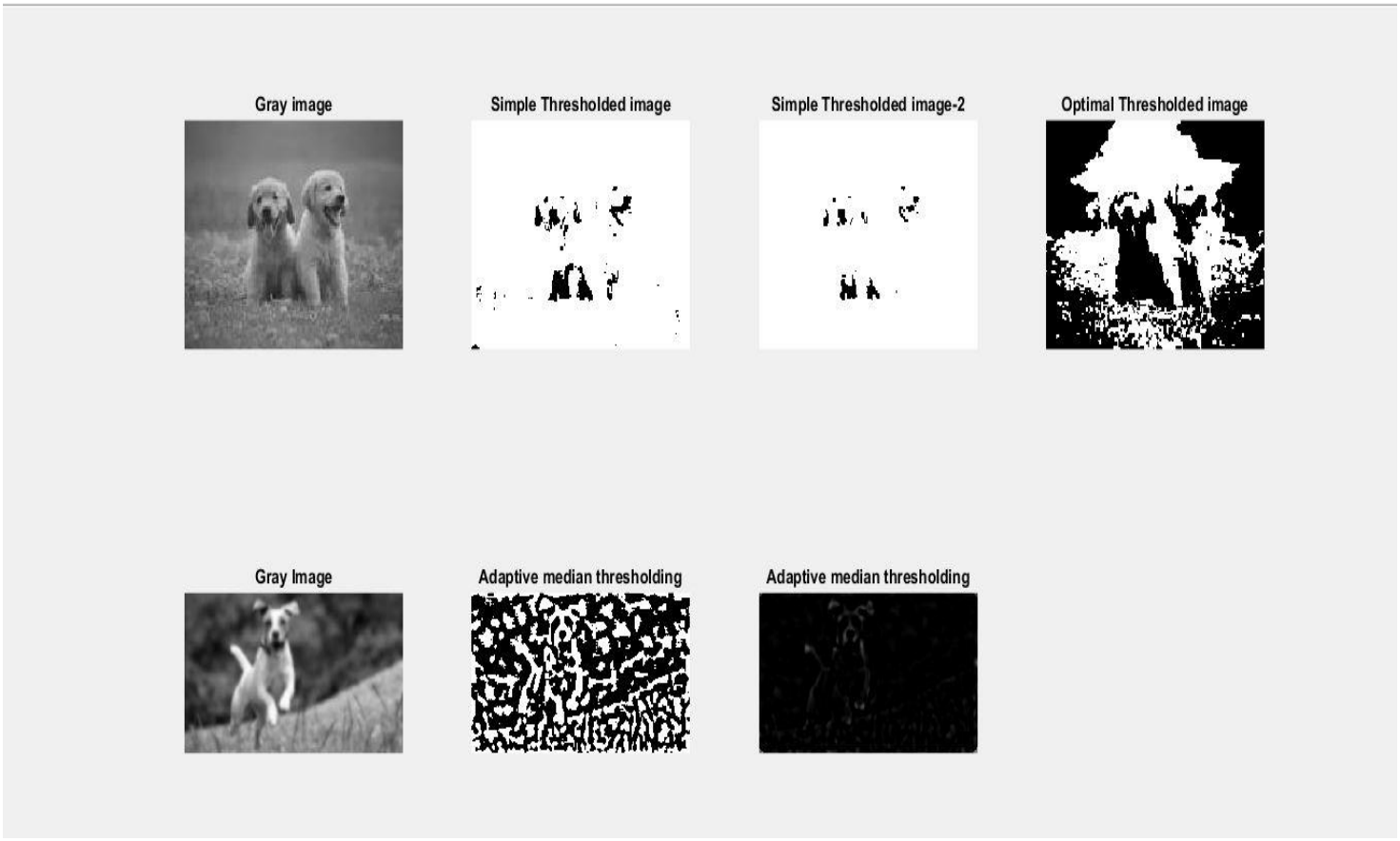
Output:-




```
% Image Segmentation using Thresholding Function


clc
clear all
a = imread('C:\Users\glau\Documents\radhika\dog.jpg');    %Gray Image
g = rgb2gray(a)
%figure, imshow(g),title('Gray Image');
th = 0.3;
thimg = im2bw(g,th); %Simple Thresholding Method 1
%figure, imshow(thimg),title('Simple Thresholded image');


%figure, imshow(g > 50),title('Simple Thresholded image-2'); %Method 2
```

```
%Optimal Threshholding
opt = graythresh(g);
optimg = im2bw(g,opt);
%figure,imshow(optimg),title('Optimal Threholded image');

%Multiple Threshholding
%mul = multithresh(0.3:0.6);
%mulImg = im2bw(g,mul);

%Adaptive Threshholding
%Here we compute mean and median with any user defined constant value
b = imread('C:\Users\glau\Documents\radhika\blurred.jpg');
b0 = rgb2gray(b);
b1 = medfilt2(b0,[20,20]);
ad = b1 + 2;
thresh = b0 - ad;
%imshow(thresh>0);


subplot(2,4,1),imshow(g),title('Gray image');
subplot(2,4,2),imshow(thimg),title('Simple Thresholded image');
subplot(2,4,3),imshow(g > 60),title('Simple Thresholded image-2');
subplot(2,4,4),imshow(optimg),title('Optimal Thresholded image');
%subplot(2,3,5),imshow(mulImg), title('Multiple Threshholding');
subplot(2,4,5),imshow(b0),title('Gray Image');
subplot(2,4,6),imshow(thresh > 0),title('Adaptive median thresholding');
subplot(2,4,7),imshow(thresh),title('Adaptive median thresholding');
```

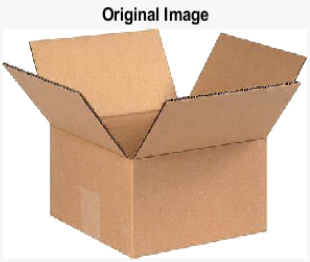
OUTPUT:-

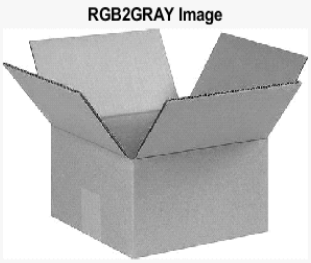


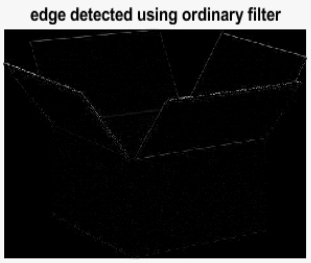
Experiment 10:- Perform the various edge detection operations (ordinary, roberts, prewitts and sobel operators).

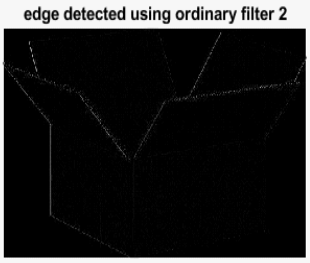
```
% Edge detection using Ordinary operators..


w1=[1 0; -1 0]
w2 = [1 -1; 0 0]
img = imread('C:\Users\GLAU\Pictures\boxes.jpg')
img2=rgb2gray(img);
[r c1]=size(img2);
img2=double(img2);
c=2;
img3=img2;
f=[1 0; -1 0]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:2
            for l=1:2
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j)=sum;
    end
end
subplot(2,3,1),imshow(uint8(img)), title ('Original Image');
subplot(2,3,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,3,3),imshow(uint8(img3)),title ('edge detected using ordinary filter');

img4=img2;
f=[1 -1; 0 0]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:2
            for l=1:2
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img4(i,j)=sum;
    end
end
subplot(2,3,4),imshow(uint8(img4)),title ('edge detected using ordinary filter 2');

img5 = img3+img4;
subplot(2,3,5),imshow(uint8(img5)),title ('Img3 + img4');
```

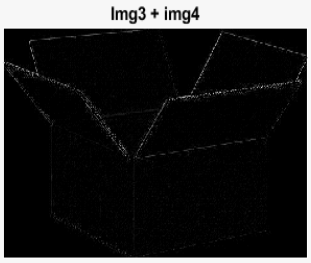
OUTPUT:-











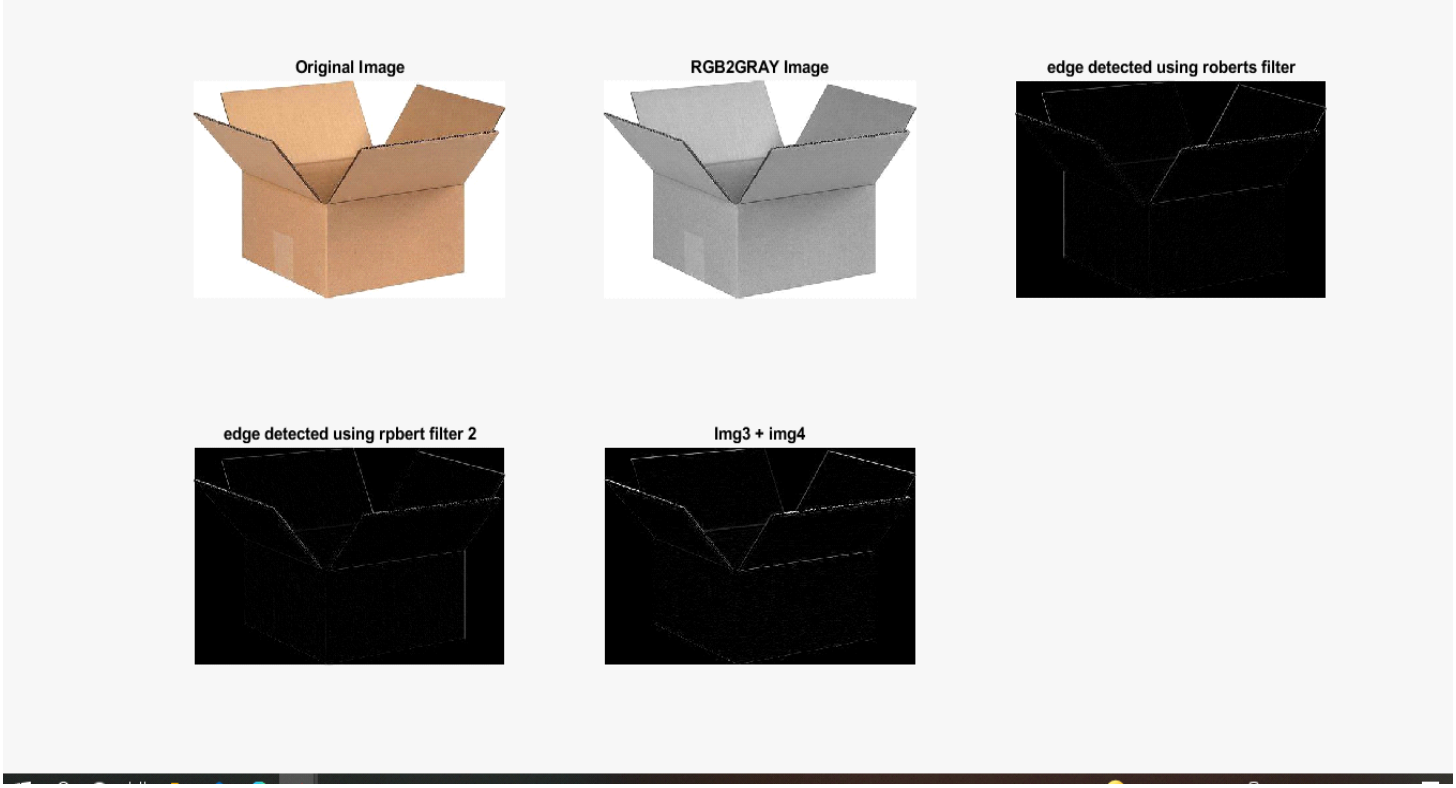
% Edge detection using **Roberts** operators..

w3 = [1 0; 0 -1]
w4 = [0 1; -1 0]

```
img = imread('C:\Users\GLAU\Pictures\boxes.jpg')
img2=rgb2gray(img);
[r c1]=size(img2);
img2=double(img2);
c=2;
img3=img2;
f=[1 0; 0 -1]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:2
            for l=1:2
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j)=sum;
    end
end
```

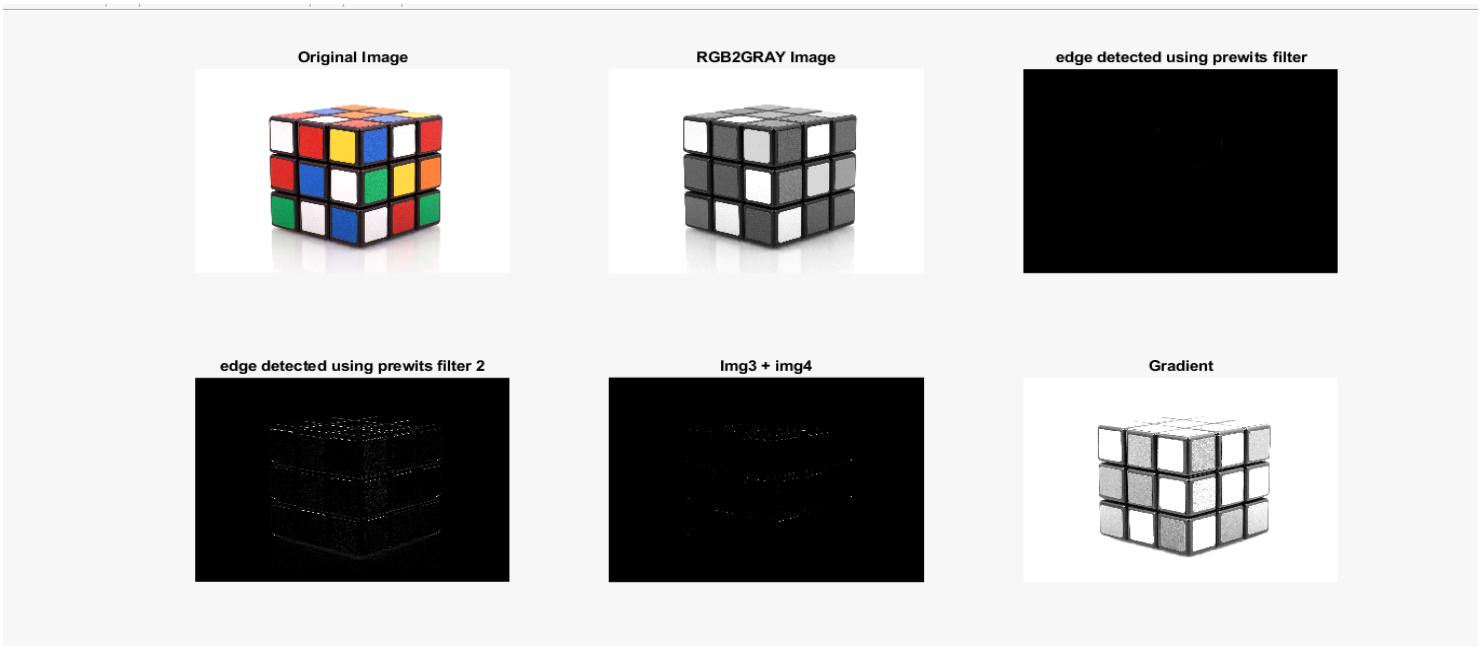
```
subplot(2,3,1),imshow(uint8(img)), title ('Original Image');
subplot(2,3,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,3,3),imshow(uint8(img3)),title ('edge detected using Robert filter');

img4=img2;
f=[0 1; -1 0]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:2
            for l=1:2
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img4(i,j)=sum;
    end
end
subplot(2,3,4),imshow(uint8(img4)),title ('edge detected using robert filter 2');

img5 = img3+img4;
subplot(2,3,5),imshow(uint8(img5)),title ('Img3 + img4');
```

OUTPUT:-



```
% Edge detection using Prewitts operators..

w5 = [-1 0 -1 ; -1 0 1; -1 0 1]
w6 = [-1 -1 -1; 0 0 0; 1 1 1]

img = imread('C:\Users\GLAU\Pictures\cube.jpg');
img2=rgb2gray(img);
[r c1]=size(img2);
img2=double(img2);
c=2;
img3=img2;
f=[-1 0 -1; -1 0 1; -1 0 1];
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:3
            for l=1:3
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j)=sum;
    end
end
subplot(2,3,1),imshow(uint8(img)), title ('Original Image');
subplot(2,3,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,3,3),imshow(uint8(img3)),title ('edge detected using prewits filter');

img4=img2;
f2=[-1 -1 -1; 0 0 0; 1 1 1]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:3
            for l=1:3
                sum=sum+img2(i-2+k,j-2+l)*f2(k,l);
            end
        end
        img4(i,j)=sum;
    end
end
subplot(2,3,4),imshow(uint8(img4)),title ('edge detected using prewits filter 2');

img5 = img3+img4;
subplot(2,3,5),imshow(uint8(img5)),title ('Img3 + img4');

img6 = sqrt(img3.^2+img4.^2);
subplot(2,3,6),imshow(uint8(img6)),title ('Gradient');
```

OUTPUT:-




```
% Edge detection using Sobel operators..

w7 =  [-1 -2 -1; 0 0 0; 1 2 1]
w8 = [-1 0 1; -2 0 2; -1 0 1]

img = imread('C:\Users\GLAU\Pictures\boxes.jpg');
img2=rgb2gray(img);
[r c1]=size(img2);
img2=double(img2);
c=2;
img3=img2;
f=[-1 2 -1; 0 0 0; -1 2 1];
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:3
            for l=1:3
                sum=sum+img2(i-2+k,j-2+l)*f(k,l);
            end
        end
        img3(i,j)=sum;
    end
end
subplot(2,3,1),imshow(uint8(img)), title ('Original Image');
subplot(2,3,2),imshow(uint8(img2)),title ('RGB2GRAY Image');
subplot(2,3,3),imshow(uint8(img3)),title ('edge detected using sobel filter');

img4=img2;
f2=[-1 0 1; -2 0 2; -1 0 1]
for i=2:r-1
    for j=2:c1-1
        sum=0;
        for k=1:3
            for l=1:3
                sum=sum+img2(i-2+k,j-2+l)*f2(k,l);
            end
```

```
        end
        img4(i,j)=sum;
    end
end
subplot(2,3,4),imshow(uint8(img4)),title ('edge detected using sobel filter 2');

img5 = img3+img4;
subplot(2,3,5),imshow(uint8(img5)),title ('Img3 + img4');

img6 = sqrt(img3.^2+img4.^2);
subplot(2,3,6),imshow(uint8(img6)),title ('Gradient');
```

OUTPUT:-