1. Aim: - Image Processing Basics

1. Program to calculate number of samples required for an image

CODE:

```
// Program to calculate the number of samples required for an image
figure  m = 4;
n = 6;
N = 400;
% Calculate the total number of samples required
Fs = m * N * n * N;
disp(['Number of samples required to preserve the information in the image = ', num2str(Fs)]);
```

Output

```
--> exec('D:\MScIT 2021-2023\SEM 2\IMAGE PROCESSING\P1.sce', -1)

Number of samples required to preserve the information in the image=

  3840000.
```

2. Image Properties

➢ Program to access image properties Dimension, height, width, number of channels, accessing and modifying any pixel

CODE:

```
figure;
i=imread("C:\ProgramFiles\scilab6.0.1\IPCV\images\lena.png");
s=size(i);
disp(s,"Dimensions");  disp(s(1),"height");
disp(s(2),"width");
disp(s(3),"No. of Channels");
disp(i(100,100,3));
i(100,100,3)=1;
disp(i(100,100,3));
```

OUTPUT:

```
--> exec('D:\MScIT 2021-2023\SEM 2\IMAGE PROCESSING\PRACTICAL\IPP12.sce', -1)
 Dimensions
   512.   512.   3.
 height
   512.
 width
   512.
 No. of Channels
   3.
  79
  1
```

3. Sampling
   - ➢ Program to study the effects of reducing the spatial resolution of a digital image

Code

```
figure;
i=imread("C:\ProgramFiles\scilab-6.0.1\IPCV\images\Lena_dark.png");
disp("sizeoforiginalimage",size(i));
 subplot(3,3,1) imshow(i);
title('OriginalImage')
j1=imresize(i,0.8);
disp("sizeofresizedImage",size(j1)); subplot(3,3,2)
imshow(j1);
title('resizedimage0.8')
j2=imresize(i,0.5);
disp("sizeofresizedImage",size(j2)); subplot(3,3,3)
imshow(j2);
title('resizedimage0.5')
```

OUTPUT

4. Quantization
   - ➢ Program to study the effects of varying the number of intensity levels in a digital image

Code

- ➢ // Program to study the effects of varying the number of intensity levels in a digital image

```
figure;
i=imread('C:\ProgramFiles\scilab6.0.1\IPCV\images\Lena_dark.png');
subplot(2,2,1);
imshow(i);
title('originalimage')
i=double(i); k1=(i*255)/64;
subplot(2,2,2); k1=uint8(k1);
imshow(uint8(k1));
title('Quantization64');
k2=(i*255)/32;
subplot(2,2,3); k2=uint8(k2);
imshow(uint8(k2));
title('Quantization32');
k3=(i*255)/16;
subplot(2,2,4);
k3=uint8(k3);
imshow(uint8(k3));
title('Quantization16');
```

OUTPUT

5. Image Addition
   - ➢ Program to perform image addition for noise reduction.

   Code

```
//Program to perform image addition for noise reduction.
figure;
i=imread('C:\ProgramFiles\scilab-6.0.1\IPCV\images\noise.jpeg');
i=imnoise(i,'salt&pepper',0.001);
subplot(1,2,1); imshow(i);
title('noisyImage');
k=imadd(i,50);//I+30
subplot(1,2,2); imshow(k);
title('Smooth Image after performing image addition');
```

   OUTPUT

6. Image Subtraction
   - ➢ Program to compare images using subtraction for enhancing the difference between image

Code

```
// Program to compare images using subtraction for enhancing the difference between
image
figure;

i=imread('C:\ProgramFiles\scilab-6.0.1\IPCV\images\tool1.jpeg');
j=imread('C:\ProgramFiles\scilab6.0.1\IPCV\images\tool2.jpeg');
subplot(2,2,1);
imshow(i); title('Image1');
subplot(2,2,2); imshow(j);
title('Image2');
k=imabsdiff(i,j);
subplot(2,2,3); imshow(k);
title('Image3=Image1-Image2');
```

output

Graphic window number 1

Image 1

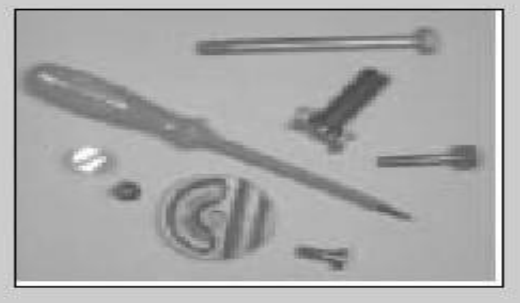


Image 2

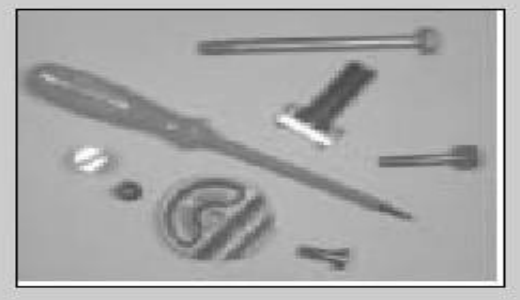


Image 3 = Image 1 - Image 2

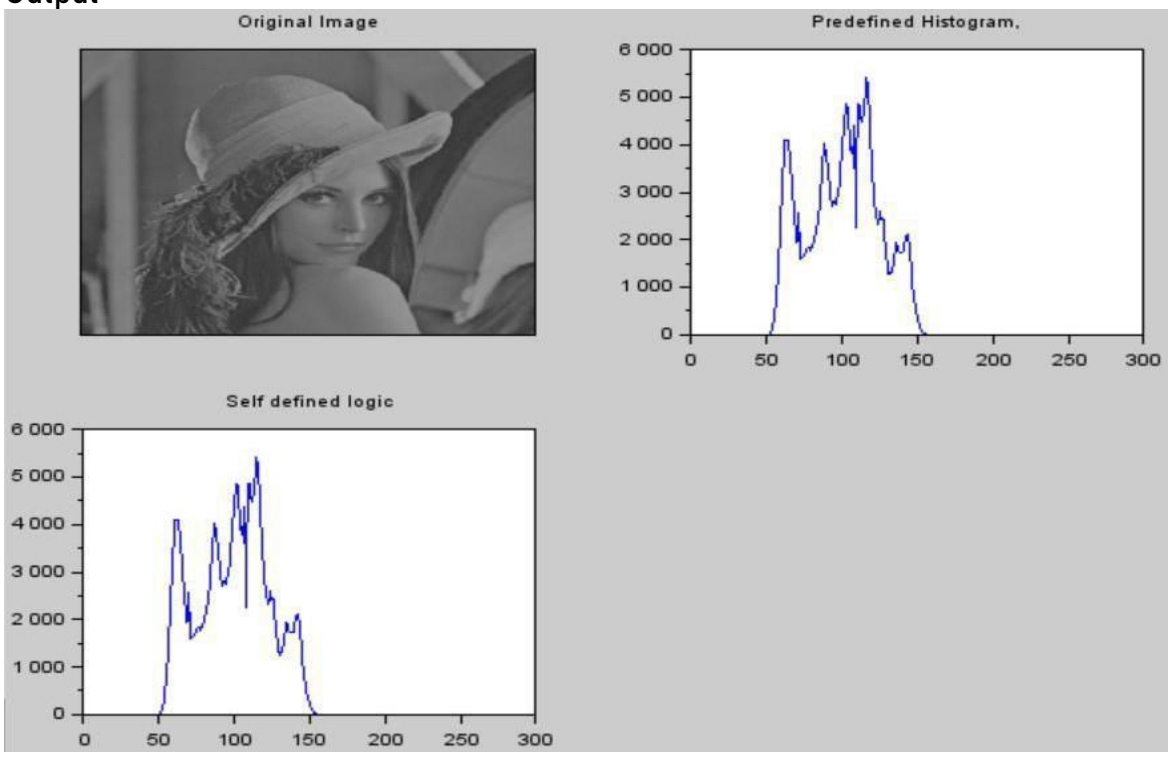
2. Aim: Histogram Processing

   a. Program to Plot Histogram of an Image

Code: -

```
Figure;
Img=imread("C:\Program Files\scilab-6.0.2\IPCV\images\Lena_dark.png") Subplot(2,2,1)
Title('OriginalImage')
Imshow(img) H1=imhist(img);
Subplot(2,2,2);
Plot(h1) Title('PredefinedHistogram,'); [r,c]=size(img);
H=zeros(1,256); S=0:255 Fori=1:r
Forj=1:c If(img(I,j)==0) Img(I,j)=1 End
K=img(I,j);
H(k)=h(k)+1;
End End
Subplot(2,2,3); Plot(h);
Title('Self defined logic');
```

Output

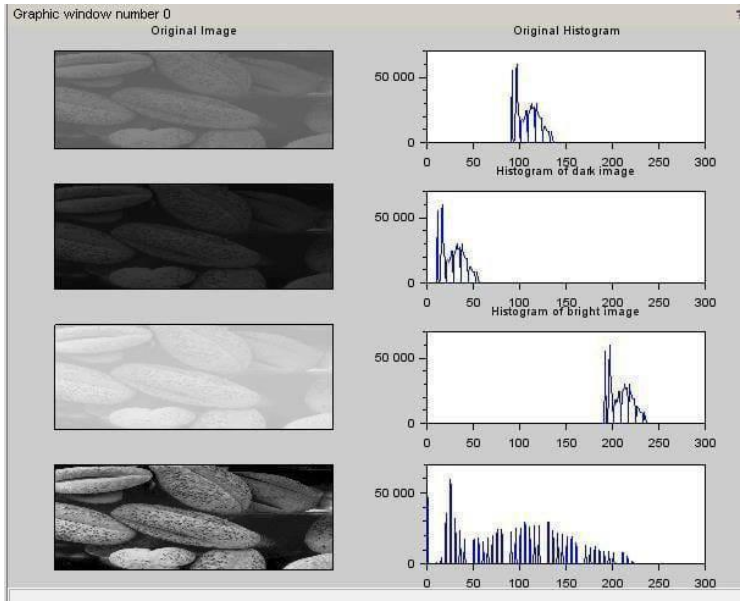


b. Plot Histogram of Low Contrast, Bright, dark and High Contrast Images

Code :

```
Clear all;

Img=imread("C:\Program     Files\scilab-6.0.2\IPCV\images\seed.tif") Subplot(4,2,1)

Title('Original Image')

Imshow(img)


H1=imhist(img);

Subplot(4,2,2); Plot(h1)

Title('OriginalHistogram');


Darkimg=img

Darkimg=darkimg-80

Subplot(4,2,3)

Imshow(darkimg)

H2=imhist(darkimg)

Subplot(4,2,4) Plot(h2)

Title("Histogram of dark image")


Brightimg=img Brightimg=brightimg+100 Subplot(4,2,5) Imshow(brightimg)
H3=imhist(brightimg) Subplot(4,2,6)

Plot(h3)

Title("Histogram ofbrightimage")


A=imread("C:\Program Files\scilab-6.0.1\IPCV\images\seed.tif"); Mmin=min(a( );
Mmax=max(a( );

Lmin=0; Lmax=255;


A1=(a-mmin)*(lmax-lmin)/(mmax-mmin)+lmin; Subplot(4,2,7)
```

Imshow(a1) H5=imhist(a1) Subplot(4,2,8) Plot(h5)



3. Aim: - Image Sharpening in Spatial Domain

   First Order Derivative Filter

Code: figure;
p=imread('C:\Program Files\scilab-6.0.1\IPCV\images\morpex.png');subplot(3,2,1);
imshow(p);
title('OriginalImage'); d=double(p);

v=[10-1;20-2;10-1];//x-direction h=[-1-2-
1;000;121];//y-direction [r1,c1]=size(p);

For i=2:1:r1-1 For j=2:1:c1-1
newv(i,j)=(v(1)*d(i-1,j-1)+(v(2)*d(i-1,j)+(v(3)*d(i-1,j+1)+(v(4)*d(i,j-
1)+(v(5)*d(i,j)+(v(6)*d(i,j+1)+(v(7)*d(i+1,j- 1)+(v(8)*d(i+1,j)+(v(9)*d(i+1,j+1); end
end subplot(3,2,2);
imshow(uint8(newv);
title("Image after applying vertical sobel operator");

for i=2:1:r1-1 for j=2:1:c1-1
newh(i,j)=(h(1)*d(i-1,j-1)+(h(2)*d(i-1,j)+(h(3)*d(i-1,j+1)+(h(4)*d(i,j-
1)+(h(5)*d(i,j)+(h(6)*d(i,j+1)+(h(7)*d(i+1,j- 1)+(h(8)*d(i+1,j)+(h(9)*d(i+1,j+1); end
end subplot(3,2,3);
imshow(uint8(newh);
title("Image after applying horizontal sobel operator");

v1=[-101;-202;-101];
h1=[121;000;-1-2-1];
[r1,c1]=size(p); For i=2:1:r1-1 For
j=2:1:c1-1
newv1(i,j)=(v1(1)*d(i-1,j-1)+(v1(2)*d(i-1,j)+(v1(3)*d(i-1,j+1)+(v1(4)*d(i,j-
1)+(v1(5)*d(i,j)+(v1(6)*d(i,j+1)+(v1(7)*d(i+1,j-1)+(v1(8)*d(i+1,j)+(v1(9)*d(i+1,j+1);
end end
subplot(3,2,4); imshow(uint8(newv1);
title("Image after applying vertical sobel operator rotated 180 degree"); for

i=2:1:r1-1

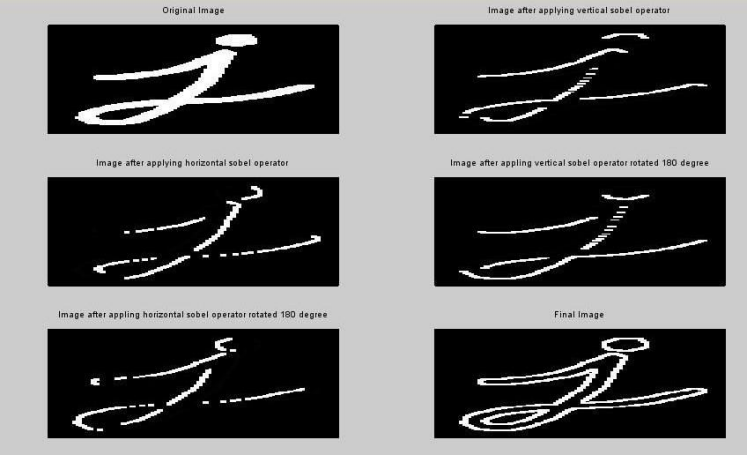
for j=2:1:c1-1

newh1(i,j)=(h1(1)*d(i-1,j-1)+(h1(2)*d(i-1,j)+(h1(3)*d(i-1,j+1)+(h1(4)*d(i,j-

1)+(h1(5)*d(i,j)+(h1(6)*d(i,j+1)+(h1(7)*d(i+1,j-1)+(h1(8)*d(i+1,j)+(h1(9)*d(i+1,j+1);
end end

```
subplot(3,2,5); imshow(uint8(newh1);
title("Image after applying horizontal sobel operator rotated 180 degree");
finalimg=uint8(newv)|uint8(newh)|uint8(newv1)|uint8(newh1); subplot(3,2,6);
imshow(finalimg); title("Final Image");
```

output



4. Second Order Derivative – Laplacian Filter

Code:
```
figure;
p=imread('C:\Program Files\scilab-6.0.1\IPCV\images\morpex.png'); subplot(3,2,1);
imshow(p); title('OriginalImage');
d=double(p); m=[010;1-41;010];
[r1,c1]=size(p); For i=2:1:r1-1 for
j=2:1:c1-1
newl4(i,j)=(m(1)*d(i-1,j-1)+(m(2)*d(i-1,j)+(m(3)*d(i-1,j+1)+(m(4)*d(i,j-
1)+(m(5)*d(i,j)+(m(6)*d(i,j+1)+(m(7)*d(i+1,j-      1)+(m(8)*d(i+1,j)+(m(9)*d(i+1,j+1); end end
subplot(1,2,2); imshow(uint8(newl4);
title("Image after Laplacian Filtering");
```