

## LAB 12

### AIM: Performing Image Segmentation

1. Apply laplacian mask  $\begin{bmatrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{bmatrix}$  to the 'wirebond.tif' image and get the following images. (use conv2 and imfilter to filter the images and see the difference).

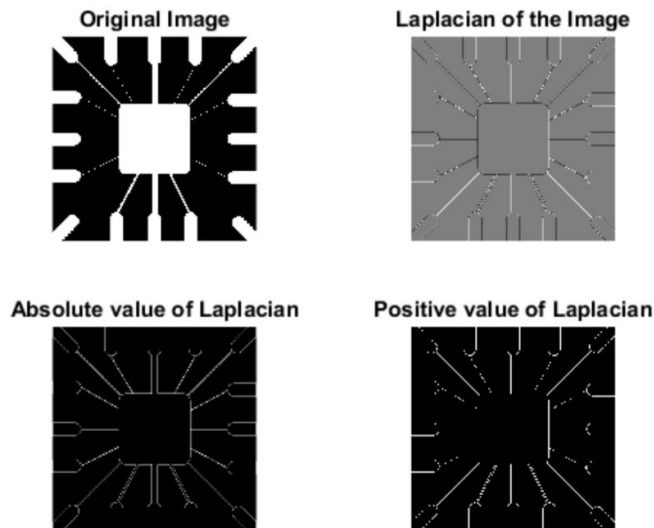
- Laplacian of the image.
- Absolute value of the laplacian.
- Positive values of the laplacian.

```
org=imread('wirebond.tif');
subplot(2,2,1);
imshow(org);
title('Original Image');
img=double(org);
mask=[-1 -1 -1;-1 8 -1; -1 -1 -1];

applying=conv2(img,mask,'same');
subplot(2,2,2);
imshow(applying,[]);
title('Laplacian of the Image');

absolute=abs(applying);
subplot(2,2,3);
imshow(absolute,[]);
title('Absolute value of Laplacian');

positive=uint8(applying);
subplot(2,2,4);
imshow(positive,[]);
title('Positive value of Laplacian');
```



2. Apply gradient filter (Sobel filter) to the image 'building.tif' and output
  - a. Gradient in x direction
  - b. Gradient in y direction
  - c. Absolute Gradient given by

$$M(x, y) \approx |g_x| + |g_y|$$

```
org=imread('building.tif');
subplot(2,2,1);
imshow(org);
title('Original Image');

x=[-1 -2 -1;0 0 0;1 2 1];
y=[-1 0 1;-2 0 2; -1 0 1];

xdir=conv2(x,im2double(org),'full');
ydir=conv2(y,im2double(org),'full');

subplot(2,2,2);
imshow(xdir);
title('Gradient in x direction');

subplot(2,2,3);
imshow(ydir);
title('Gradient in y direction');

M=sqrt((xdir.*xdir)+(ydir.*ydir));
subplot(2,2,4);
imshow(M);
title('Magnitude of Gradient');
```

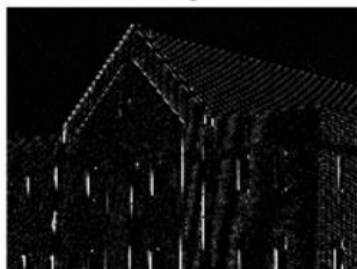
**Original Image**



**Gradient in x direction**



**Gradient in y direction**



**Magnitude of Gradient**



3. Implement Otsu's Method to segment 'balloons.jpg' and compare your result with the in-built function *graythresh(Image)*. If both implementations give same result 'ThumbsUp.jpg' should be displayed otherwise 'ThumbsDown.jpg' should be displayed. Eventually output should be

```
org=imread('balloons.jpg');
gray=rgb2gray(org);
subplot(2,2,1);
imshow(gray);
title('Original Image');

n=imhist(gray);
N=sum(n);
max=0;
level1=0;

for i=1:256
    p(i)=n(i)/N;
end

for t=2:256
    p0=sum(p(1:t))
    p1=sum(p(t+1:256))
    m0=dot((0:t-1),p(1:t))/p0;
    m1=dot((t:255),p(t+1:256))/p1;
    temp=p0*p1*((m0+m1)^2);
    if(temp>max)
        max=temp;
        level1=t-1;
    end
end

img=im2bw(gray,level1/255);
subplot(2,2,2);
imshow(img);
L=graythresh(gray);
img1=im2bw(img,L);
subplot(2,2,3);
imshow(img1);
if(img==img1)
    final=imread('ThumbsUp.jpg');
else
    final=imread('ThumbsDown.jpg');
end
subplot(2,2,4);
imshow(final);
```

Original Image

