

## Edge Detection

Edge detection is basically a method of segmenting an image into regions based on discontinuity, i.e. it allows the user to observe those features of an image where there is a more or less abrupt change in grey level or texture, indicating the end of one region in the image and the beginning of another.

Matlab includes the built-in function `edge` designed for edge detection.

**BW = edge (I, Method)**

**I**: input Image

**BW**: output image

**Method (edge detectors)** : {sobel,prewitt,Roberts}.

$z_1$	$z_2$	$z_3$
$z_4$	$z_5$	$z_6$
$z_7$	$z_8$	$z_9$

Image neighborhood

-1	-2	-1
0	0	0
1	2	1

$$G_x = (z_7 + 2z_8 + z_9) - (z_1 + 2z_2 + z_3)$$

-1	0	1
-2	0	2
-1	0	1

$$G_y = (z_3 + 2z_6 + z_9) - (z_1 + 2z_4 + z_7)$$

Sobel

-1	-1	-1
0	0	0
1	1	1

$$G_x = (z_7 + z_8 + z_9) - (z_1 + z_2 + z_3)$$

-1	0	1
-1	0	1
-1	0	1

$$G_y = (z_3 + z_6 + z_9) - (z_1 + z_4 + z_7)$$

Prewitt

-1	0
0	1

$$G_x = z_9 - z_5$$

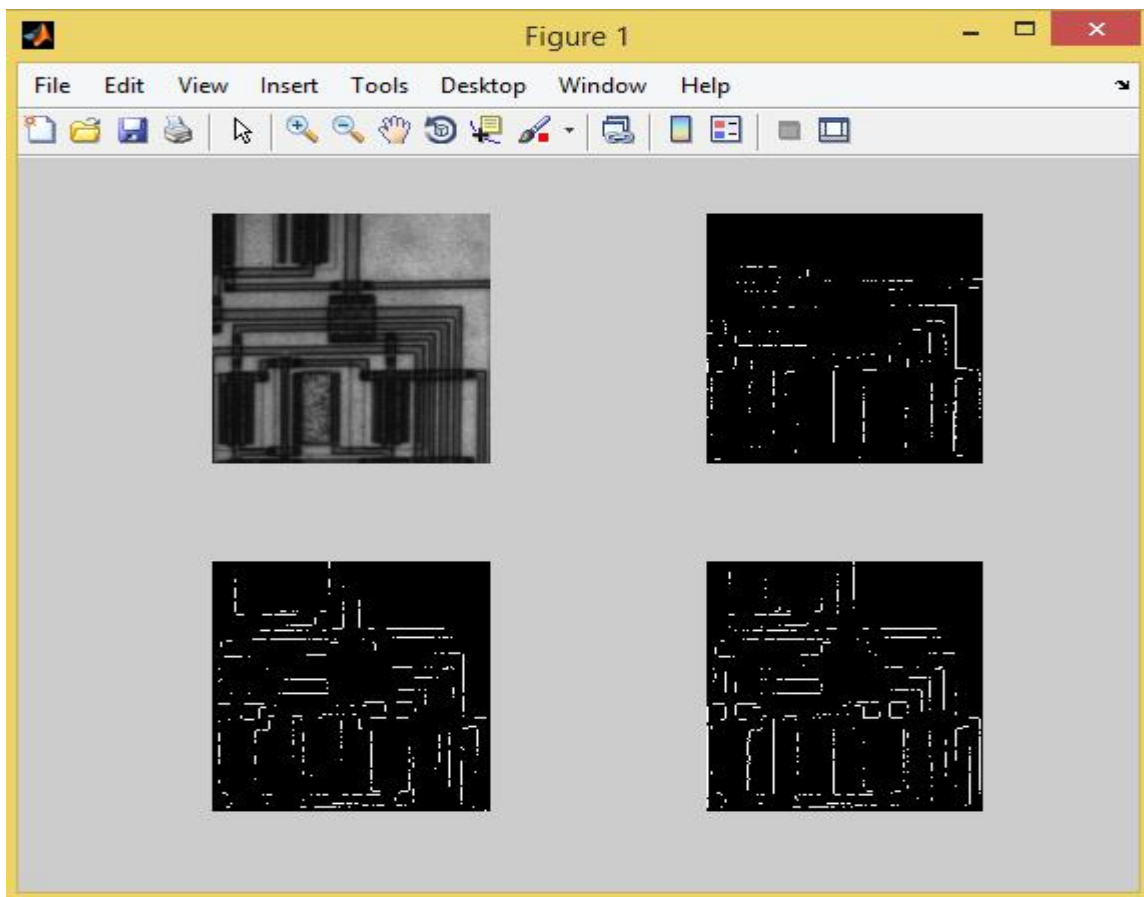
0	-1
1	0

$$G_y = z_8 - z_6$$

Roberts

**EX 1:**

```
I=imread('circuit.tif'); %Read in image
IE1 =edge(I,'roberts'); %Roberts edges
IE2 =edge(I,'prewitt'); %Prewitt edges
IE3 =edge(I,'sobel'); %Sobel edges
subplot(2,2,1), imshow(I); %Display image
subplot(2,2,2), imshow(IE1); %Display image
subplot(2,2,3), imshow(IE2); %Display image
subplot(2,2,4), imshow(IE3); %Display image
```



**EX 2:**

```
I=imread('football.jpg'); %Read in image
I=rgb2gray (I);
IE1 =edge(I,'roberts'); %Roberts edges
IE2 =edge(I,'prewitt'); %Prewitt edges
IE3 =edge(I,'sobel'); %Sobel edges
subplot(2,2,1), imshow(I); %Display image
subplot(2,2,2), imshow(IE1); %Display image
subplot(2,2,3), imshow(IE2); %Display image
```

