

Apply Roberts, Sobel and Prewitt operators on pixel (1,1) in the following image:

50	50	100	100
50	50	100	100
50	50	100	100
50	50	100	100

1) Roberts Operator

$$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$50 \times (-1) + 100 \times 1$$

$$= 50$$

2) Sobel Operator

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

$$= 50 \times (-1) + 50 \times (-2) + 100 \times (-1) + 50 \times (1) + 50 \times (2) + 100 \times (1)$$

$$= 0$$

3) Prewitt Operator

50	50	100	100
50	50	100	100
50	50	100	100
50	50	100	100

+1	-1	-1
0	0	0
1	1	1

$$= -1 (50 + 50 + 100) + 1 (50 + 50 + 100) = 0$$