

Sobel Filter

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How they work

The Sobel operator uses kernel convolution over an image, and it uses kernels, which are:

- A kernel to approximate intensity changes in the x-direction (horizontal)
- A kernel to approximate intensity changes at a pixel in the y-direction (vertical).

After it finishes getting all the values of the pixels after being convolved with these kernels, it sums them up by bringing the magnitude of both gradients (the result of the previous convolution), and it gets the angle of the edge by taking the inverse tan of the gradients. Here are the two special kernels used in the Sobel algorithm

x-direction kernel		
-1	0	1
-2	0	2
-1	0	1

y-direction kernel		
-1	-2	-1
0	0	0
1	2	1

Figure 1 Sobel X and Y Kernels

What it is Used for and Examples

The Sobel operator is used in image processing to detect edges in many applications. Here is an example of it:



Figure 2 Sobel Operator Example

Python Code

```
import cv2
img = cv2.imread('type you images path here / image.jpg')
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
x = cv2.Sobel(gray, ddepth, 1,0, ksize=3, scale=1)
y = cv2.Sobel(gray, ddepth, 0,1, ksize=3, scale=1)
absx= cv2.convertScaleAbs(x)
absy = cv2.convertScaleAbs(y)
edge = cv2.addWeighted(absx, 0.5, absy, 0.5,0)
cv2.imshow('edge', edge)
cv2.waitKey(0)
cv2.destroyAllWindows()
```