

Computer Vision Homework #9

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Original



Result

Roberts (Threshold = 12)	Prewitt (Threshold = 24)	Sobel (Threshold = 38)
The image shows the edge detection result using the Roberts operator with a threshold of 12. The edges are thin and sparse, capturing only the most prominent features of the original image.	The image shows the edge detection result using the Prewitt operator with a threshold of 24. The edges are more numerous and thicker than in the Roberts result, capturing more detail.	The image shows the edge detection result using the Sobel operator with a threshold of 38. The edges are the most prominent and thickest, capturing the most significant features of the original image.

Frei and Chen (Threshold = 30)	Kirsch (Threshold = 135)	Robinson (Threshold = 43)
		

Nevatia Babu (Threshold = 12500)


Implementation

- **Border Padding**

- To handle the border condition, I write a function `Border_padding(img, size)` to return a padded version of the input image. The padding method is the same as

169	169	146
169	169	146
104	104	104

The padding size depends on the filter size of different

operators.

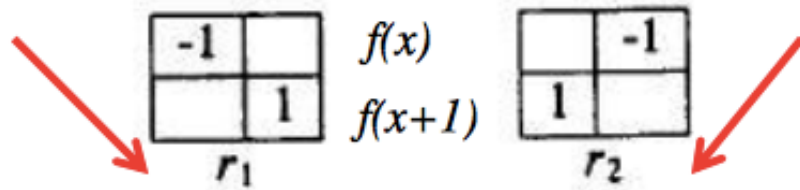
- **Edge Detection Operator**

All the operators follow the same processing steps

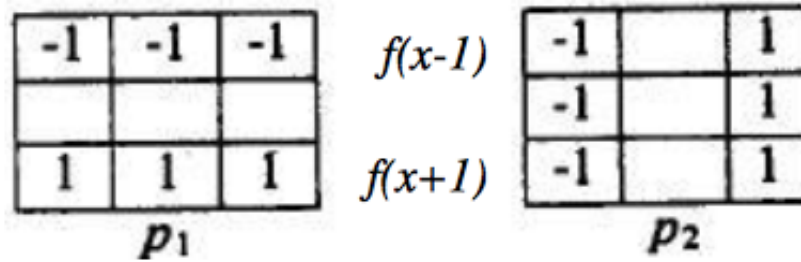
1. Create corresponding filter
2. Border padding according to filter size
3. Convolutionally traverse through each pixel

4. Compute gradient magnitude or select the maximum value
5. Compare the result with threshold and write the value to a new image

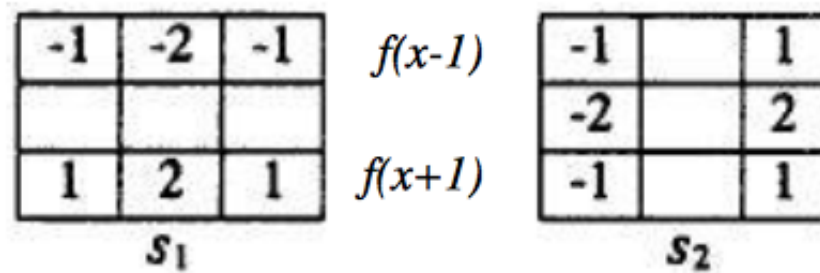
- Roberts



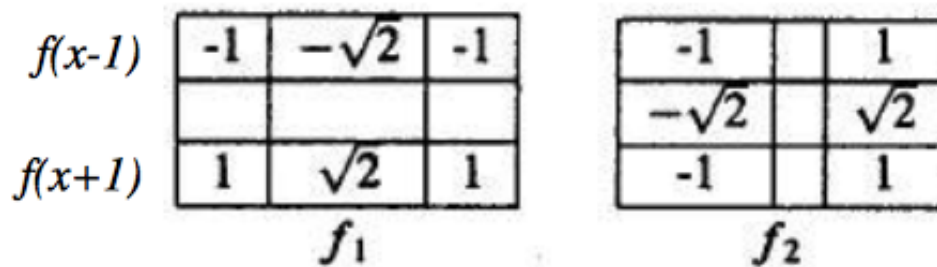
- Prewitt



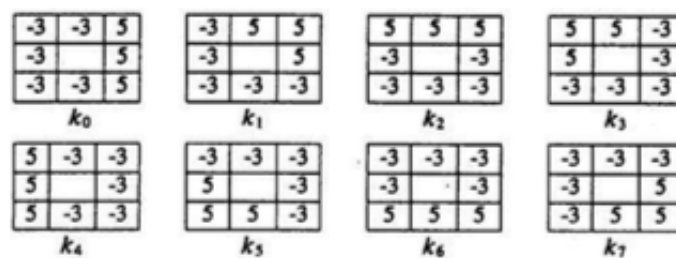
- Sobel



- Frei and Chen



- Kirsch



- Robinson

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- Nevatia Babu

100	100	100	100	100
100	100	100	100	100
0	0	0	0	0
-100	-100	-100	-100	-100
-100	-100	-100	-100	-100
0°				

100	100	100	100	100
100	100	100	78	-32
100	92	0	-92	-100
32	-78	-100	-100	-100
-100	-100	-100	-100	-100
30°				

100	100	100	32	-100
100	100	92	-78	-100
100	100	0	-100	-100
100	78	-92	-100	-100
100	-32	-100	-100	-100
60°				

-100	-100	0	100	100
-100	-100	0	100	100
-100	-100	0	100	100
-100	-100	0	100	100
-100	-100	0	100	100
-90°				

-100	32	100	100	100
-100	-78	92	100	100
-100	-100	0	100	100
-100	-100	-92	78	100
-100	-100	-100	-32	100
-60°				

100	100	100	100	100
-32	78	100	100	100
-100	-92	0	92	100
-100	-100	-100	-78	32
-100	-100	-100	-100	-100
-30°				