Lecture 6 Edge Detection

COMP3204 & COMP6223 Computer Vision

What are edges and how do we find them?

Book pp 140 - 153

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(a) original image

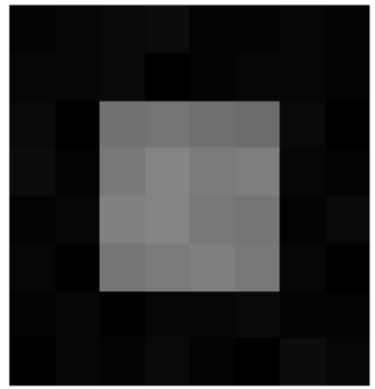
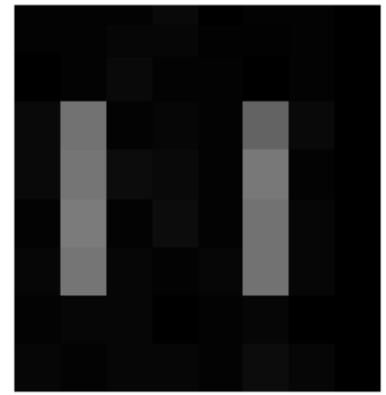
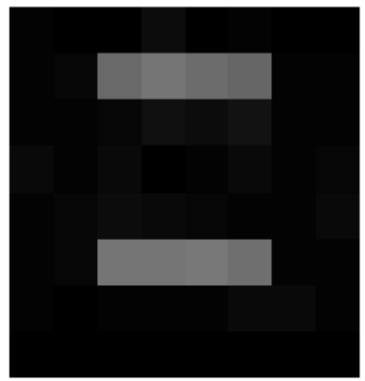
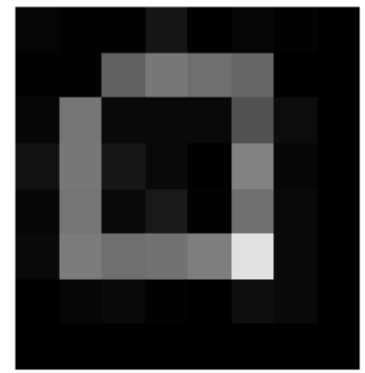
(b) Sobel edge magnitude

(c) thresholded magnitude

Applying the Sobel Operator

U2’s Edge can’t detect edges

http://metro.co.uk/2015/05/15/the-edge-falls-off-the-edge-of-the-stage-in-spectacular-style-during-u2s-world-tour-5199503/

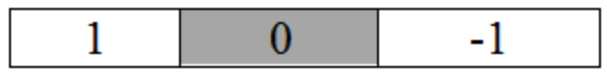
 (a) original image	 (b) vertical edges
 (c) horizontal edges,	 (d) all edges
First Order Edge Detection	

2	-1
-1	0

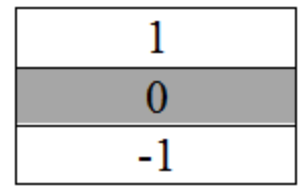
Template for First Order Difference

```
edge(pic) := | newpic ← zero(pic)
             | for x ∈ 0 .. cols(pic) - 2
             |   for y ∈ 0 .. rows(pic) - 2
             |     newpic_{y,x} ← |2·pic_{y,x} - pic_{y,x+1} - pic_{y+1,x}|
             | newpic
```

First Order Edge Detection

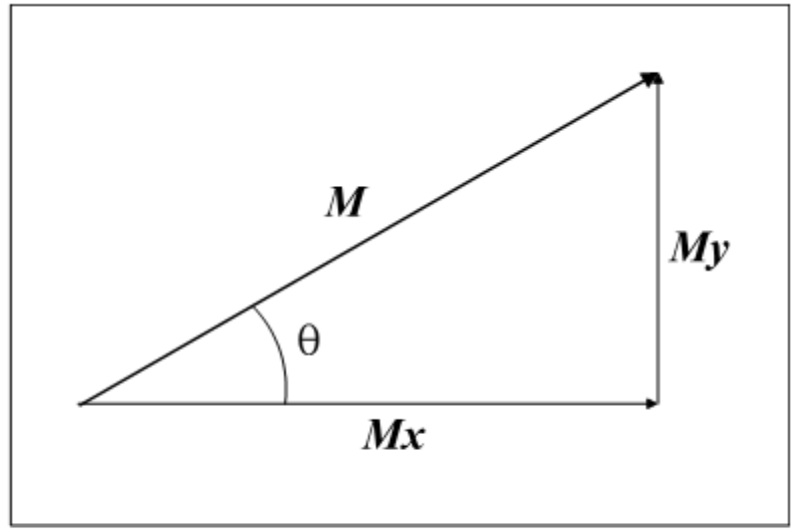


(a) *Mx*



(b) *My*

Templates for Improved First Order Difference



Edge Detection in Vectorial Format

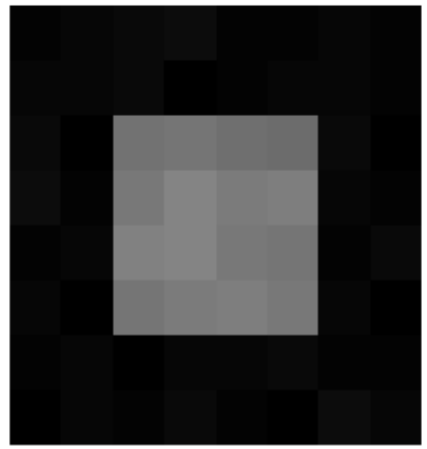
1	0	-1
1	0	-1
1	0	-1

(a) *Mx*

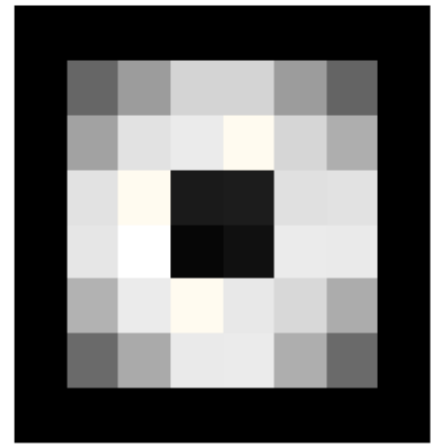
1	1	1
0	0	0
-1	-1	-1

(b) *My*

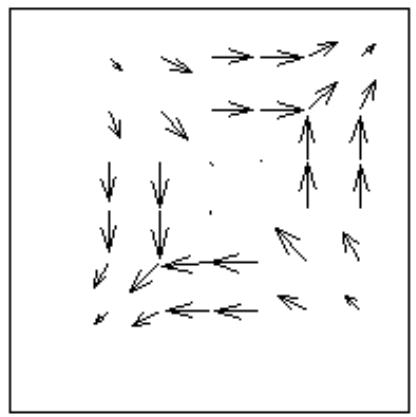
Templates for Prewitt Operator



(a) original image



(b) edge magnitude



$prewitt\_vec_{0,1}, prewitt\_vec_{0,0}$

(c) vector format

$$dir = \begin{bmatrix} 313 & 331 & 3 & 3 & 24 & 47 \\ 298 & 315 & 1 & 2 & 42 & 63 \\ 273 & 276 & 13 & 43 & 88 & 88 \\ 269 & 268 & 199 & 117 & 91 & 92 \\ 242 & 225 & 181 & 178 & 133 & 116 \\ 225 & 210 & 183 & 179 & 155 & 132 \end{bmatrix}$$

(d) edge direction

Applying the Prewitt Operator

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

(a) *Mx*

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

(b) *My*

Templates for Sobel Operator

(a) original image

(b) Sobel edge magnitude

(c) thresholded magnitude

Applying the Sobel Operator

COURSEWORK!!!!