



deeplearning.ai

# Convolutional Neural Networks

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More edge  
detection


# Vertical edge detection examples

10	10	10	0	0	0
10	10	10	0	0	0
10	10	10	0	0	0
10	10	10	0	0	0
10	10	10	0	0	0
10	10	10	0	0	0




\*

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



=

0	30	30	0
0	30	30	0
0	30	30	0
0	30	30	0




0	0	0	10	10	10
0	0	0	10	10	10
0	0	0	10	10	10
0	0	0	10	10	10
0	0	0	10	10	10
0	0	0	10	10	10




\*

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




=

0	-30	-30	0
0	-30	-30	0
0	-30	-30	0
0	-30	-30	0




# Vertical and Horizontal Edge Detection



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

Vertical



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

Horizontal

10	10	10	0	0	0
10	10	10	0	0	0
10	10	10	0	0	0
0	0	0	10	10	10
0	0	0	10	10	10
0	0	0	10	10	10

6x6

\*

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

=

0	0	0	0
30	10	-10	-30
30	10	-10	-30
0	0	0	0



# Learning to detect edges

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



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



Sobel filter

3	0	-3
10	0	-10
3	0	-3

Scharr filter



3	0	1	2	7	4
1	5	8	9	3	1
2	7	2	5	1	3
0	1	3	1	7	8
4	2	1	6	2	8
2	4	5	2	3	9

convolution  
×

$W_1$	$W_2$	$W_3$
$W_4$	$W_5$	$W_6$
$W_7$	$W_8$	$W_9$

3x3

=

45°  
70°  
73°
