

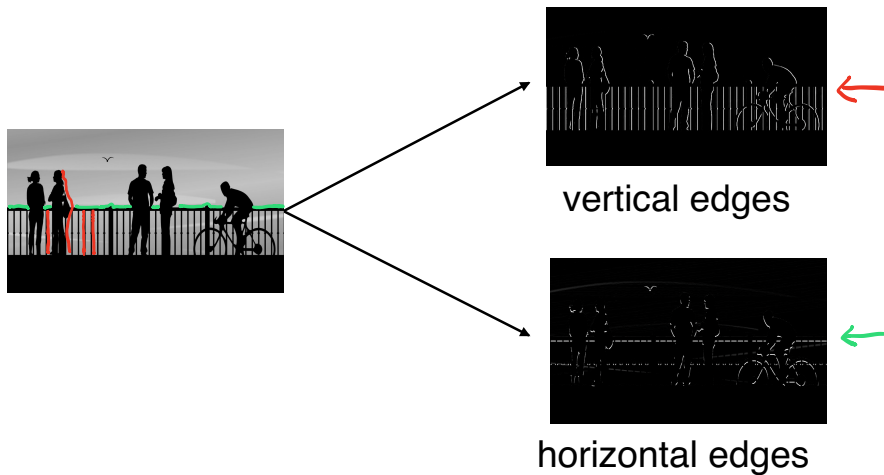


deeplearning.ai

Convolutional Neural Networks

Edge detection
example

Computer Vision Problem



Vertical edge detection

$$3 \times 1 + 1 \times 1 + 2 \times 1 + 0 \times 0 + 5 \times 0 + 7 \times 0 + 1 \times -1 + 8 \times -1 + 2 \times -1 = -5$$

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

$$6 \times 6 \times 1$$

"Convolution"

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

$$3 \times 3$$

filter/kernel

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-5	-4	0	8
-10	-2	2	3
0	-2	-4	-7
-3	-2	-3	-16

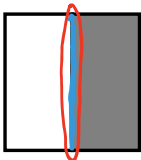
$$4 \times 4$$

python: Conv-forward
 TF: tf.nn.conv2d.
 keras: Conv2D

Vertical edge detection

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

6 × 6



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

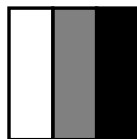
3 × 3

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

4 × 4

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