

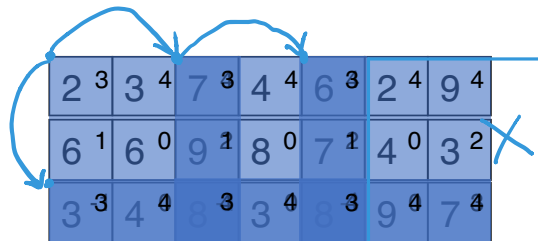


deeplearning.ai

Convolutional Neural Networks

Strided convolutions

Strided convolution



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

7x7

3	4	4
1	0	2
-1	0	3

3x3

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91	100	83
69	91	127
44	72	74

3x3

Stride = 2

$\lfloor z \rfloor = \text{floor}(z)$

$n \times n$
padding P * $f \times f$
stride S
S=2

$$\left\lfloor \frac{n+p-f}{s} + 1 \right\rfloor \times \left\lfloor \frac{n+p-f}{s} + 1 \right\rfloor$$

$$\frac{7+0-3}{2} + 1 = 3$$

Summary of convolutions

$n \times n$ image

$f \times f$ filter

padding p

stride s

$$\left\lfloor \frac{n + 2p - f}{s} + 1 \right\rfloor \times \left\lfloor \frac{n + 2p - f}{s} + 1 \right\rfloor$$

Technical note on cross-correlation vs. convolution

Convolution in math textbook:

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

"Convolution" in DL
↓

3	4	5
1	0	2
-1	9	7

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7	2	5
9	0	4
-1	1	3

"Convolution" in math
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$$(A * B) * C = A * (B * C)$$