deeplearning.ai

Convolutional Neural Networks

Why convolutions?

Why convolutions

$f = 5$
6 filters

$32 \times 32 \times 3$

$28 \times 28 \times 6$
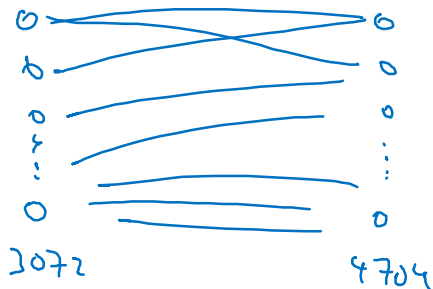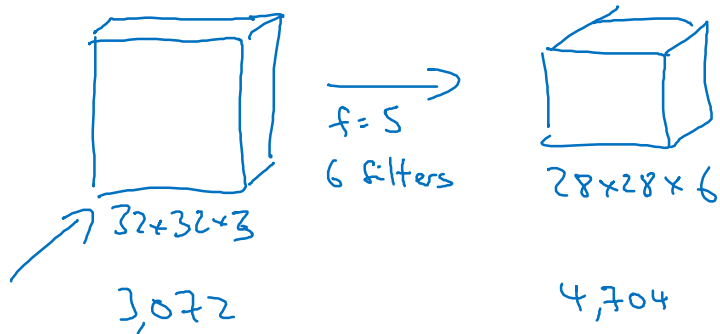
3,072

4,704

$5 \times 5 = 25$

26

$6 \times 26 = 156$ Parameters

$(5 \times 5 \times 3) + 1) \times 6 = 456$

$3,072 \times 4,704 \approx 14M$

3072

4704

Andrew Ng

Why convolutions

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

3×3

=

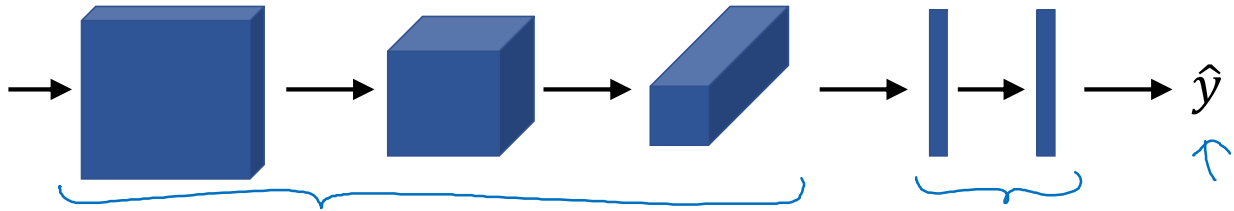| 0	30	30	0
0	30	30	0
0	30	30	0
0	30	30	0
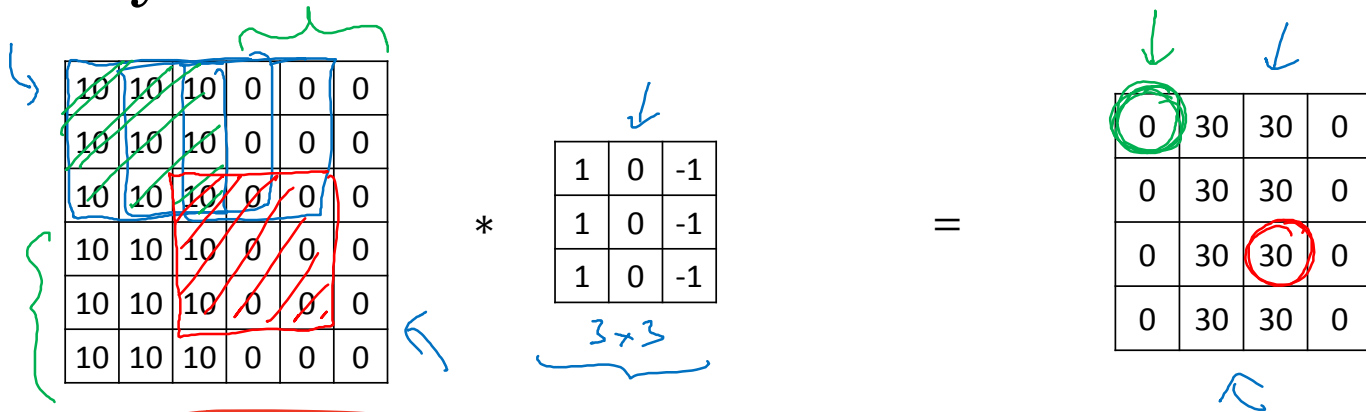
Parameter sharing: A feature detector (such as a vertical edge detector) that's useful in one part of the image is probably useful in another part of the image.

Sparsity of connections: In each layer, each output value depends only on a small number of inputs.

Putting it together

Training set $(x^{(1)}, y^{(1)}) \dots (x^{(m)}, y^{(m)})$.

ω, b

$\hat{y}$

Cost $J = \dfrac{1}{m} \displaystyle\sum_{i=1}^{m} \mathcal{L}(\hat{y}^{(i)}, y^{(i)})$

Use gradient descent to optimize parameters to reduce J

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