



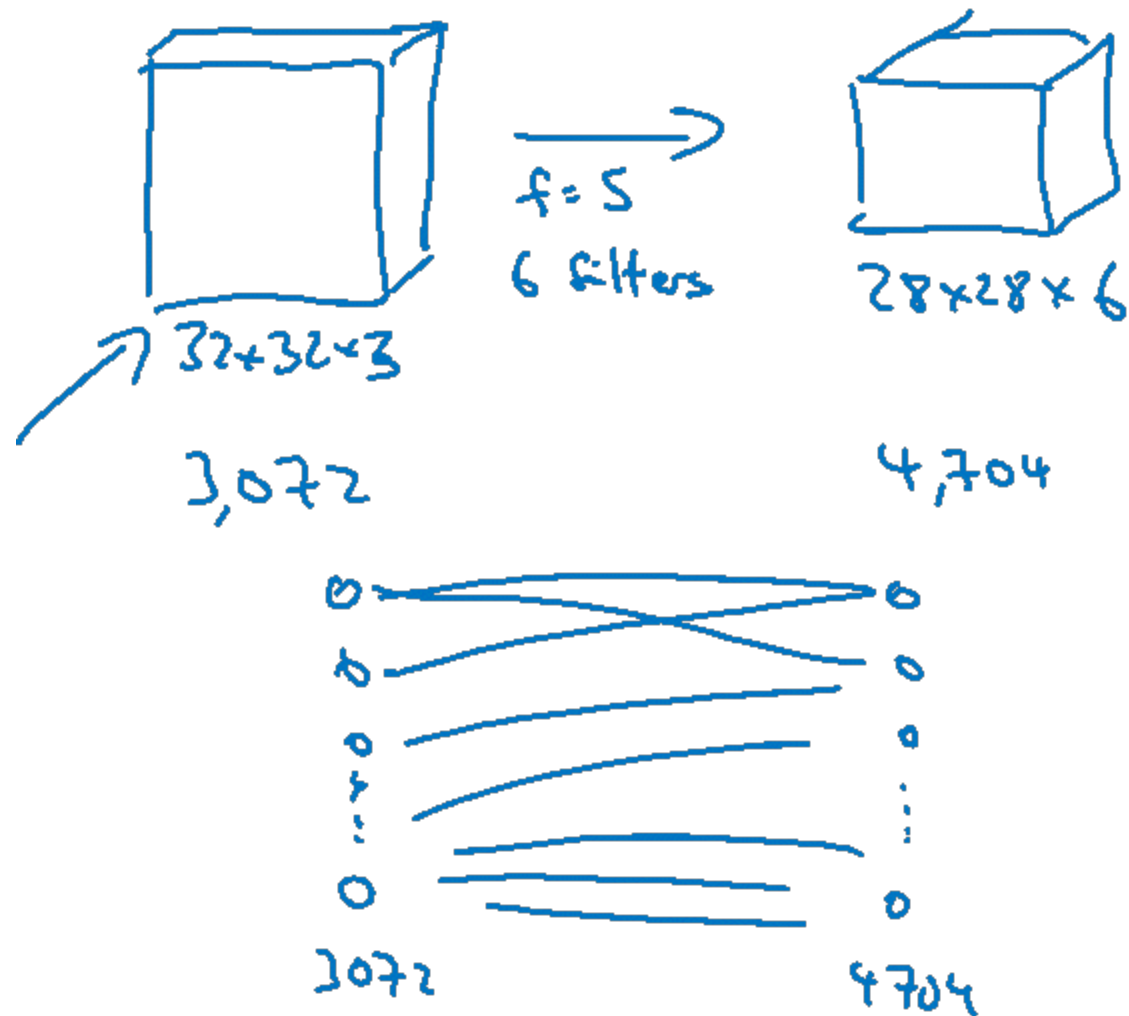
**deeplearning.ai**

# Convolutional Neural Networks

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Why  
convolutions?

# Why convolutions



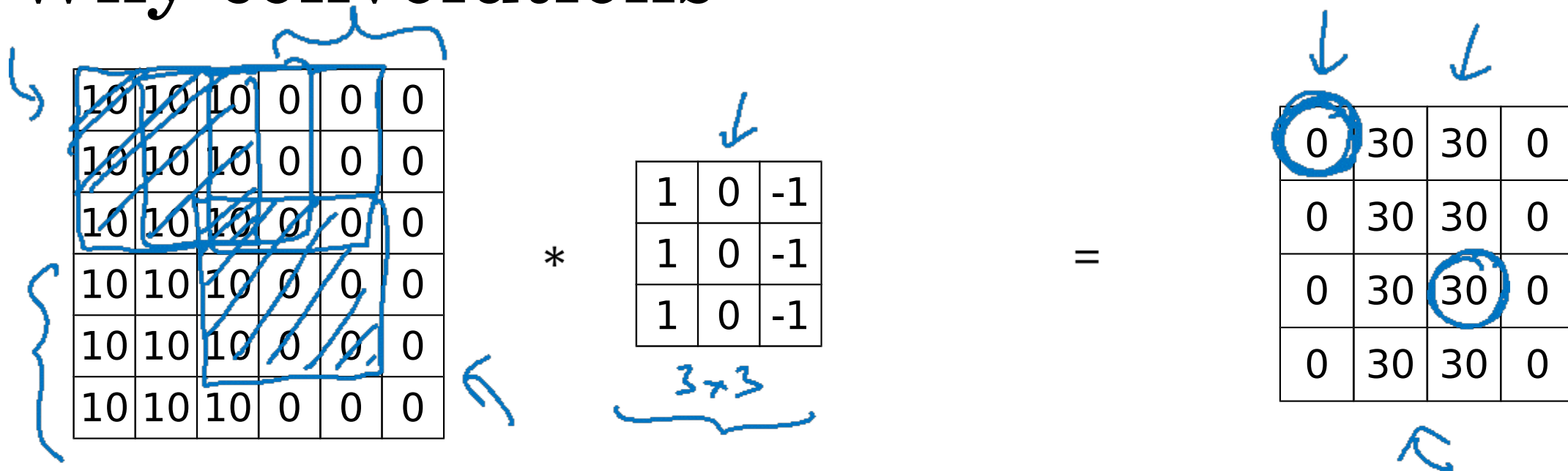
$$5 \times 5 = 25$$

$$26$$

$$6 \times 26 = 156 \text{ parameters}$$

$$3,072 \times 4,704 \approx \underline{14M}$$

# Why convolutions

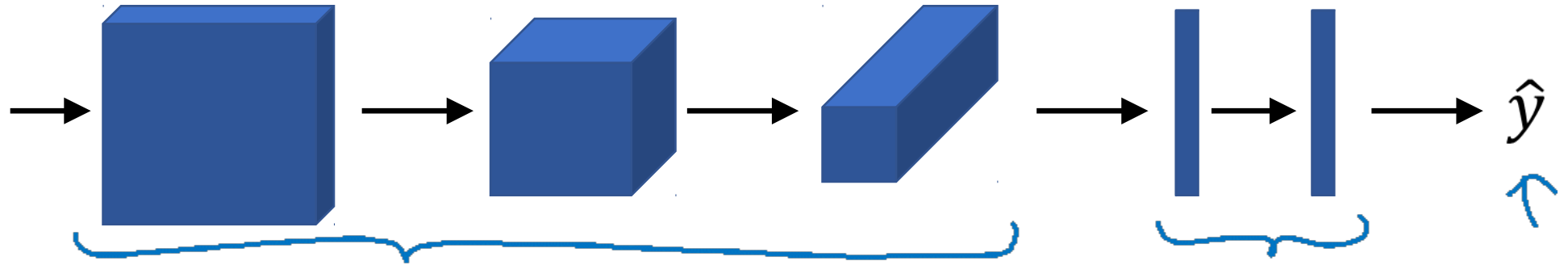


**Parameter sharing:** A feature detector (such as a vertical edge detector) that's useful in one part of the image is probably useful in another part of the image.

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

# Putting it together

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



$$\text{Cost} = \frac{1}{m} \sum_{i=1}^m \mathcal{L}(\hat{y}^{(i)}, y^{(i)})$$

Use gradient descent to optimize parameters to reduce