



**deeplearning.ai**

# Convolutional Neural Networks

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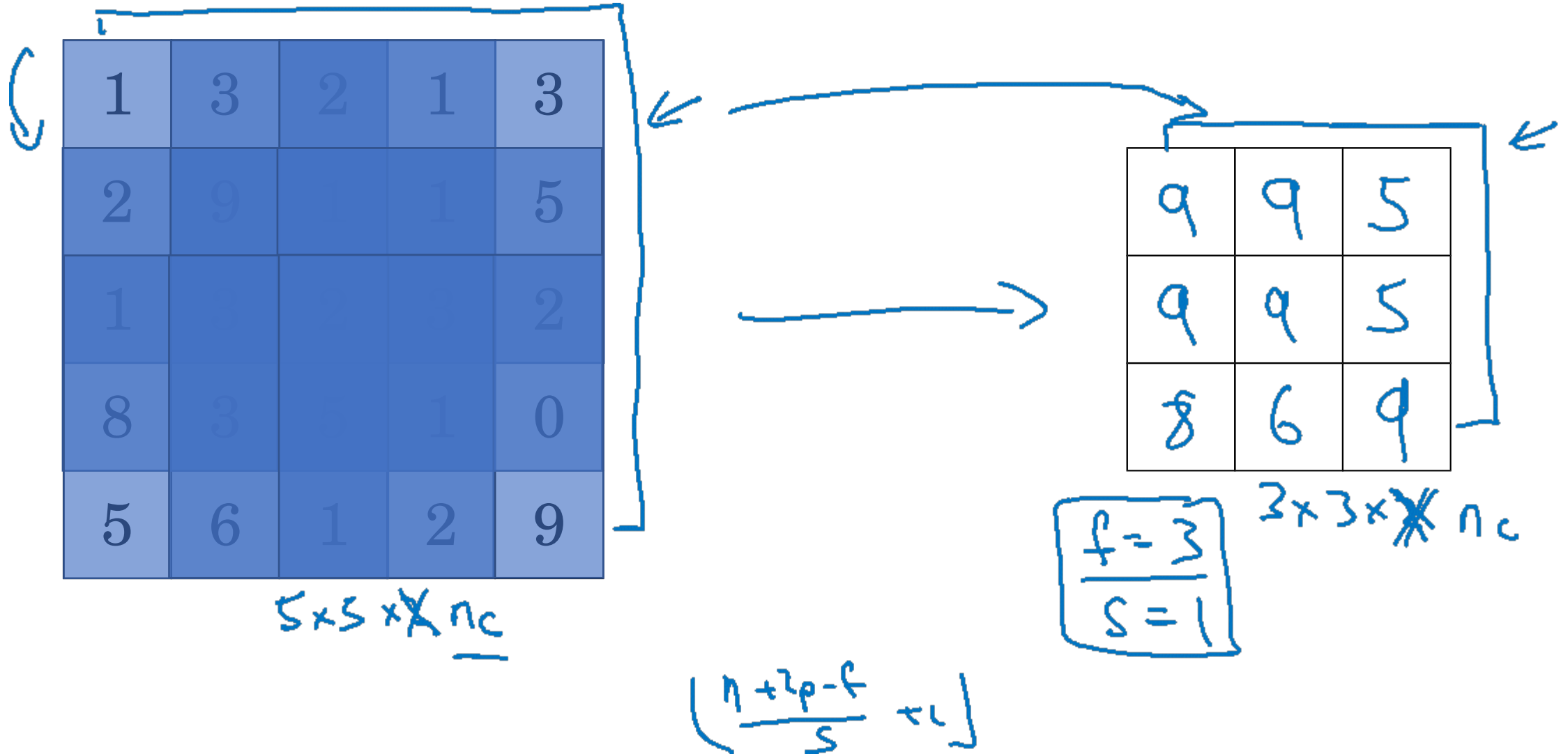
## Pooling layers

# Pooling layer: Max pooling

|   |   |   |   |
|---|---|---|---|
| 1 | 3 | 2 | 1 |
| 2 | 9 | 1 | 1 |
| 1 | 3 | 2 | 3 |
| 5 | 6 | 1 | 2 |

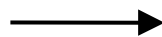
|  |  |
|--|--|
|  |  |
|  |  |

# Pooling layer: Max pooling



# Pooling layer: Average pooling

|   |   |   |   |
|---|---|---|---|
| 1 | 3 | 2 | 1 |
| 2 | 9 | 1 | 1 |
| 1 | 4 | 2 | 3 |
| 5 | 6 | 1 | 2 |



|      |      |
|------|------|
| 3.75 | 1.25 |
| 4    | 2    |

$$f=2$$

$$s=2$$

$$\underline{7 \times 7 \times 1000} \rightarrow 1 \times 1 \times 1000$$

# Summary of pooling

Hyperparameters:

f : filter size

s : stride

Max or average pooling

f=2, s=2  
f=3, s=2

~~⇒ p: padding.~~

No parameters to learn!

$$\begin{array}{c} n_H \times n_W \times \underline{n_C} \\ \downarrow \\ \left\lfloor \frac{n_H - f}{s} + 1 \right\rfloor \times \left\lfloor \frac{n_W - f}{s} + 1 \right\rfloor \\ \times \underline{n_C} \end{array}$$