



deeplearning.ai

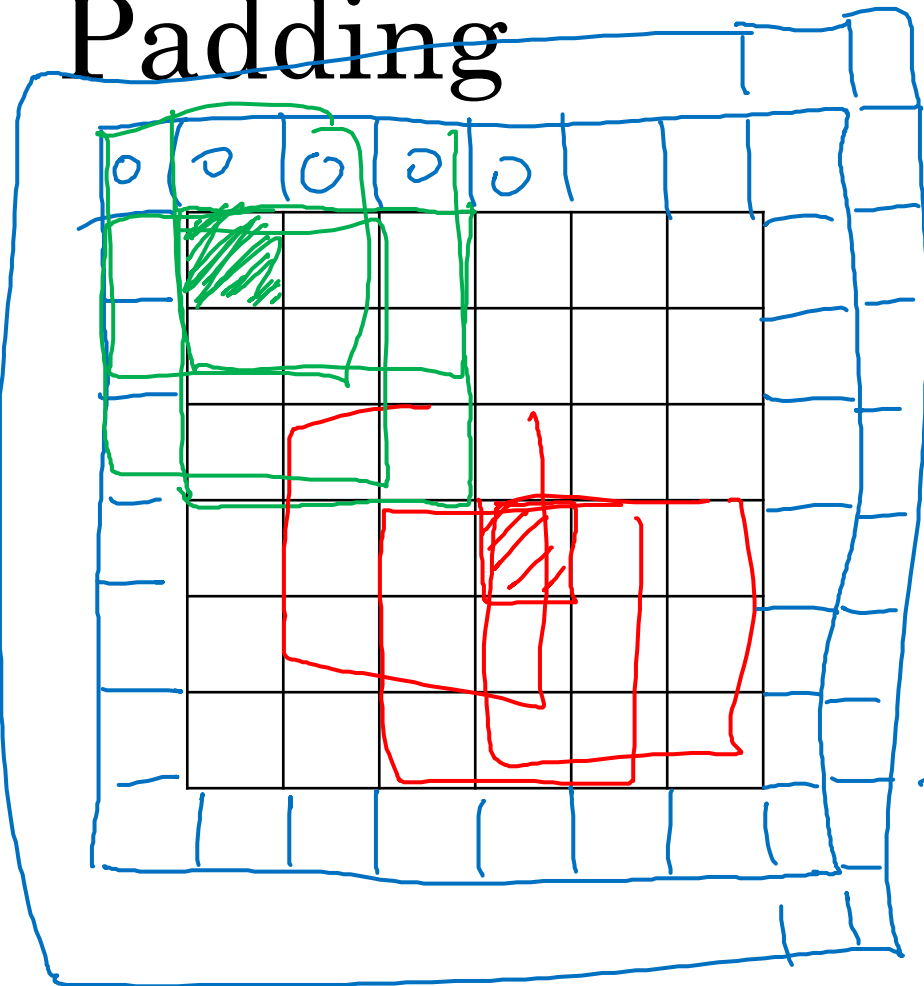
# Convolutional Neural Networks

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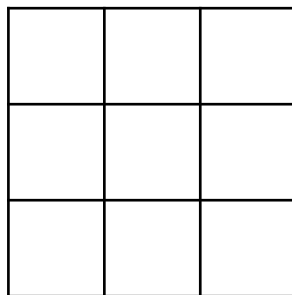
## Padding

# Padding

- shrinky output
- throw away info from edge

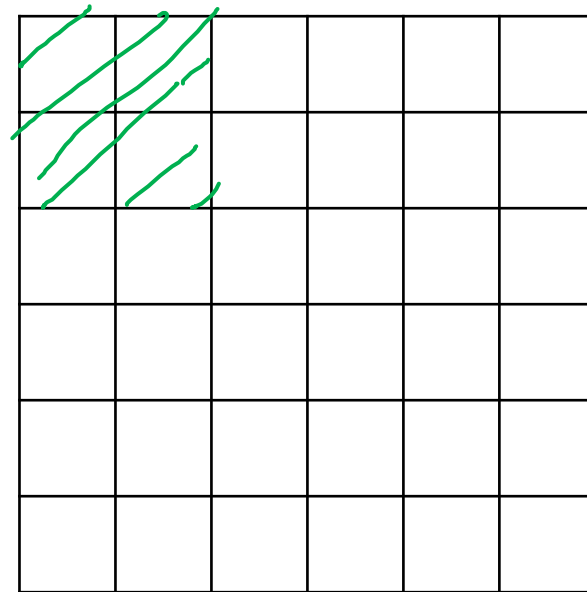


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3x3  
f x f

=



6x6

6x6 → 8x8  
n x n

$n - f + 1 \times n - f + 1$

$6 - 3 + 1 = 4$

$p = \text{padding} = \underline{1}$

$n + 2p - f + 1 \times n + 2p - f + 1$

$6 + 2 - 3 + 1 \times \underline{\underline{4}} = 6 \times 6$

# Valid and Same convolutions

→ no padding

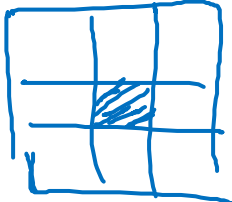
“Valid”:  $n \times n \quad * \quad f \times f \quad \rightarrow \quad \frac{n-f+1}{1} \times n-f+1$   
 $6 \times 6 \quad * \quad 3 \times 3 \quad \rightarrow \quad 4 \times 4$

“Same”: Pad so that output size is the same as the input size.

$$n+2p-f+1 \times n+2p-f+1$$
$$\cancel{n+2p-f+1} = \cancel{n} \Rightarrow \boxed{p = \frac{f-1}{2}}$$
$$3 \times 3 \quad p = \frac{3-1}{2} = 1 \quad \left| \quad \begin{array}{c} 5 \times 5 \\ f=5 \end{array} \right.$$

$f$  is usually odd

1x1  
3x3  
5x5  
7x7



$p=2$