Convolutional
Neural Networks

Padding

deeplearning.ai

Padding

- shrink output
- throw away info from edge

3×3
$f \times f$

$p = 2$

$*$

$=$

6×6

$6 \times 6 \rightarrow 8 \times 8$
$n \times n$

$P = padding = \underline{1}$

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

$6 - 3 + 1 = 4$

4×4

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

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

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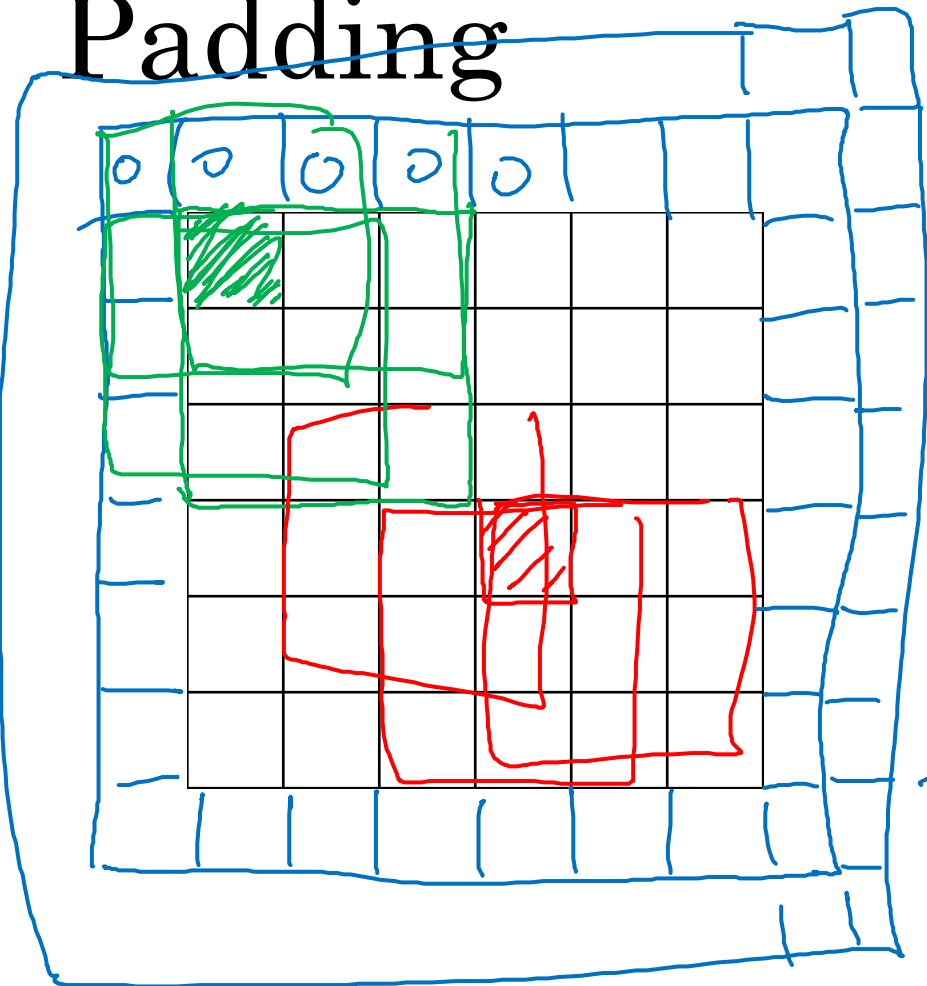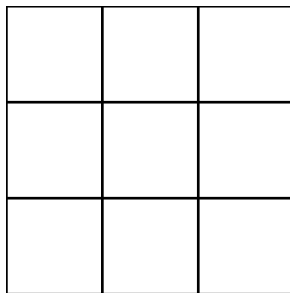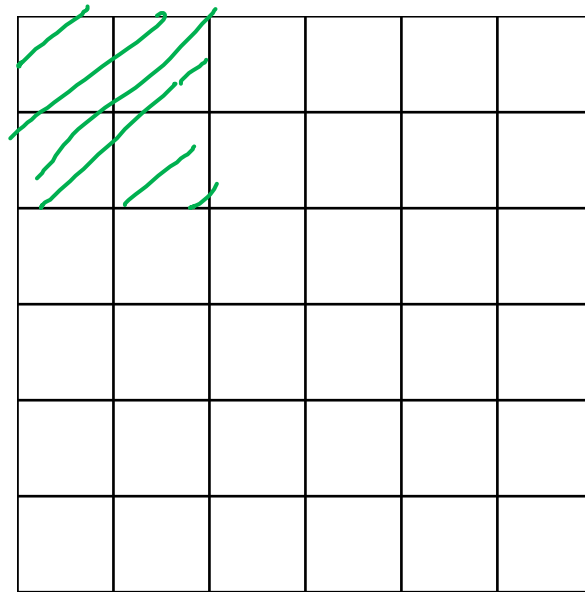
Valid and Same convolutions

$\rightarrow$ no padding
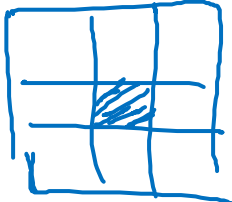
"Valid": $n \times n$ $\ast$ $f \times f$ $\longrightarrow$ $\underline{n-f+1} \times n-f+1$

6×6 $\ast$ 3×3 $\longrightarrow$ 4×4

"Same": Pad so that output size is the $\underline{same}$ as the input size.

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

f is usually odd

$n+2p-f+1 = n$ $\Rightarrow$ $\boxed{p = \dfrac{f-1}{2}}$

3×3 $p = \dfrac{3-1}{2} = 1$ | 5×5 $p = 2$
$f = 5$

1×1
3×3
5×5
7×7

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