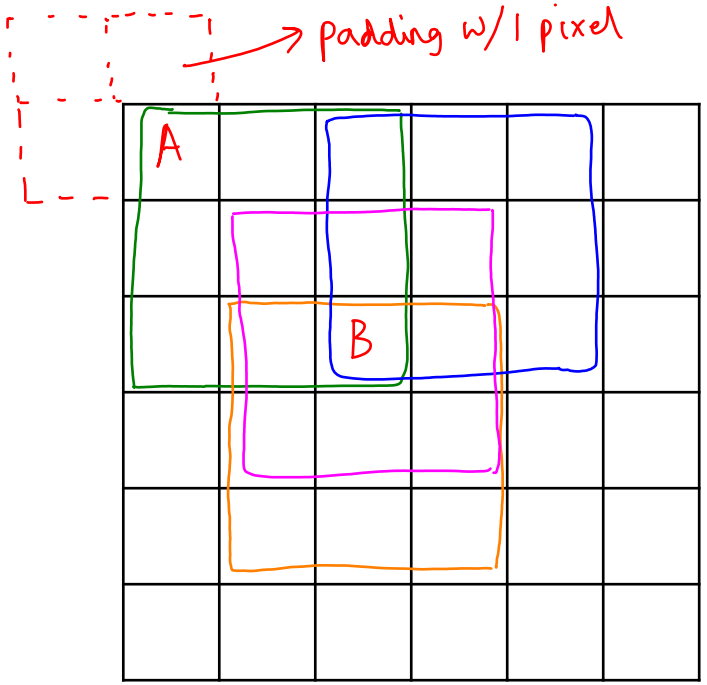
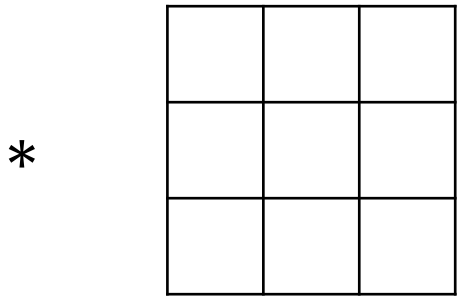
deeplearning.ai

Convolutional Neural Networks

Padding

Padding





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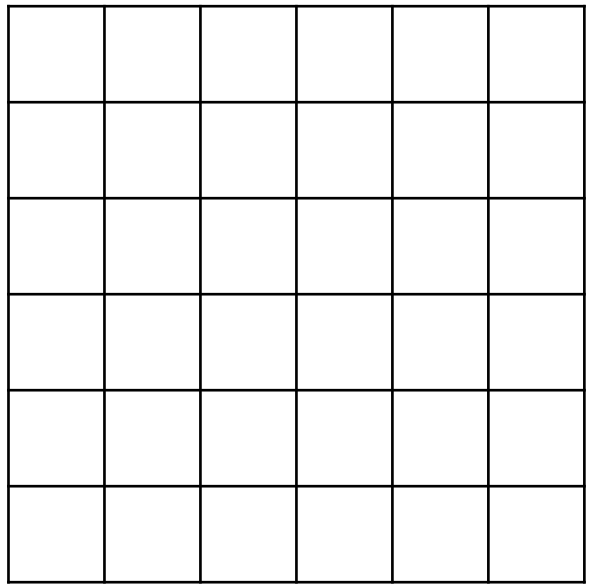

2 problems with convolution operations as we do it

① If we have a $n \times n$ Image & a $f \times f$ filter, then resulting Image is $(n-f+1) \times (n-f+1)$

ie, $(6 \times 6) * (3 \times 3) = (4 \times 4)$

If we do this again w/ the 3×3 filter, we get $(4 \times 4) * (3 \times 3) = (2 \times 2)$

ie, $(n-f+1) \times (n-f+1)$, ie, our resulting Image in the layers Ahead will keep shrinking, till we hit a Roadblock

ie, $(2 \times 2) * (3 \times 3)$ → Not possible $(n-f+1) = 0$

Image Filter

② Pixel A is only part of 1 convolution, while pixel B is part of many ⇒ we count the info from B, many more times than A in the Image Ahead

1 way to solve this is padding the Image with pixels

For example, $p=1$ gives 1 pixel padding ⇒ New Image becomes $(8 \times 8) * (3 \times 3) = 6 \times 6$

$(n+2p \times n+2p) * (f \times f) =$ → $(n+2p-f+1) \times (n+2p-f+1)$

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Valid and Same convolutions

No padding

"Valid": $n \times n * f \times f \Rightarrow (n-f+1) \times (n-f+1)$

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

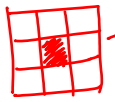
$\Rightarrow n \times n \equiv n+2p-f+1$

$\Rightarrow n+2p-f+1=n$

$\Rightarrow \frac{f-1}{2}=p$

$f \rightarrow$ even will not give a whole number for "p" $\Rightarrow$ we keep f odd ie, 3x3 or 5x5 etc.

Also with f being odd, like 3x3 or 5x5, we get a central pixel



This helps in convolution (will see later)