

MODERN COMPUTER VISION

BY RAJEEV RATAN

Pooling

We explore the Max Pool Layer and it's purpose

Pooling

- Pooling is the process whereby we reduce the size or dimensionality of the Feature Map
- This allows us to reduce the number of Parameters in our Network whilst retaining important features
- Also called Subsampling or Downsampling

Example of Max Pooling

4	123	1	34
56	99	222	253
45	122	165	12
21	187	133	124

MaxPool Operation



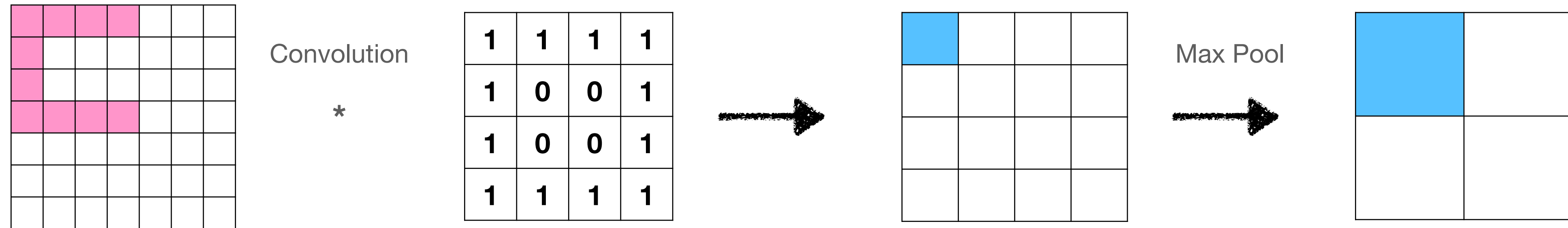
Stride = 2
Kernel = 2x2

123	167
187	165

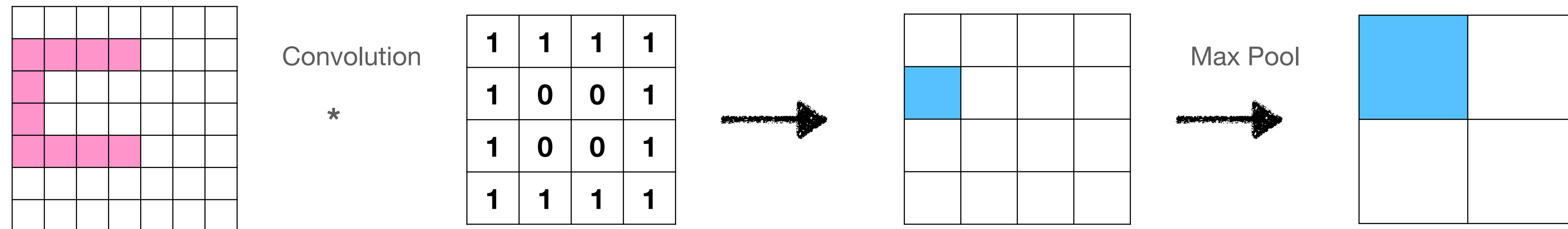
More on Pooling

- Typically we use **2x2** kernels and a Stride of **2** with no padding.
- With the above setting, pooling reduces the **dimensionality by a factor of 2** (width and height).
- Pooling makes our model more **invariant** to minor **transformations** and **distortions** in our image.
- We can also use Average Pooling or Sum Pooling

How Max Pooling Achieves Translation Invariance



Shifting Our C down one pixel



Why Pooling Works

Pooling reduces our feature map size by half in most cases, is that ok?

- Neighbouring pixels are **strongly correlated**, especially in lowest layers
- Remember further apart two pixels are from each other, the less correlated
- Therefore, we can **reduce the size** of the output by subsampling (**pooling**) the filter response **without losing information**
- A big stride in the pooling layer leads to high information loss
- In practice, a stride of 2 and a kernel size 2x2 for the pooling layer was found to be effective in practice



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Next...

Fully Connected Layer