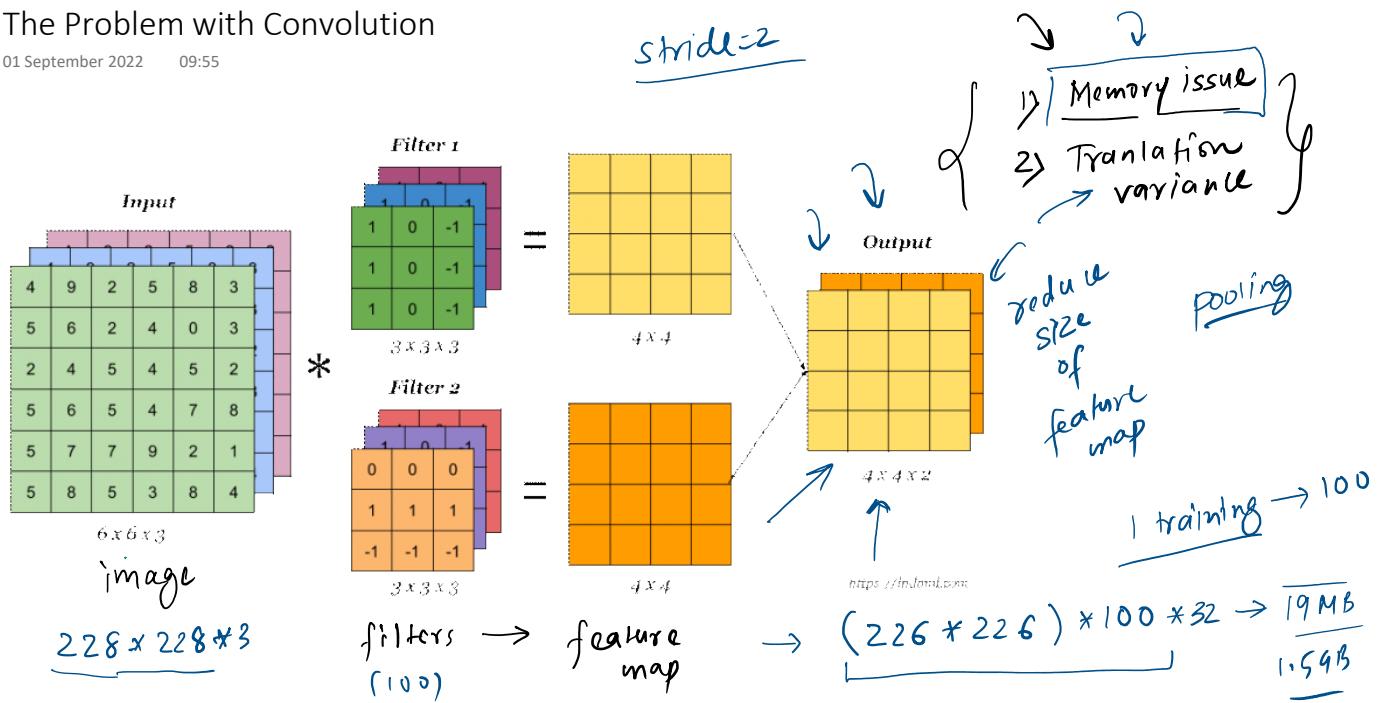
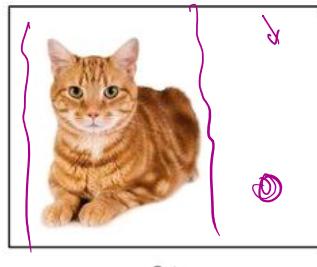
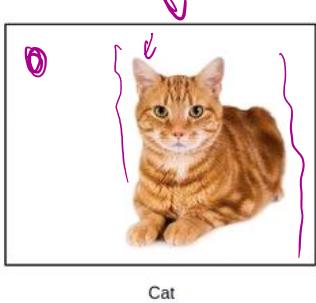


The Problem with Convolution

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Translation Variance



features
 { location dependent }

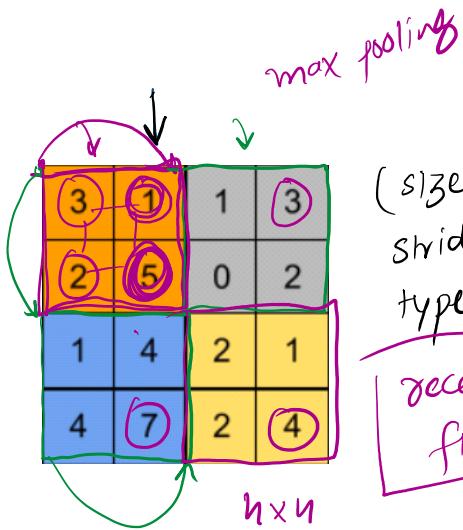
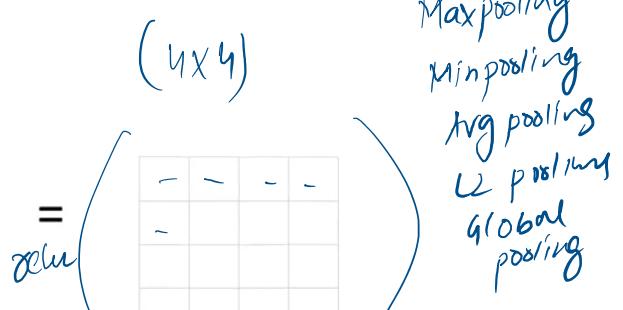
location,
 → pooling
 { down sample your feature map }

Pooling

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0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
255	255	255	255	255	255	255
255	255	255	255	255	255	255
255	255	255	255	255	255	255

$$* \quad \begin{matrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{matrix}$$



(size) \rightarrow (2, 2)
stride \rightarrow (2)
type \rightarrow Max

receptive field

featuremap (non-linear)

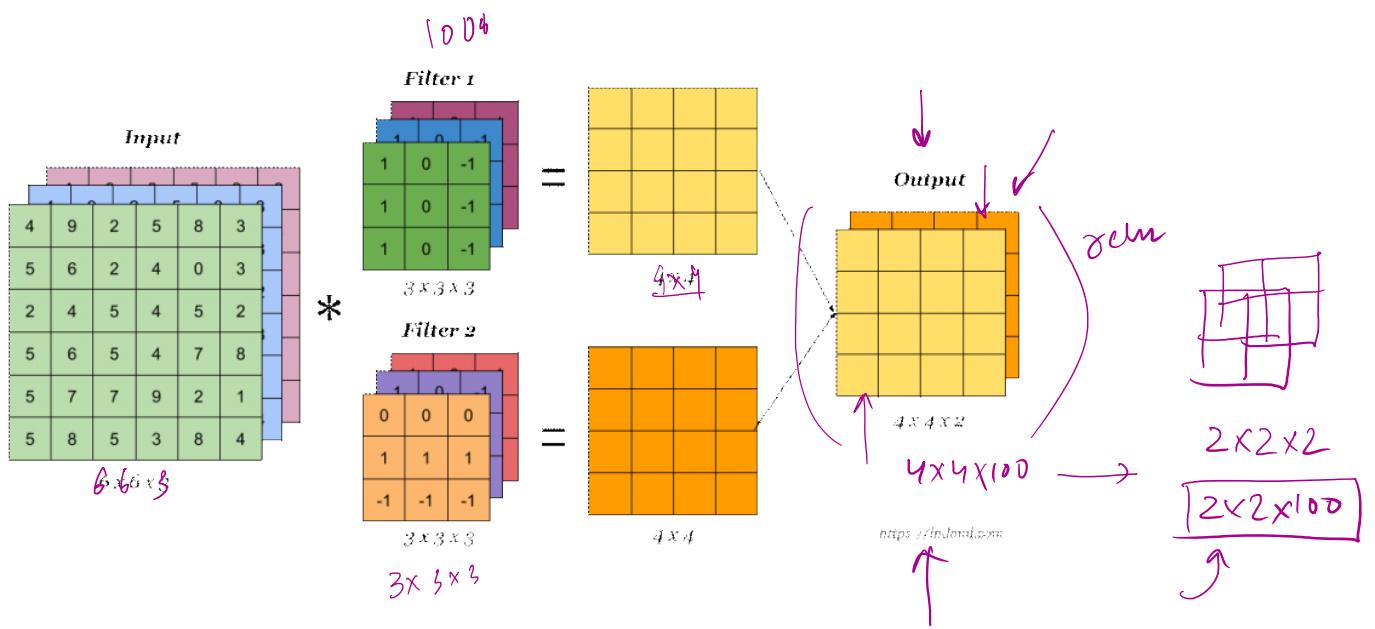
feature map

2x2

low level details eliminated

Pooling on Volumes

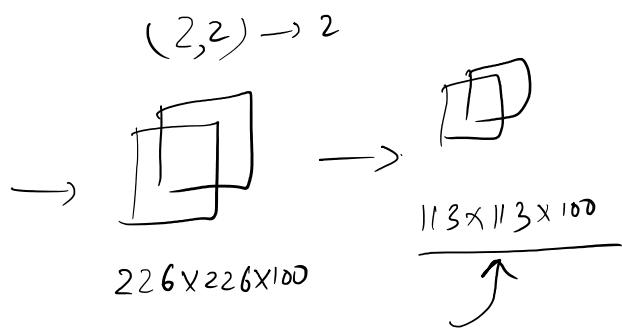
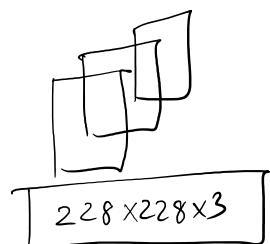
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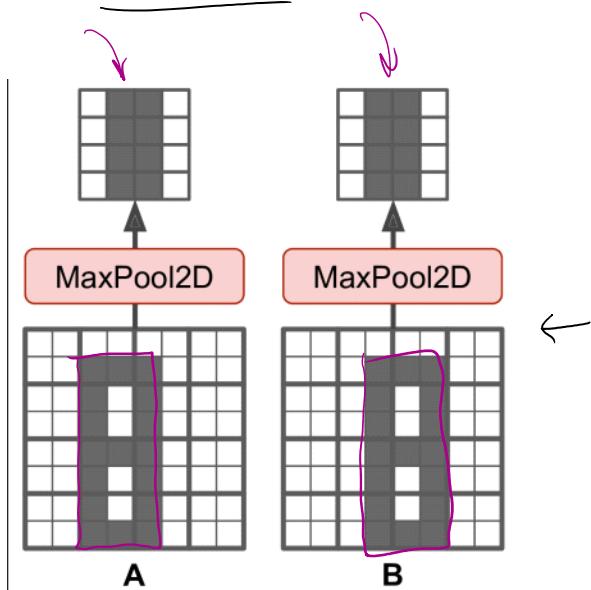
Advantages of Pooling

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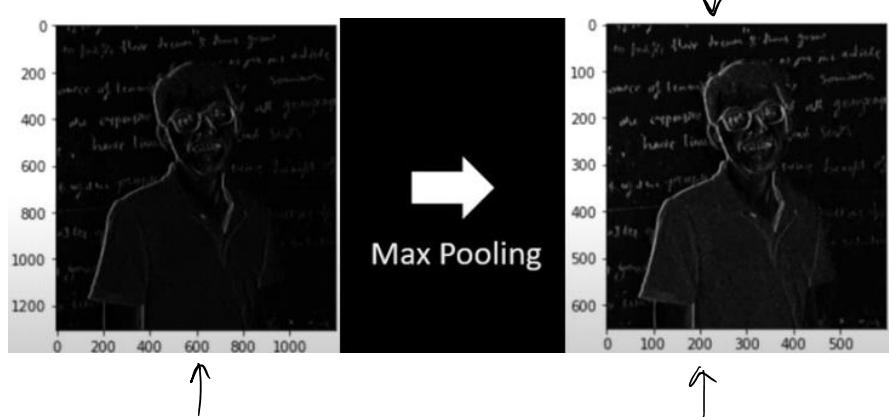
- 1) reduced size

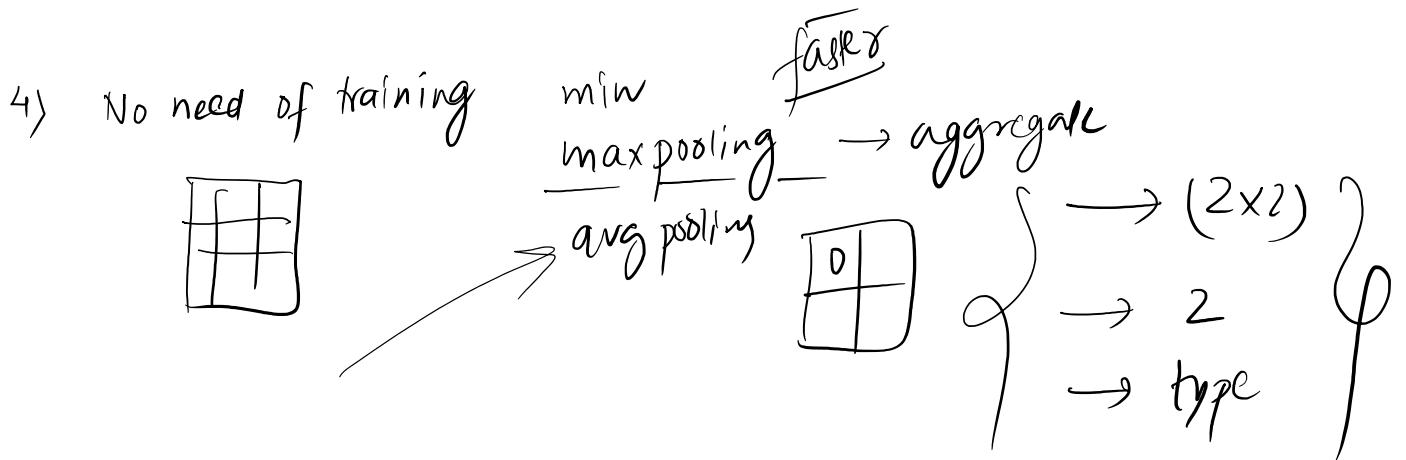


- 2) Translation invariance



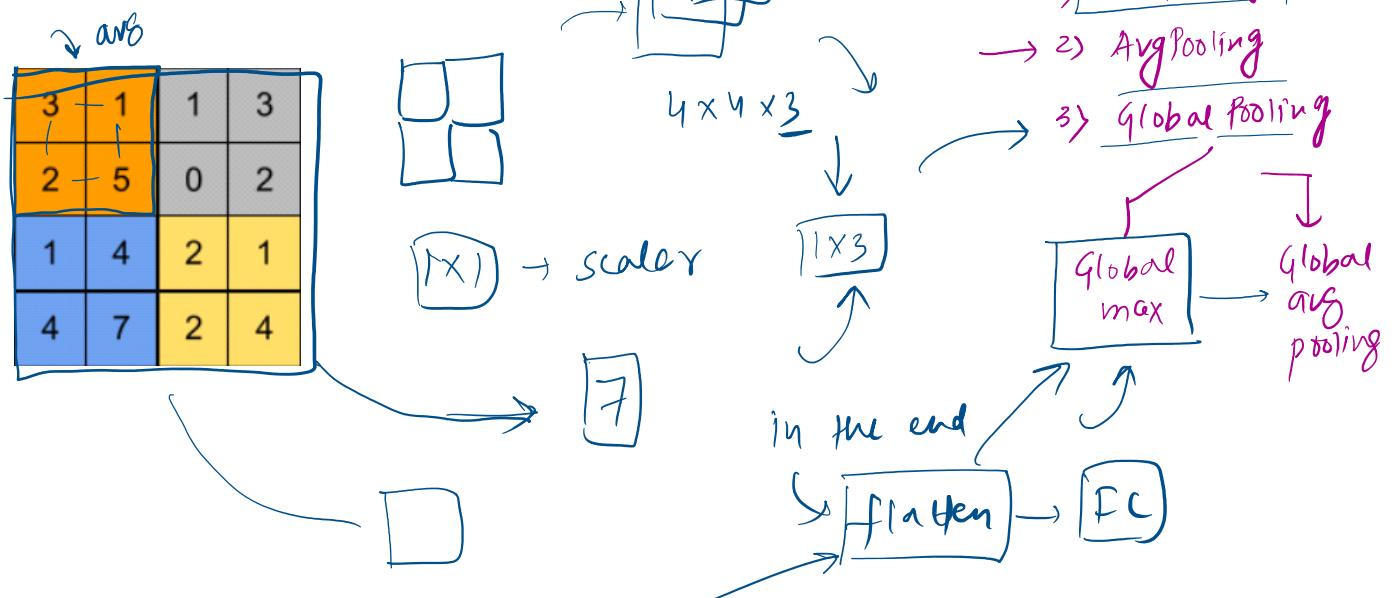
- 3) Enhanced features
(only in case of Maxpooling)





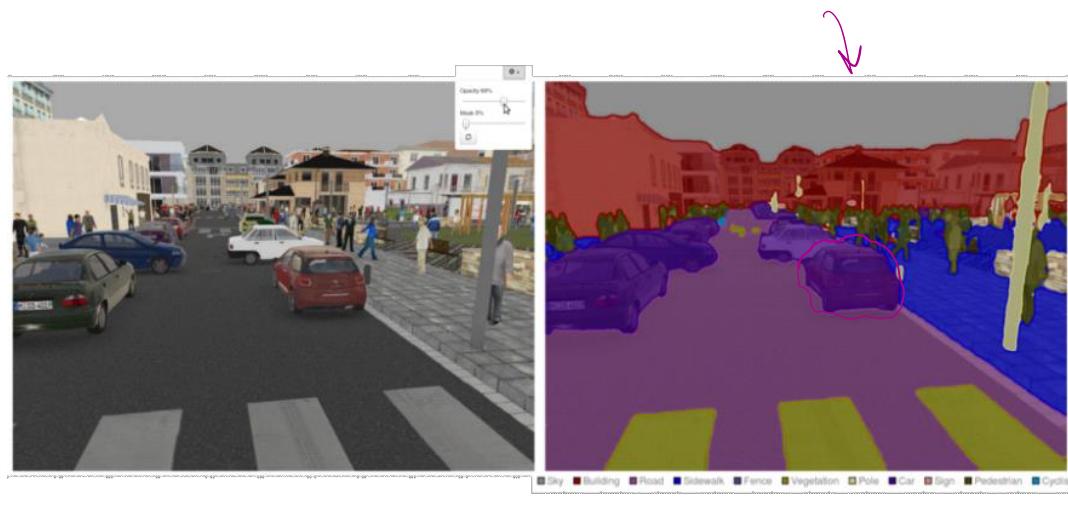
Types of Pooling

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Disadvantages of Pooling

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lose a lot of info

$4 \times 4 \rightarrow 16$

$2 \times 2 \rightarrow 4$

