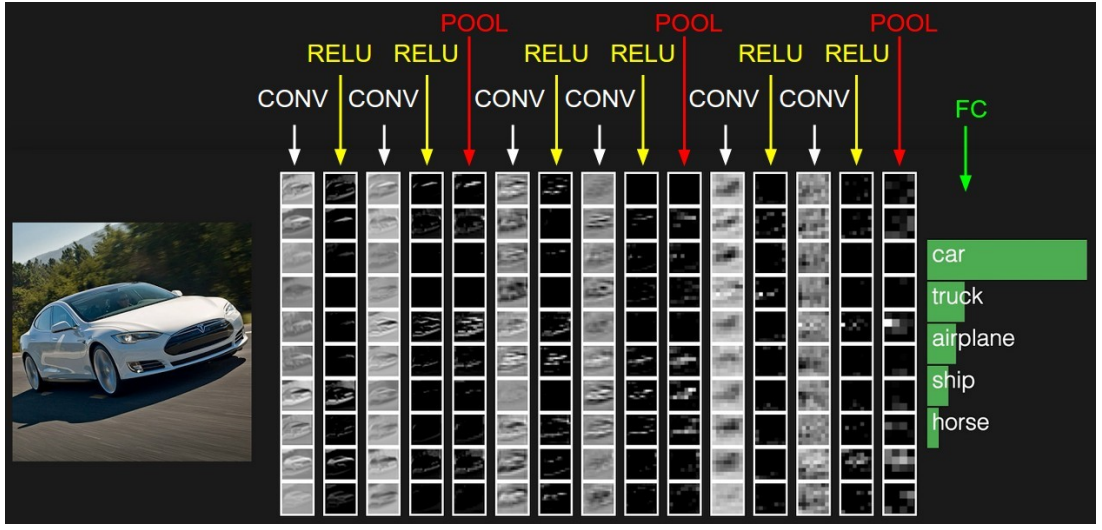
Convolutions and transposed convolutions

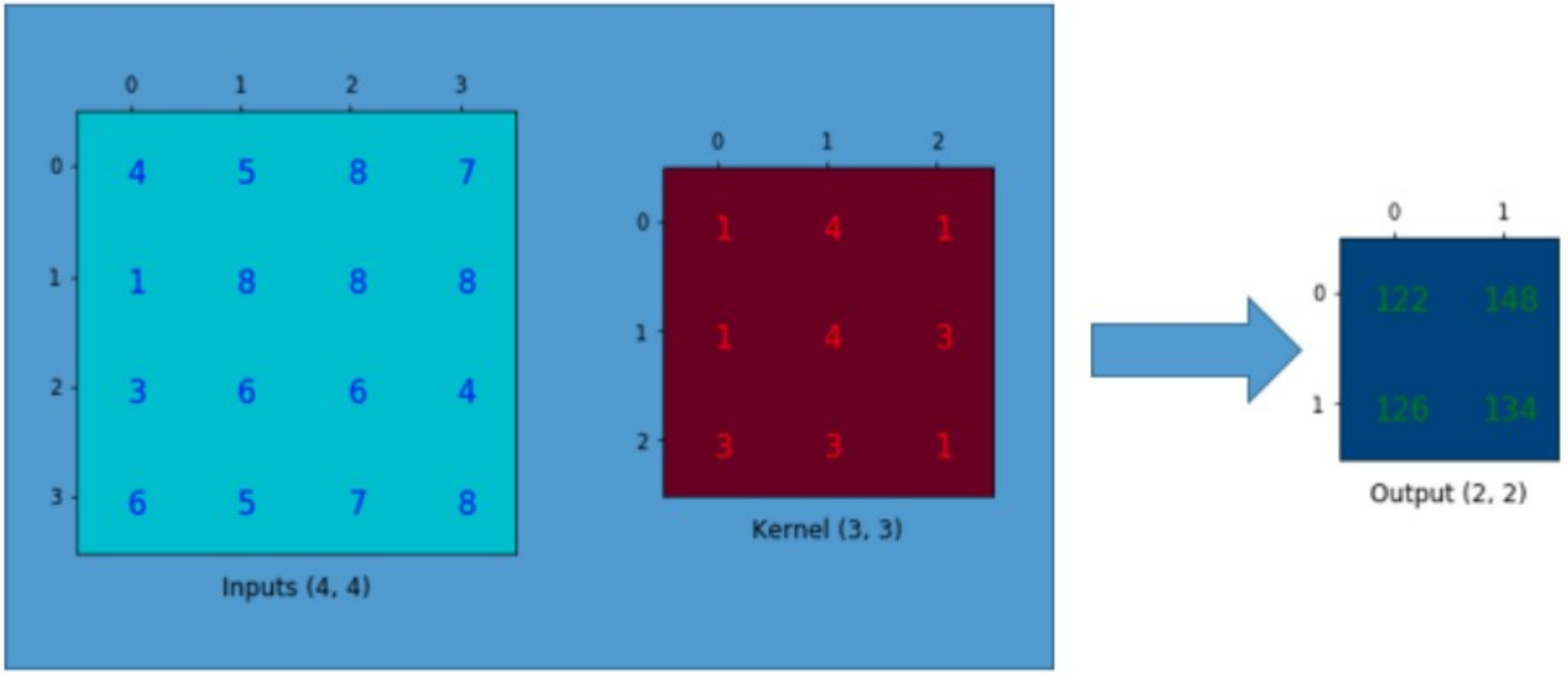
The most common ConvNet architecture follows the pattern:

INPUT -> [[CONV -> RELU]*N -> POOL?]*M -> [FC -> RELU]*K -> FC

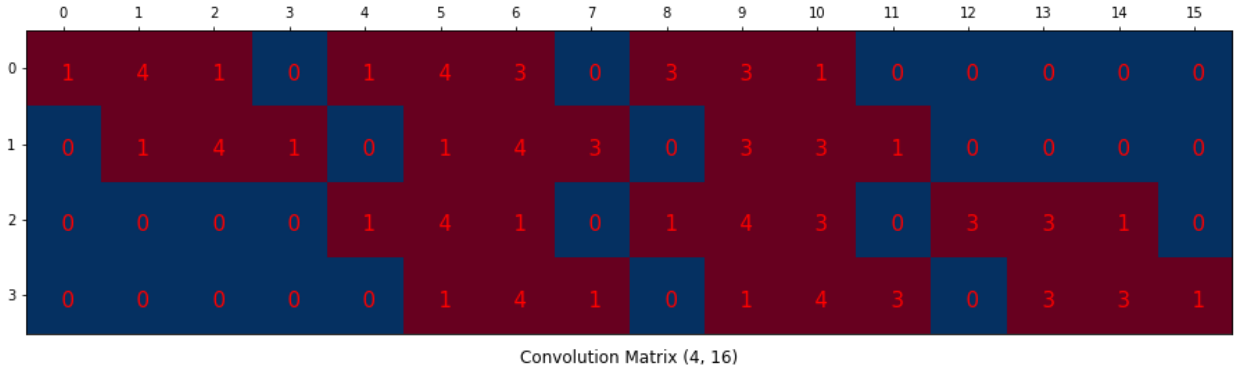


https://medium.com/activating-robotic-minds/up-sampling-with-transposed-convolution-9ae4f2df52d0

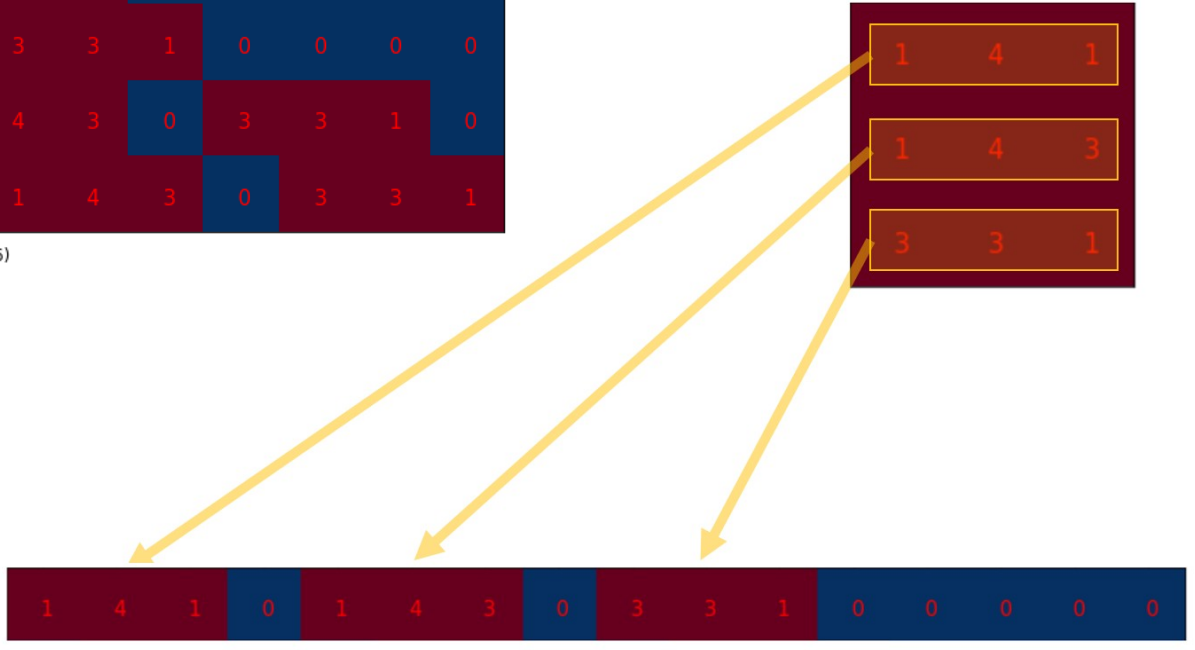
Convolutions as matrix operations



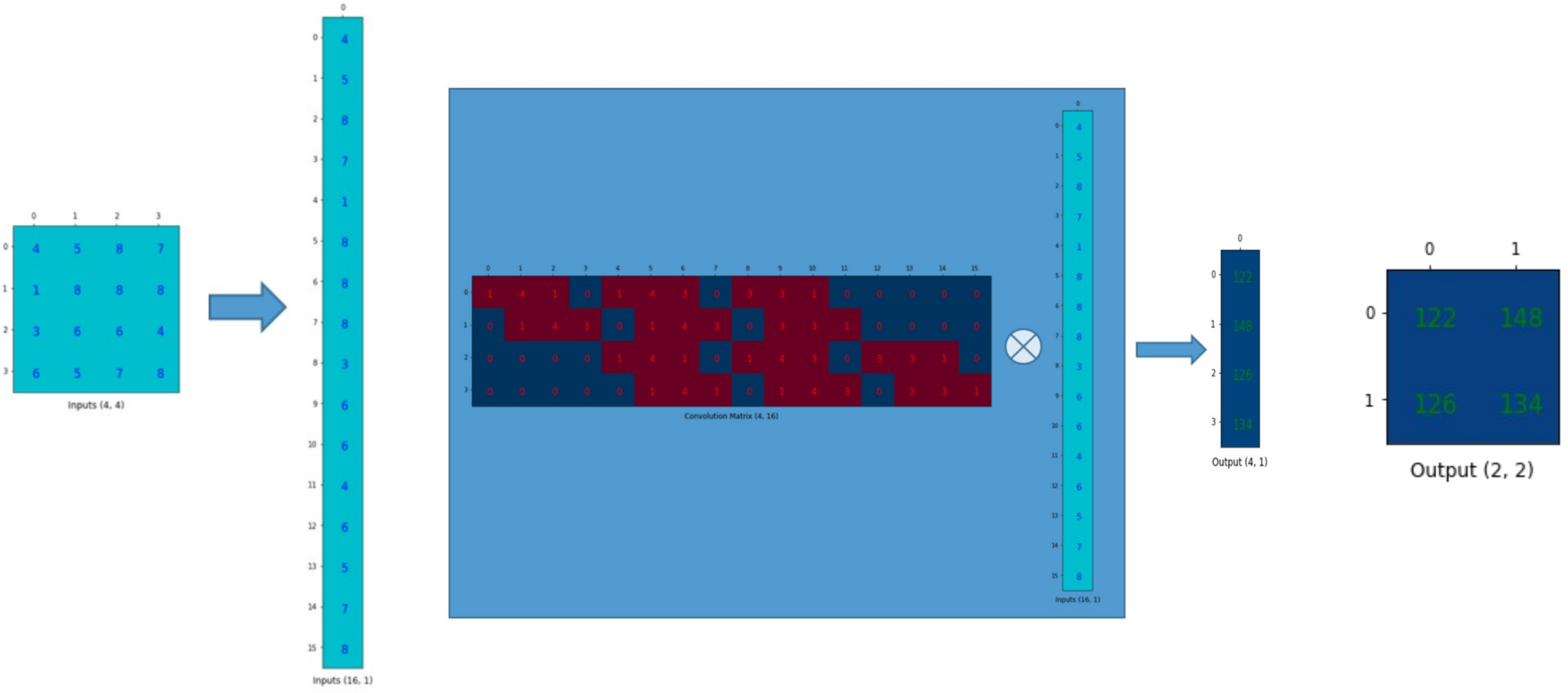
Convolutions as matrix operations



Convolution Matrix (4, 16)



Convolutions as matrix operations

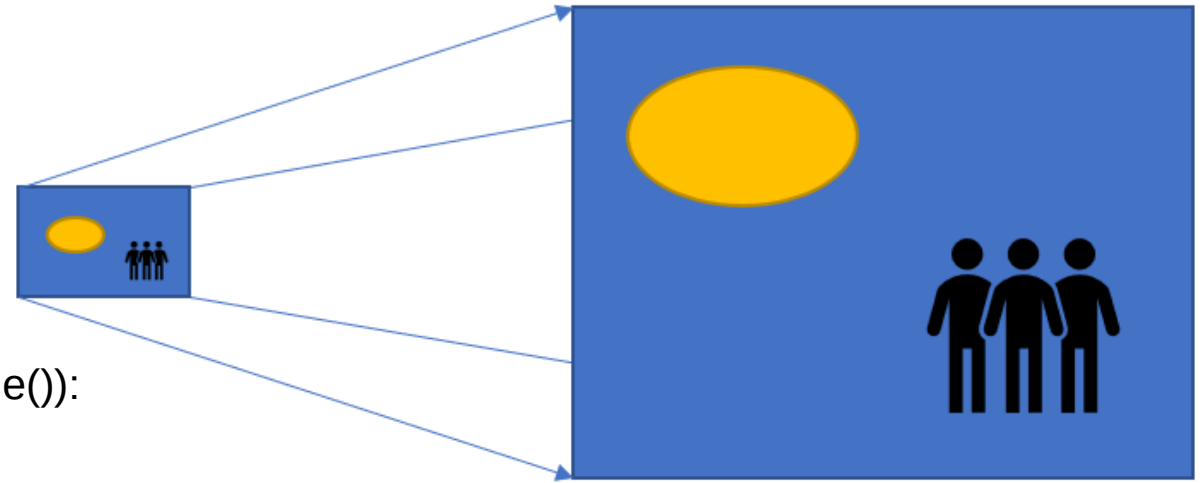


Upsampling

With the convolution matrix, we can go from 16 (4x4) to 4 (2x2) because the convolution matrix is 4x16.

Then, if we have a 16x4 matrix, we can go from 4 (2x2) to 16 (4x4): We can perform upsampling.

Upsampling



Old fasion approaches (eg. cv.resize()):

- Nearest neighbor interpolation
- Bi-linear interpolation
- Bi-cubic interpolation

Transposed convolution