$$I = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 2 & 1 \\ 1 & -3 & -4 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

$$k = k' = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

Same convolution

$$\frac{n + 2p - f}{s} + 1 = n$$

$n = 4,\ f = 3,\ s = 1 \Rightarrow 2p - f + 1 = 0$

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

$$I_{padded} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 2 & 1 & 0 \\ 0 & 1 & -3 & -4 & 1 & 0 \\ 0 & 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$I_{padded} \cdot k' = \begin{bmatrix} 4 & 5 & 6 & 4 \\ 5 & 3 & 3 & 6 \\ 1 & -3 & -7 & 0 \\ 4 & 1 & 0 & 4 \end{bmatrix}$$

ReLU activation:

$$\begin{bmatrix} 4 & 5 & 6 & 4 \\ 5 & 3 & 3 & 6 \\ 1 & 0 & 0 & 0 \\ 4 & 1 & 0 & 4 \end{bmatrix}$$

valid Max Pooling, size (2, 2), stride (2, 2)

$$\begin{bmatrix} 5 & 6 \\ 4 & 4 \end{bmatrix}$$

flattened: $[5, 6, 4, 4]^T$

Fully connected layer: $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{bmatrix} \begin{bmatrix} 5 \\ 6 \\ 4 \\ 4 \end{bmatrix} = \begin{bmatrix} 45 \\ 121 \end{bmatrix}$

Softmax: $\begin{bmatrix} 9,9 \cdot 10^{-34} \\ 1 \end{bmatrix} \approx \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ => class 2