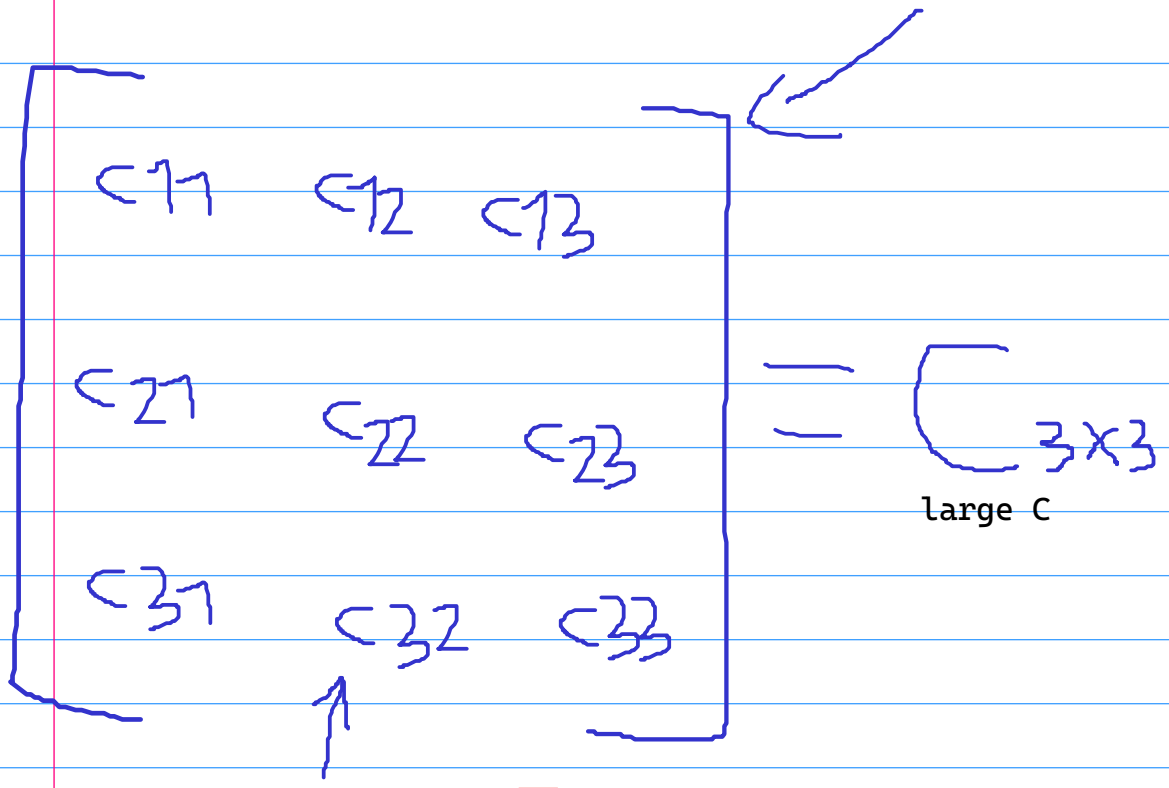
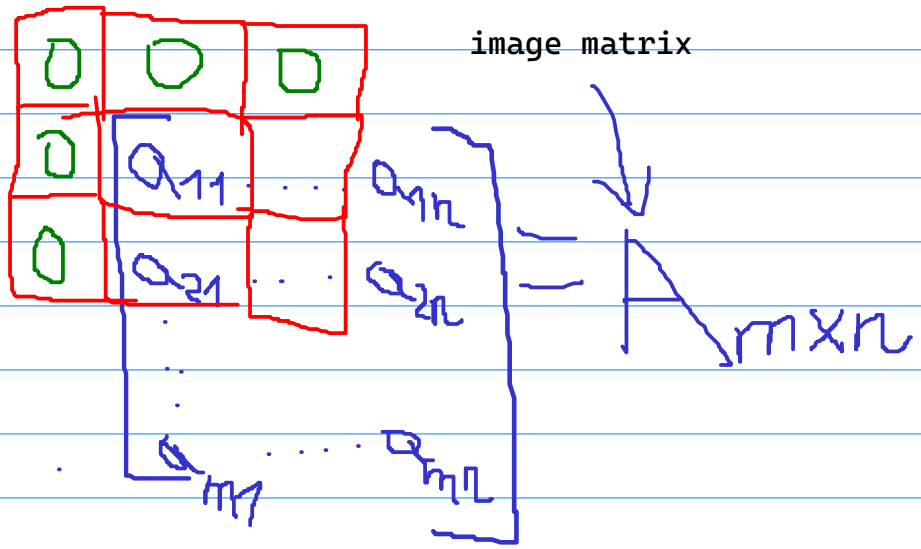
convolution Kernel





pixel after convolution

$$a'_{yx} = a_{y-1\,x-1} \cdot c_{11} + a_{y-1\,x} \cdot c_{12} + \ldots + c_{22} \cdot a_{xy} + \ldots + c_{33} \cdot a_{y+1\,x+1}$$

The probem is that if we want to calculate convolution for the value on the border then the resulting matrix will be smaller. Every convolution will make s smmaller matrix.

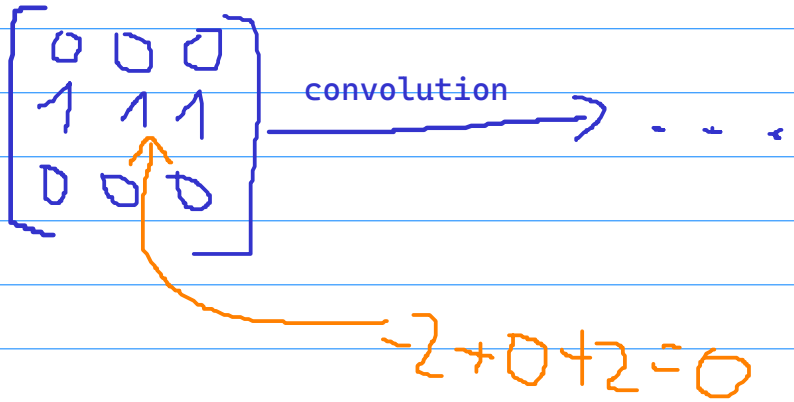
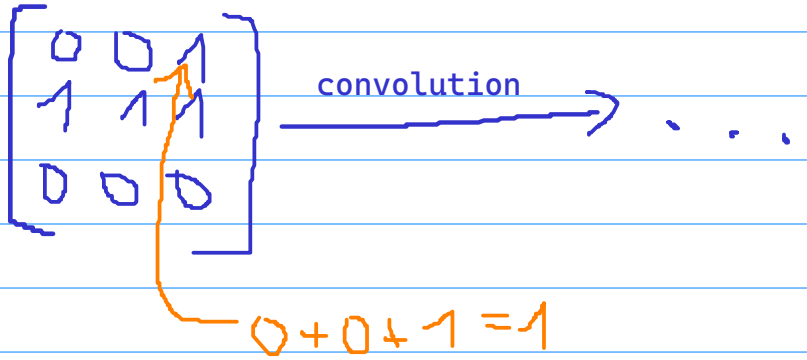
We will go with a different approach - we add a padding (populate borders with zeros).

Sobel matrix

$$\begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$$

$$S_y = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{bmatrix}$$

Straight line



this line