

DIAGRAM OF TRANSPOSED CONVOLUTION

(Using a 2D example)

1. Input grid.

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

- Input feature map 2×2 .

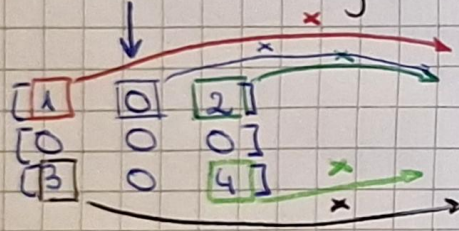
2. Stride and zero insertion. Suppose stride = 2.

$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 0 & 0 \\ 3 & 0 & 4 \end{bmatrix}$

- Expanded input after zero insertion

3. Kernel sliding and summing. For example, a 3×3 kernel such as:

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



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

(each 0 contributes 0)

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

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

$\begin{bmatrix} 1+3 & 0+0+0 & 1+2+3+4+0 & 0+0+0 & 2+4 \end{bmatrix} =$

$\begin{bmatrix} 0 & 3 & 0+0 & 4 & 0 \end{bmatrix}$

$\begin{bmatrix} 3 & 0 & 3+4 & 0 & 4 \end{bmatrix}$

$\begin{bmatrix} 1 & 0 & 3 & 0 & 2 \\ 0 & 1 & 0 & 2 & 0 \\ 4 & 0 & 10 & 0 & 6 \\ 0 & 3 & 0 & 4 & 0 \\ 3 & 0 & 7 & 0 & 4 \end{bmatrix}$

4. Padding effect. Suppose padding = 1.

~~$\begin{bmatrix} 1 & 0 & 3 & 0 & 2 \\ 0 & 1 & 0 & 2 & 0 \\ 4 & 0 & 10 & 0 & 6 \\ 0 & 3 & 0 & 4 & 0 \\ 3 & 0 & 7 & 0 & 4 \end{bmatrix}$~~

Then, we keep the central 3×3

$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 10 & 0 \\ 3 & 0 & 4 \end{bmatrix}$

Formula:

Output size = $(\text{Input size} - 1) * \text{stride} - 2 * \text{padding} + \text{kernel size}$

$(2-1) * 2 - 2 * 1 + 3 = \boxed{3}$
size 3×3