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Assignment 3 - CS 5783

(1) The dimension of input [X] is 6

The dimension of kernel [K] is 3

There are total of 9 parameters in kernel.

(2) Assuming Stride = 1

$$X = \begin{bmatrix} 7 & 5 & 0 & 0 & 3 & 2 \\ 6 & 4 & 5 & 1 & 4 & 8 \\ 9 & 0 & 2 & 2 & 5 & 4 \\ 6 & 3 & 4 & 7 & 9 & 8 \\ 5 & 7 & 5 & 6 & 9 & 0 \\ 7 & 9 & 0 & 8 & 2 & 5 \end{bmatrix} \qquad K = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

In the first step consider

$$\begin{bmatrix} 7 & 5 & 0 \\ 6 & 4 & 5 \\ 9 & 0 & 2 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

$= 7\times1 + 5\times0 + 0(-1) + 6\times2 + 4\times0 + 5\times-2 + 9\times1 + 0\times0 + 2\times-1$

$= 7 + 12 - 10 + 9 - 2$

$= 16.$

Similarly with Stride = 1

$$\begin{bmatrix} 5 & 0 & 0 \\ 4 & 5 & 1 \\ 0 & 2 & 2 \end{bmatrix} \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

$= 5\times1 + 0\times0 + 0\times-1 + 4\times2 + 5\times0 + 1\times-2 + 0\times1 + 2\times0 + 2\times-1$

$= 5 + 8 - 2 - 2 = 9$

Similarly the results for all

$$O = \begin{bmatrix} 16 & 9 & -4 & -18 \\ 17 & -5 & -10 & -12 \\ 11 & -9 & -17 & 2 \\ 9 & -1 & -15 & 16 \end{bmatrix}$$

(3) After applying maxpooling on

$$O = \begin{bmatrix} 16 & 9 & -4 & -18 \\ 17 & -5 & -10 & -12 \\ 11 & -9 & -17 & 2 \\ 9 & -1 & -15 & 10 \end{bmatrix}$$

Max pooling with 3X3 kernel with stride 1

$$\begin{bmatrix} 17 & 9 \\ 17 & 16 \end{bmatrix}$$