Exercise 05

May 26, 2020

1 Spatial Dimenions

a)

$$W_1 = 55,\ H_1 = 43,\ D_1 = 3,\ K = 6,\ S = 2,\ F = 3,\ P = 1$$
$$W_2 = \frac{55 - 3 + 2 * 1}{2} + 1 = 28$$
$$H_2 = \frac{43 - 3 + 2 * 1}{2} + 1 = 22$$
$$D_2 = 6$$

The shape of the output tensor is $(W_2 \times H_2 \times D_2) = 27 \times 21 \times 6$

b)

$$W_1 = 73,\ H_1 = 73,\ D_1 = 3,\ W_2 = 11,\ H_2 = 11,\ D_2 = 6,\ S = 3,\ P = 2$$
$$H_2 = \frac{H_1 - F + 2P}{S} + 1 \Leftrightarrow$$
$$F = -((H_2 - 1) * S - H_1 - 2P$$
$$= -((11 - 1) * 3 - 73 - 2 * 2$$
$$= -(30 - 73 - 40) = 3$$

The number of Filters is $K = 10$, the shape of the filters is $3 \times 3 \times 5$.

c)

$$W_1 = 73,\ H_1 = 73,\ D_1 = 3,\ W_2 = 11,\ H_2 = 11,\ D_2 = 6,\ S = 3,\ P = 2,\ F = 7$$

$$\begin{aligned} W_2 = \frac{W_1 - F + 2P}{S} + 1 = 11 \\ \Leftrightarrow \frac{73 - 7 + 4}{S} = 10 \\ \Rightarrow S = \frac{70}{10} = 7 \\ X = D_1 = 3 \end{aligned}$$

Stride is 7, X is 3

d)

$$W_1 = 256,\ H_1 = 256,\ D_1 = 3,\ W_2 = 86,\ H_2 = 86,\ D_2 = 10,\ S = 3,\ F = 9$$

$$\begin{aligned} W_2 = \frac{W_1 - F + 2P}{S} + 1 = \frac{256 - 9 + 2P}{3} + 1 = 86 \\ \Rightarrow \frac{247}{3} + \frac{2P}{3} = 85 \\ \Rightarrow \frac{2P}{3} = 85 - \frac{247}{3} \\ \Rightarrow 2P = 3(85 - \frac{247}{3} \Rightarrow P = \frac{255 - 247}{2} = 4 \\ \Rightarrow P = 4 \end{aligned}$$

Number of Filters is $K = D_2 = 10$, zero Padding is $P = 4$.