

# Pooling Layer

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## 1 The Summary on Convolution Layer

1 The input of three dimension:

$$W_1 * H_1 * D_1 \quad (1)$$

2 4 parameters need to be given:

- \* Number of filters K
- \* Their spatial extent F
- \* The stride S
- \* The amount of zero padding P

3 The output of a three-dimensional unit  $W_2 * H_2 * D_2$ , which:

$$W_2 = \frac{W_1 - F + 2P}{S} + 1 \quad (2)$$

$$H_2 = \frac{H_1 - F + 2P}{S} + 1 \quad (3)$$

$$D_2 = K \quad (4)$$

each slice of depth, and the scale is generally 2 \*

2.The operation of pooling layer is the following [1]:

\* Max Pooling. Take the maximum of 4 points.

This is the most commonly used pooling method.

\* Mean Pooling. Take the mean of the 4 points.

\* Gauss pooling. Draw on the method of Gauss's vagueness. It's not common.

The most common pooling layer is 2\*2 with the stride of 2, and each depth slice of the input is sampled below. Each MAX operation is performed on four numbers, as shown in the following figure 1: The pool operation will keep the size of depth

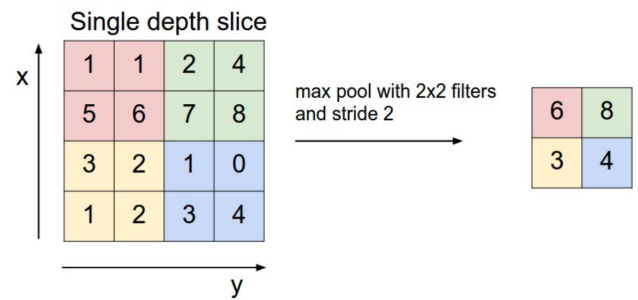


Figure 1: Example of Pooling

## 2 Pooling Layer

Pool (downsamples) is designed to reduce the feature map. The pool operation is independent of

. If the size of the input unit of the pooling layer is not an integer multiple of two, the zero-padding is generally used to fill the multiple of 2 and then

pool.

## References

- [1] Cheng Guan. Pooling layer. *CSDN*, 135(6):269–284, 2018.