**Day 45**

**What to do?**

Learn about pooling layer and different types of it.

**Pooling layer:**

While there are convolution networks that summarizes the presence of features, pooling layers use those detected features to output a much more robust feature detection. The advantage of pooling layers is that it consumes less computational power, which makes the process faster than ConvNet. There are two types of pooling techniques.

1. **Max pooling:**

This pooling operation calculates the maximum value from input image. If we consider the image below, it has input of 4 x 4 size and filter of size 2 x 2 and stride 2. Hence, the output size is 2 x 2.

One of the most prominent features of max pooling is that the values in the output represents the strongest features in the image. Moreover, there is nothing for the gradient descent to learn from. The filter size and the stride are pre-fixed by us.

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 3 | 2 | 1 |
| 2 | 9 | 1 | 1 |
| 1 | 3 | 2 | 3 |
| 5 | 6 | 1 | 2 |

Max (1, 3, 2, 9)

|  |  |
| --- | --- |
| 9 | 2 |
| 6 | 3 |

Max Pooling

2 x 2 image  
4 x 4 images

1. **Average pooling:**

In average pooling, instead of using maximum values, we take the average of the values.

Avg (1, 3, 2, 9)

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 3 | 2 | 1 |
| 2 | 9 | 1 | 1 |
| 1 | 3 | 2 | 3 |
| 5 | 6 | 1 | 2 |

|  |  |
| --- | --- |
| 3.75 | 1.25 |
| 4 | 2 |

Avg Pooling

The hyperparameters for the pooling operations are filter size ‘f’, stride ‘s’, and max or average pooling