**卷積神經網路 (Convolutional Neural Networks, CNN)**

- If 100x100x3 🡪 Linear model (Fully connected layer) 🡪 there will be too many weight/parameters to tune 🡪 (flexible but easy to overfitting

🡪 that we need CNN

**3.1 Simplification**

**3.1.1 Receptive Field**

- Usually kernel size 3x3, with stride 2 (we prefer overlap)

3.1.2 Parameters Sharing

- Talking about the convolution story)

**3.2 From the Convolutional Layer’s perspective**

- In one convolutional layer, every **filter** convolutes the whole picture and output a **feature map.**

- the filter x feature map become our new image (number of feature map/filter become the channel size)

- Therefore, the second convolutional layer is considering a (3x3 kernel size times previous layer’s number of filter), and that is why indeed the second convolutional layer is considering a (3+3-1=5 x 5 Area)

**3.1.3 Pooling – e.g., Max pooling**

- nothing needs to learn (fixed setting)

- pooling layer usually follows after convolutional layer

- nowadays, many CNN models try not to use pooling, because in the past there is pooling is people want to reduce the computation, but now computation is much advanced than in the past.

Alpha Go: does not use pooling, because add a row or column would become a different story

For CNN, data augmentation is required. Rotation, scaling the data.