CNN - convolutional neural network

Conv layer

$$\text{output size} = \left(\frac{W-k+2P}{S}+1\right)$$

W is input height/length, P is padding, S is stride, k is filter size

7 × 7 input ⇒ 3×3 filter with stride 1, padding 0

$\frac{7-3}{1}+1=5$ ⇒ output 5×5

7×7 input ⇒ 3×3 filter with stride 2, padding 0

$\frac{7-3}{2}+1=3$ ⇒ output 3×3

32×32 input ⇒ 5×5 filter with stride 1, padding 2

$\frac{32-5+2\times2}{1}+1=32$

ReLU (Rectified Linear Units) layer.

ReLU layer after each conv layer. Purpose: Introduce nonlinearity to a system that has just been computing linear operations during the conv layer. In the past use: sigmod, tanh. but relu layer works better (computational efficiency). ReLU also help to alleviate the vanishing gradient problem. ReLU change all negative activations to 0.

lower layers of network train slow because the gradient decrease exponentially through the layers

Pooling layer: downsampling layer. (Maxpooling most popular) others: average pooling. L2-norm pooling. This layer dramatically reduce the spatial dimension. Main purpose: 1. reduce parameters or weights. 2. deal with overfitting.