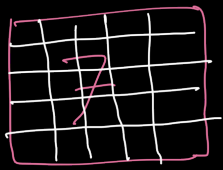


CNN VS ANN

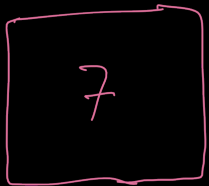
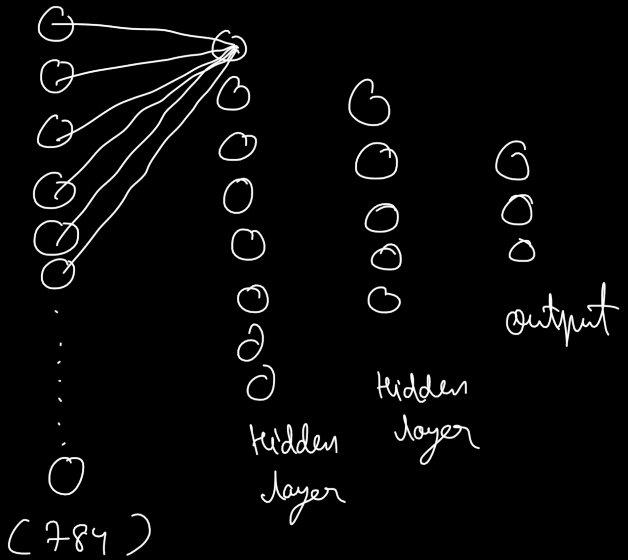
- 1) Computation Cost
- 2) overfitting
- 3) Loss of imp features like Spatial arrangements of pixels.

ANN



28 x 28

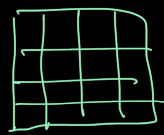
2D →



3x3

↑
bias value

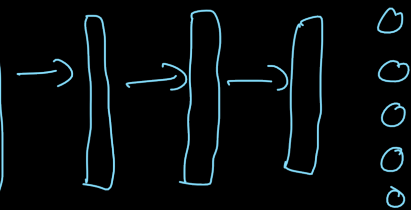
Relu



26, 26

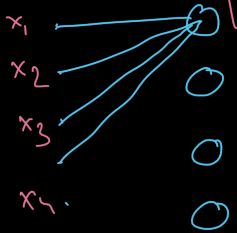
feature map

(bias = 1)



ANN

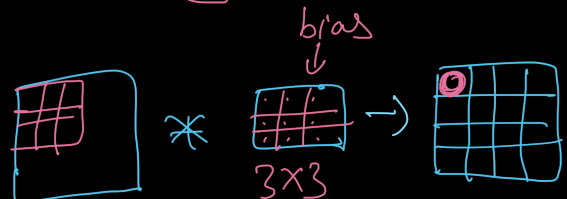
$$\text{relu} \left[(w_1 x_1 + w_2 x_2 + w_3 x_3 \dots + w_{784} x_{784}) + b \right]$$



here weights are trained or trainable parameters

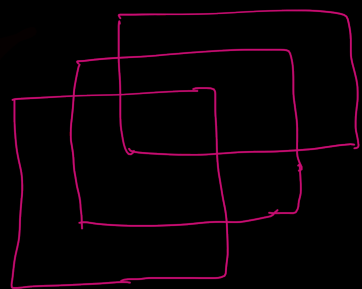
{ ANN node & CNN filter }
are same to some extent

CNN

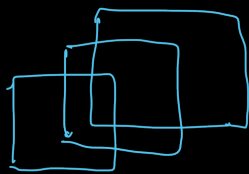


$$\text{relu} \left[(x_1 w_1 + x_2 w_2 + x_3 w_3 + \dots + x_9 w_9) + \text{bias} \right]$$

here filter values are trainable

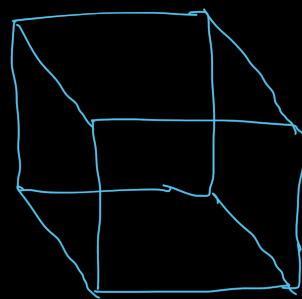


$(228, 228, 3)$

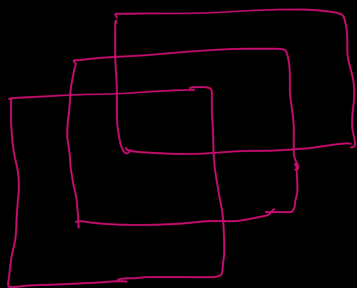


$(3, 3, 3)$

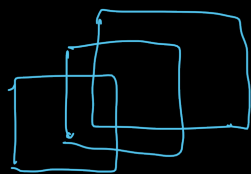
50 filters



learnable Parameters : $3 \times 3 \times 3 \times 50$ $(226, 226, 50)$
 $+ 50$ biases = 1400

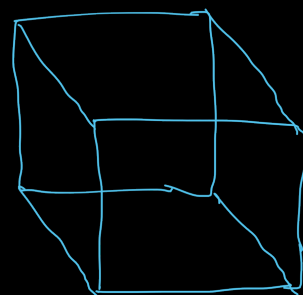


$(1080, 1080, 3)$



$(3, 3, 3)$

50 filters

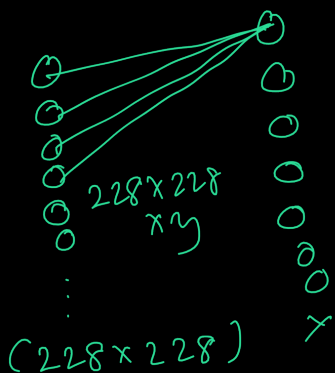


$(226, 226, 50)$

learnable Parameters : $3 \times 3 \times 3 \times 50$
 $+ 50$ biases = 1400 (same)

\Rightarrow that's why computational cost is less in CNN than ANN
 because learnable parameters in CNN do not depend on
 input size like ANN but number of filter and filter
Size.

But in ANN



If input size changes

