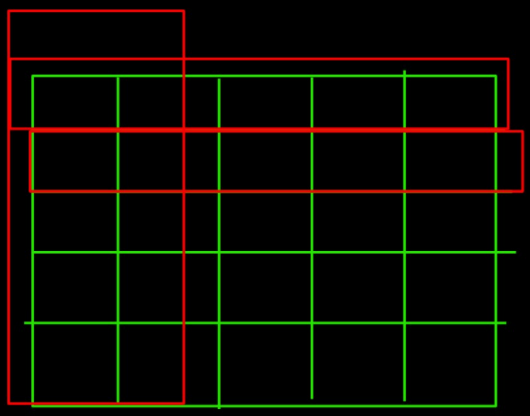
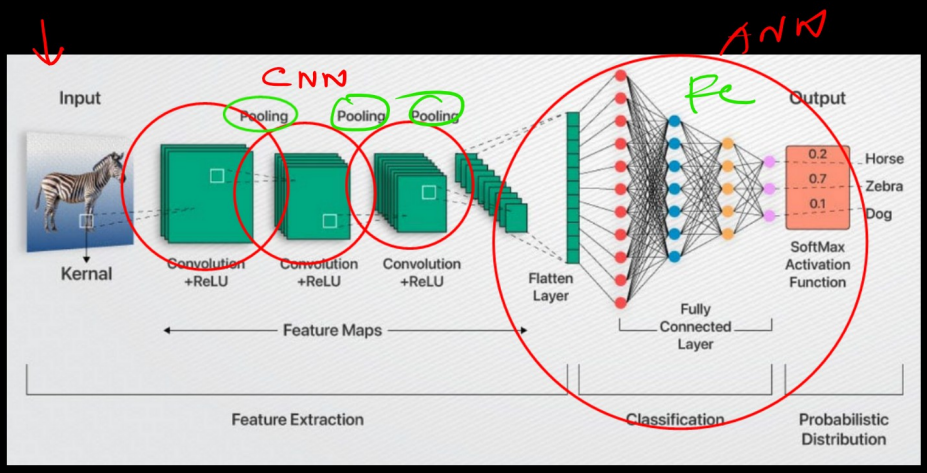
What is CNN?

Convolutional Neural Network, also known as convnet, CNN, are the special kind of Neural Networks for processing Data that has a known grid like topology.





→ convolution
→ pooling
→ FC layer

ANN → Matrix multiplication

CNN → Convolution

1998 — Yann Lecun → AT and T Lab — LENET 5

Document Recognition

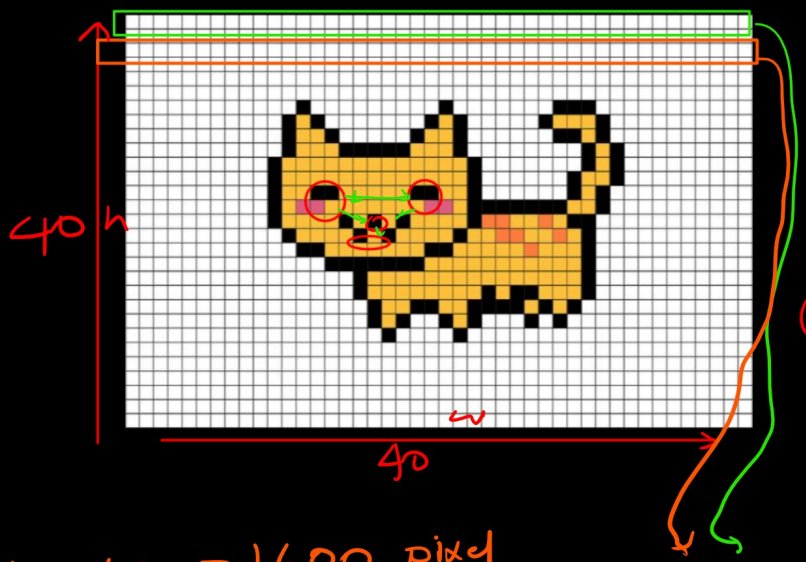
① Digit
② Alphabet

Resnet-50, Inception, Vgg16, Olexnet

CNN →

Why not to use ANN?

2D



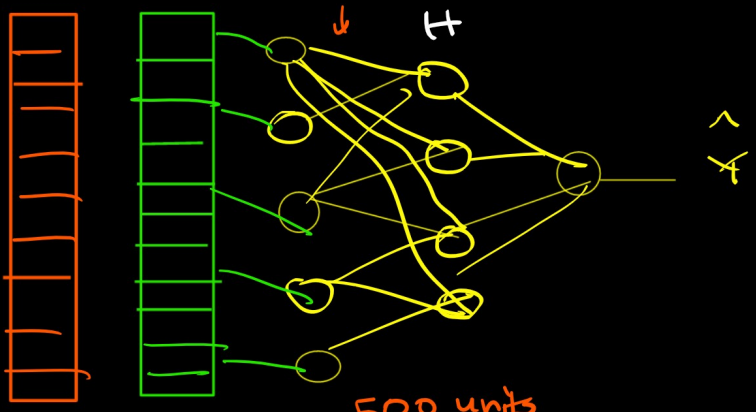
~~4~~ High computation cost
~~2~~ Overfitting issue
~~3~~ Loss of important spatial features/pixels

40 x 40 = 1600 pixel

1600 x 500
⇒ 800,000 weight

1000 x 1000
⇒ 1000000 pixels

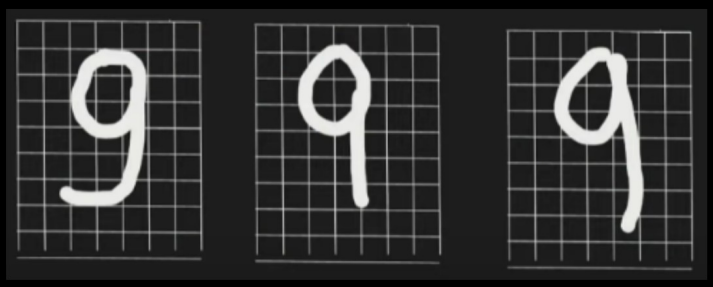
ANN



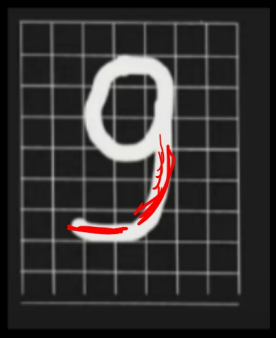
10 00000 X 500

⇒ 5000000000 ⟶ parameter size

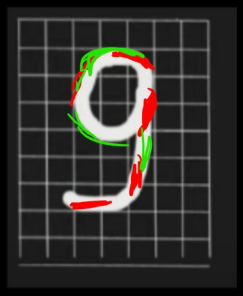
CNN :



→ primitive feature edges

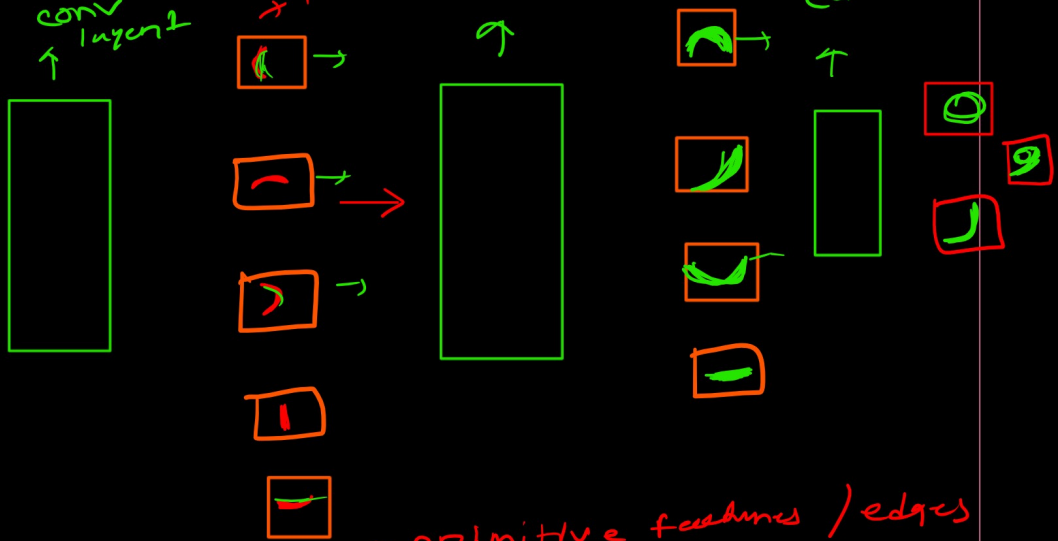


→ features



Feature Extraction → Filter

conv layer1 → FM → conv-2 → conv-3



→ primitive features / edges

2 types cell

① simple cell → small feature → small receptive field

② complex cell → Big feature → Big receptive field

Filters → matrix (3,3) (5,5) (7,7)

1	0	-1
2	0	-2
1	0	-1

→ Filters → sobel filter vertical edge

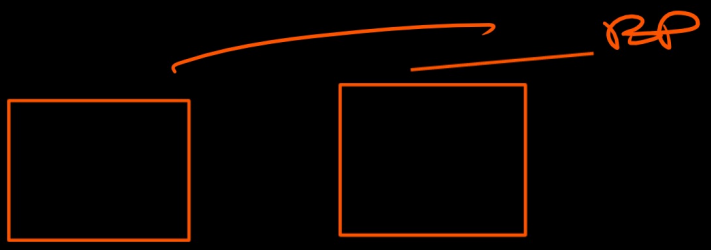
1	2	1
0	0	0
-1	-2	-1

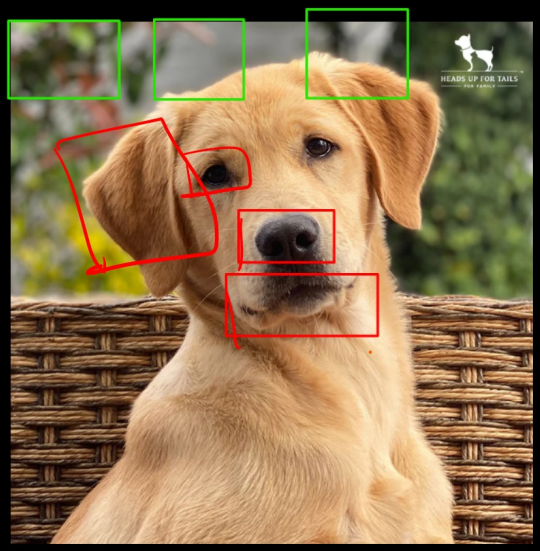
→ Horizontal sobel filters

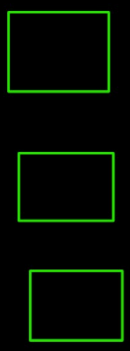
Hand coded – Filters –

CNN —— Deep Learning NN

Back propagation







Convolution:

- Padding, stride
- pooling

→ CNN Architecture

→ conv
- padding, stride
- pooling
- Activation function

→ CNN Architecture

CNN vs ANN

→ projects — classifier system

→ Data Augmentation

→ popular CNN Architecture
- LENET
- VGG16
- AlexNet
- ResNet
- Inception
- so on ---

→ Transfer Learning