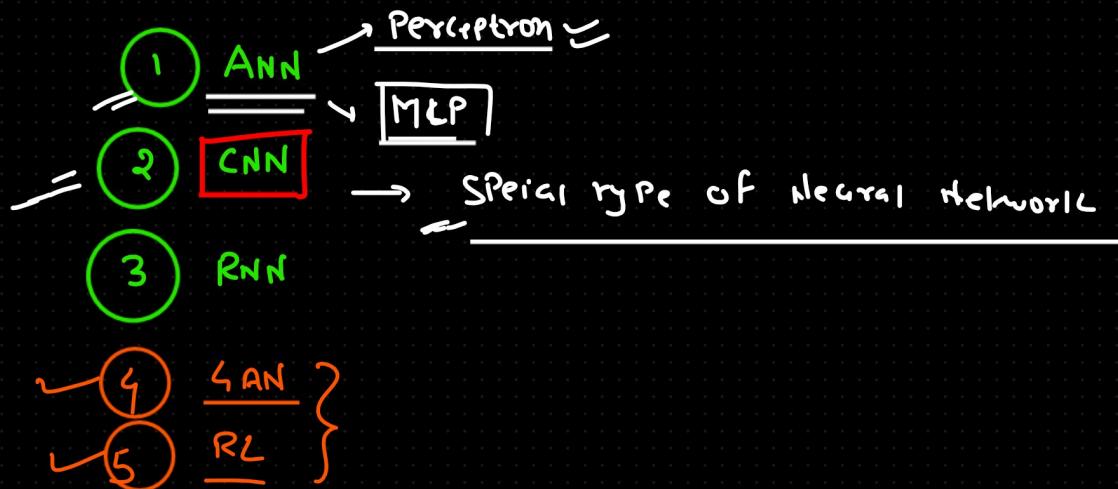
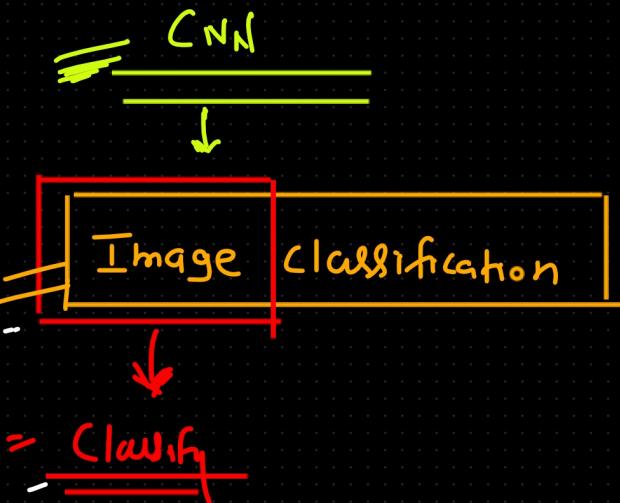
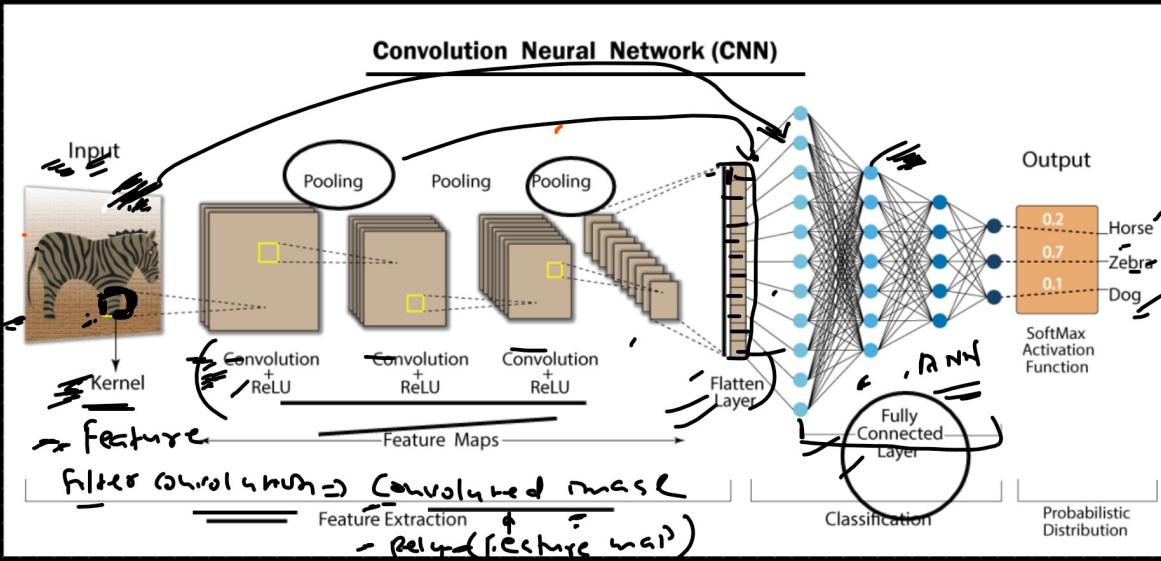


Convolution Neural Network



- Which type of Data we use $\boxed{\text{CNN}}$?

= image, video \Rightarrow grid like structure
 $\Leftrightarrow (2\text{-D}, 3\text{-D}) =$
 $\Leftrightarrow (\text{Matrix}) =$



Sunny | Krish |
Sudhanshu |
Happy |

Image \Rightarrow Collection of Pixels \Rightarrow Pixel \rightarrow Numerical value

\hookrightarrow Gray image
(Black and White)
Single channel

\hookrightarrow [0-255]
Black, White



\hookrightarrow Color image (R, G, B)
 \hookrightarrow (Red) (Green) (Blue)
3 channel.



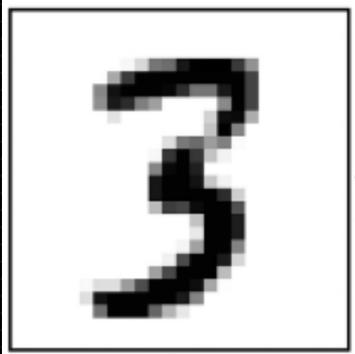


Image | Picture \Rightarrow Collection of Pixels

4

Numeric value

$$[0 - 2\pi)$$

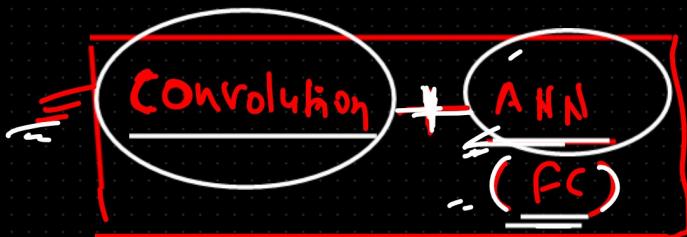
2

white

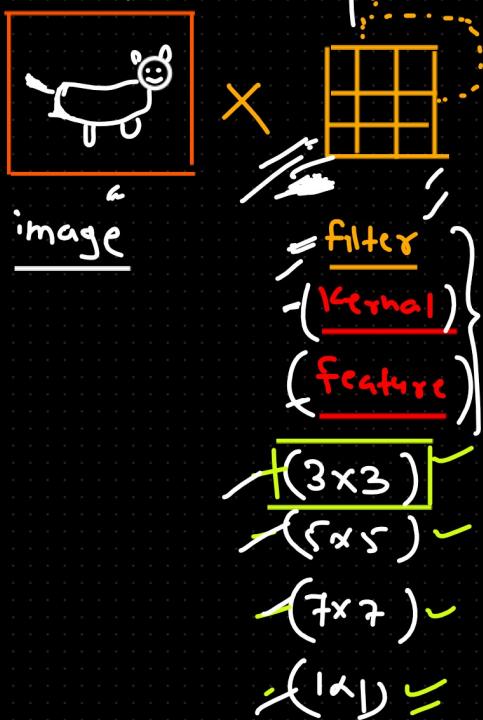
trained your mind to identify this particular

(CNN)

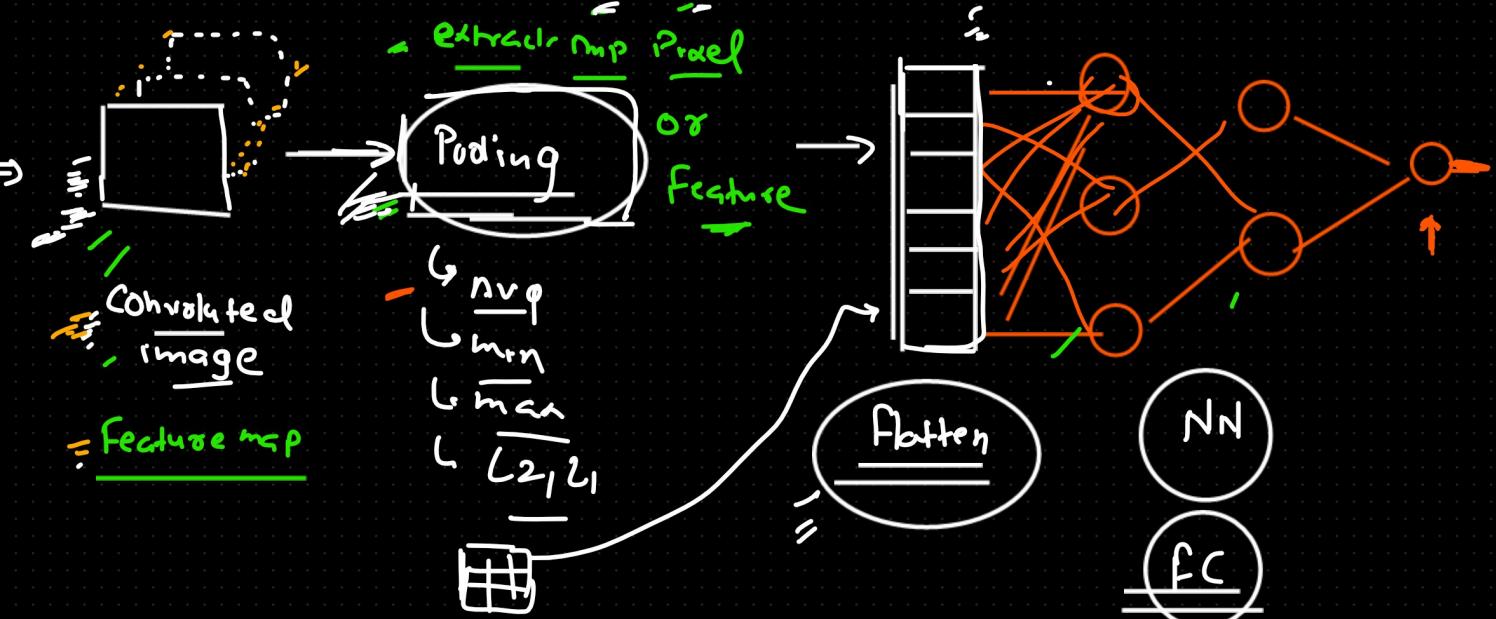
Convolution Neural Network



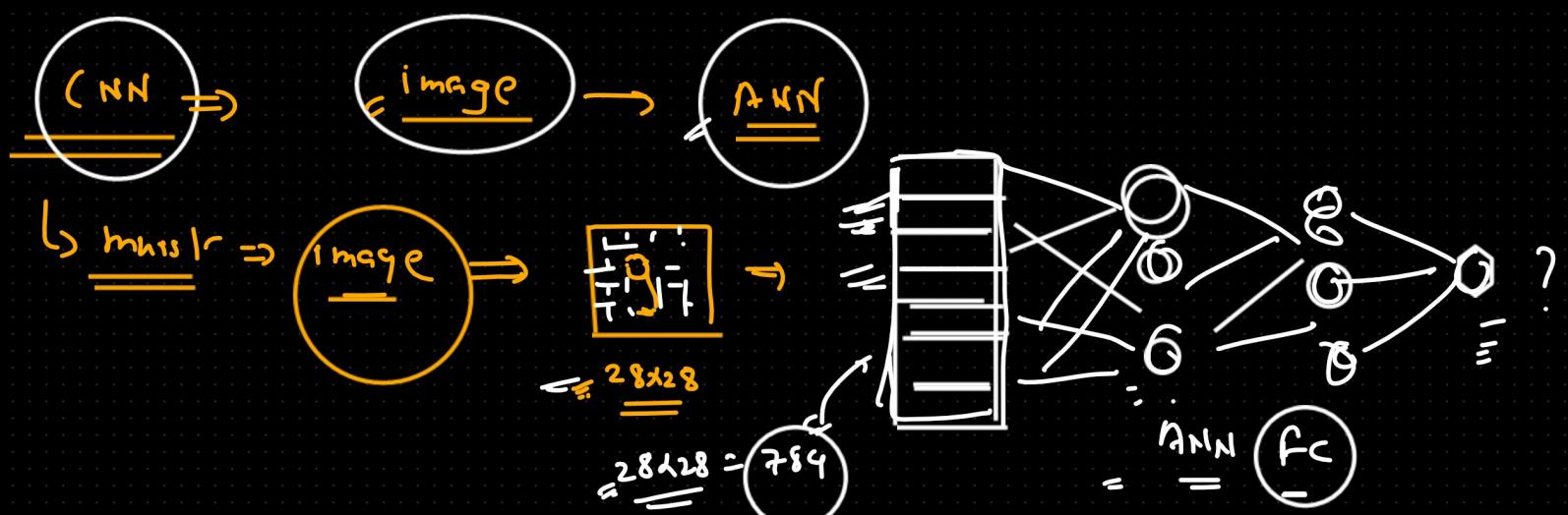
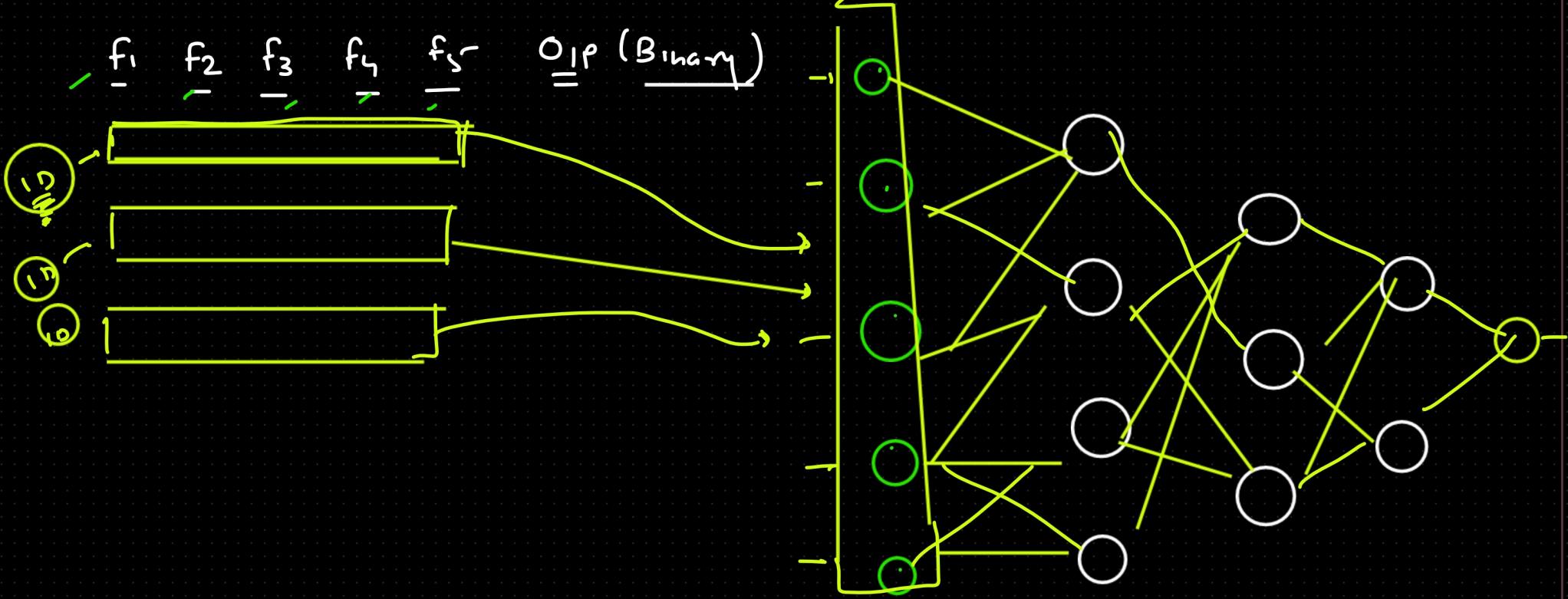
- Convolution

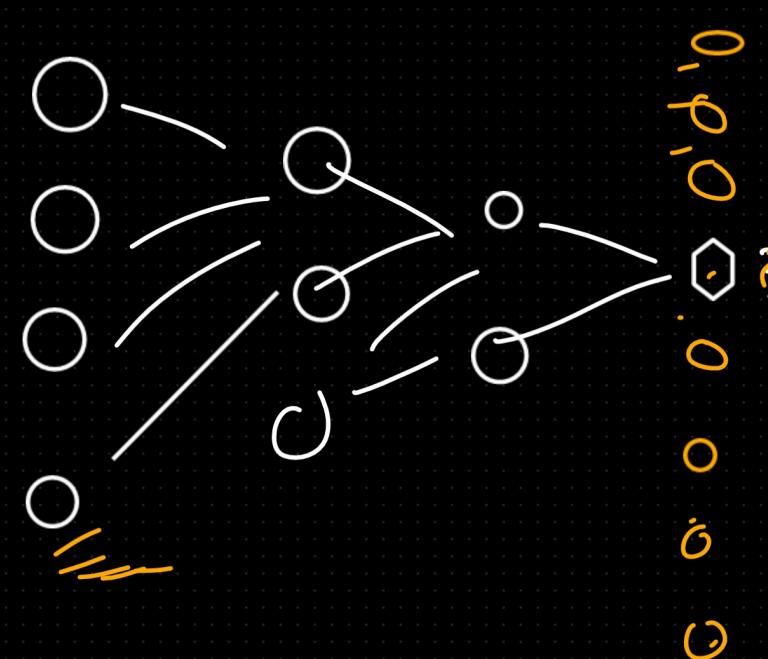
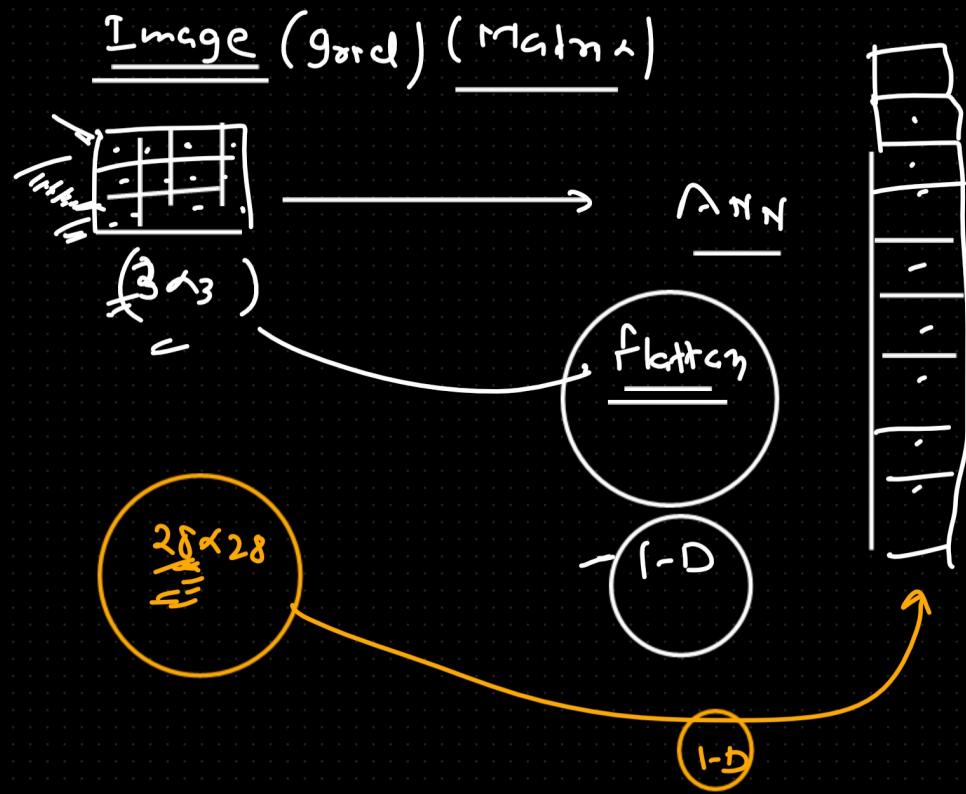
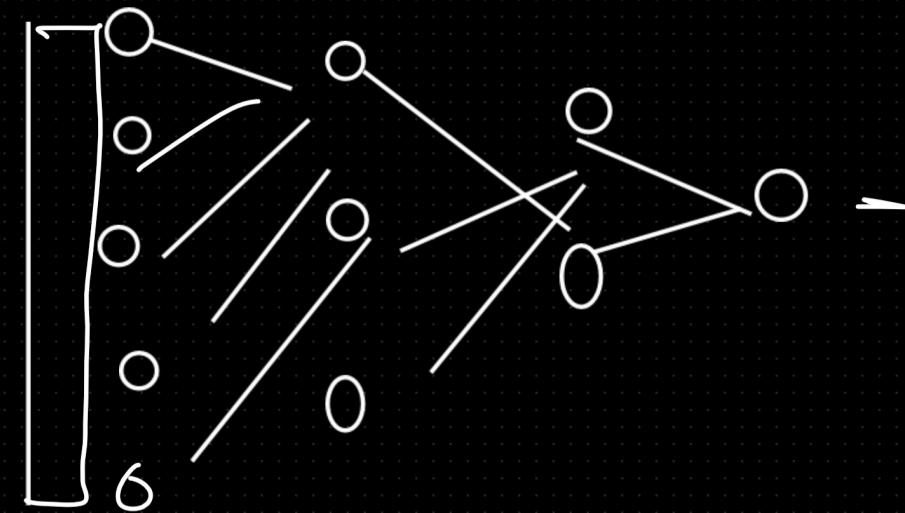
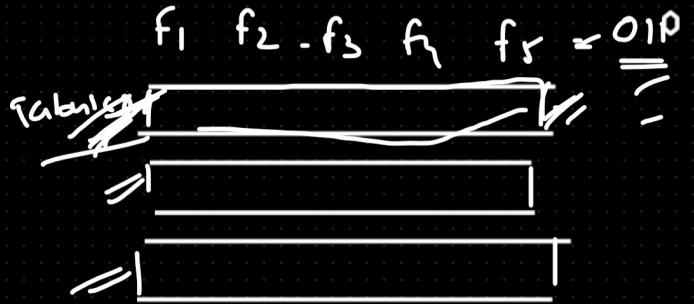


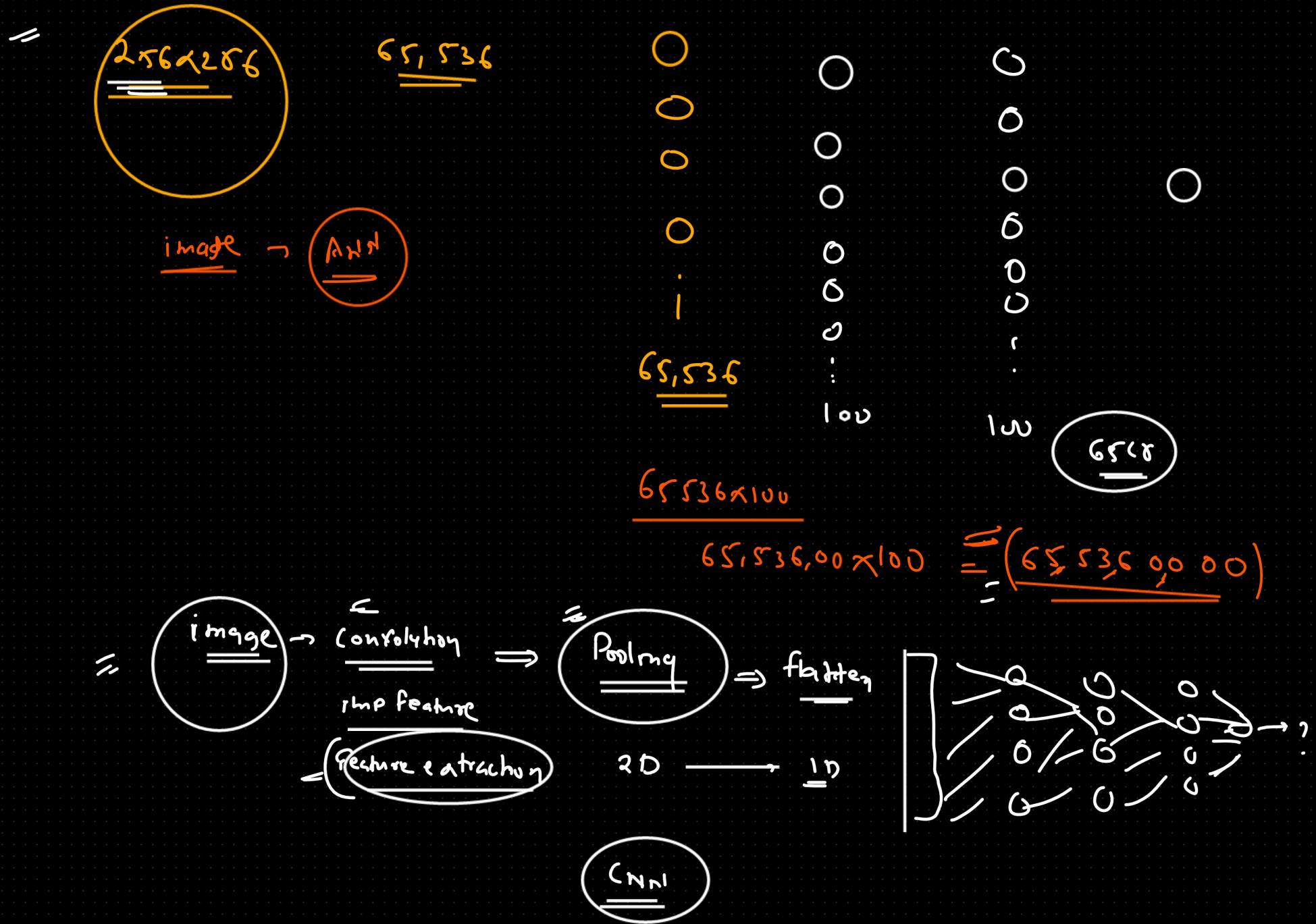
Learnable
filter



High-level overview



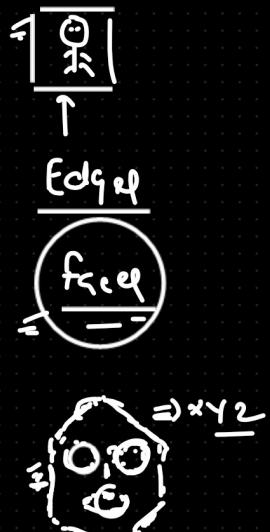
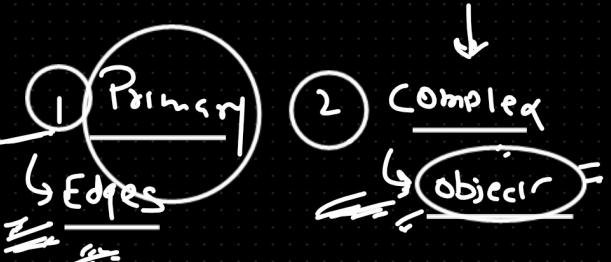
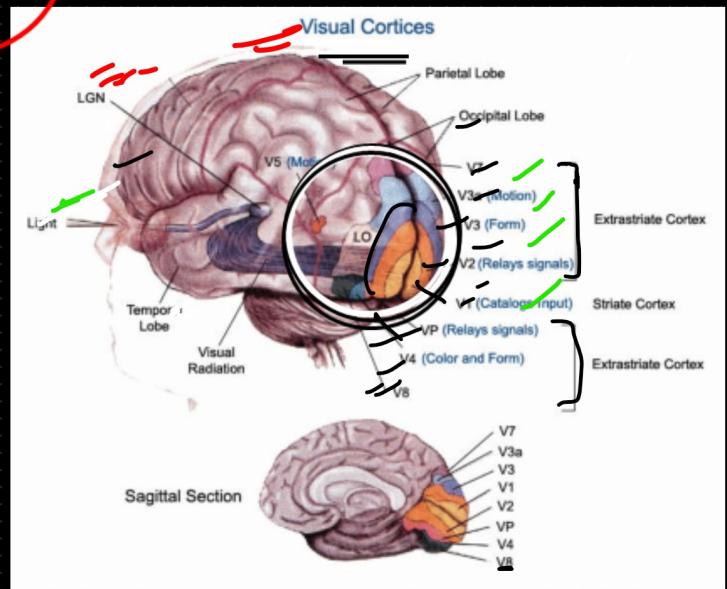




1960-1970 Human brain

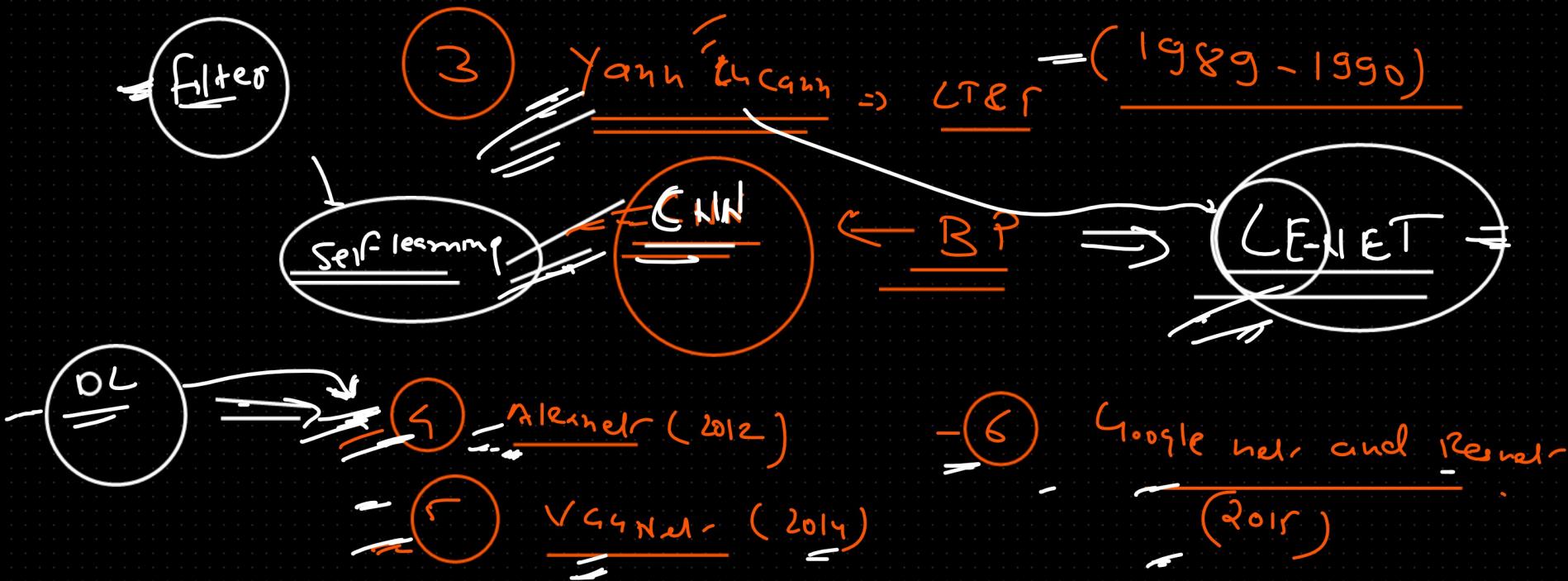
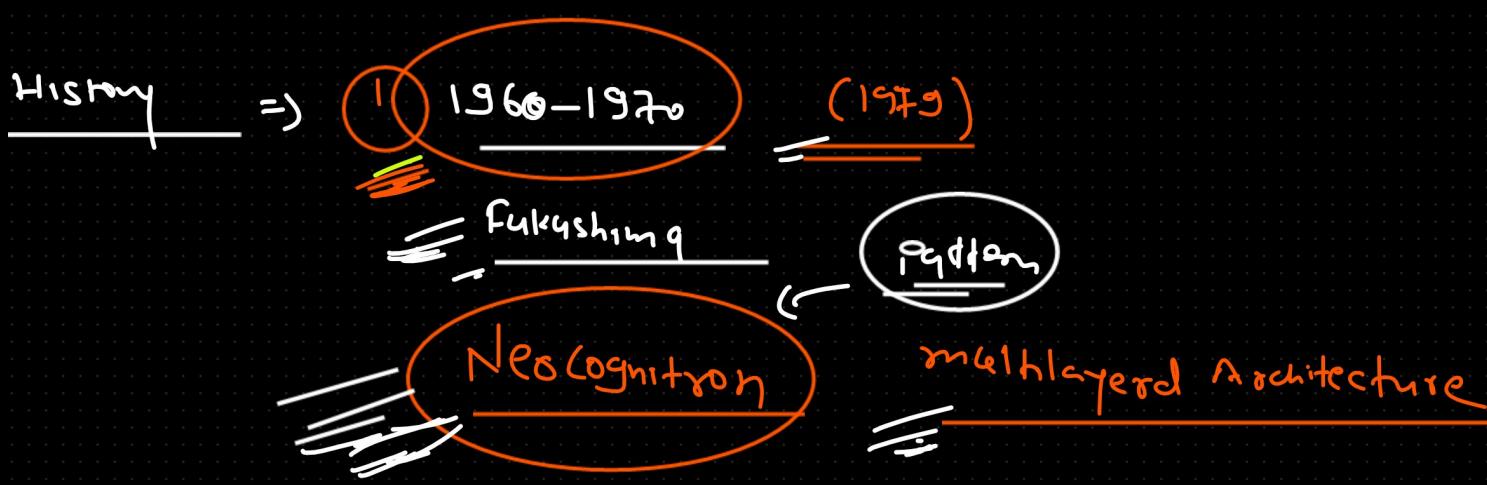
From where this CNN inspired

Artificial Human vision (Visual cortex)



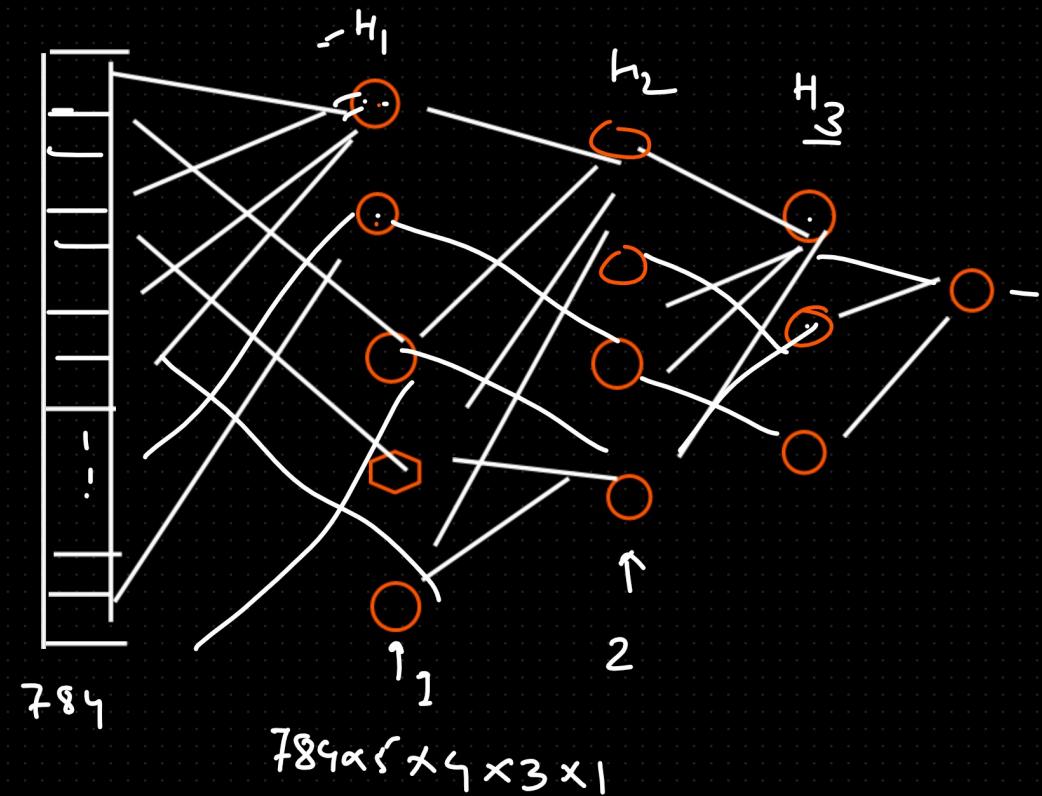
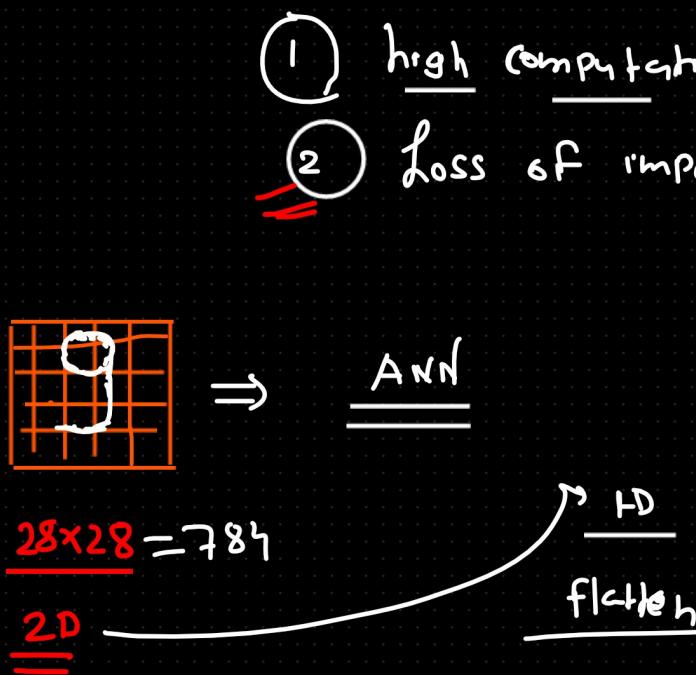
human

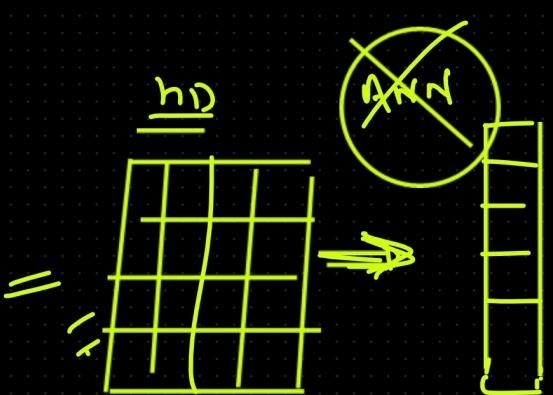
1960



Transfer Learning

Why not ANN instead of CNN? --





$$\frac{1000 \times 100}{\underline{\hspace{1cm}}}$$

1000000

$$= \frac{1}{1000000} \times 100 = 100$$

GDP \Rightarrow 176 Billion \equiv Billion, Trillion

$$\begin{array}{r}
 \overset{5}{\cancel{2}} \\
 787 \cancel{a} 60 \\
 \underline{-000} \\
 6103x \\
 \hline
 61,050
 \end{array}$$

$$\frac{10 \times 10}{100}$$

franchise

(Precise)

256 \times 256



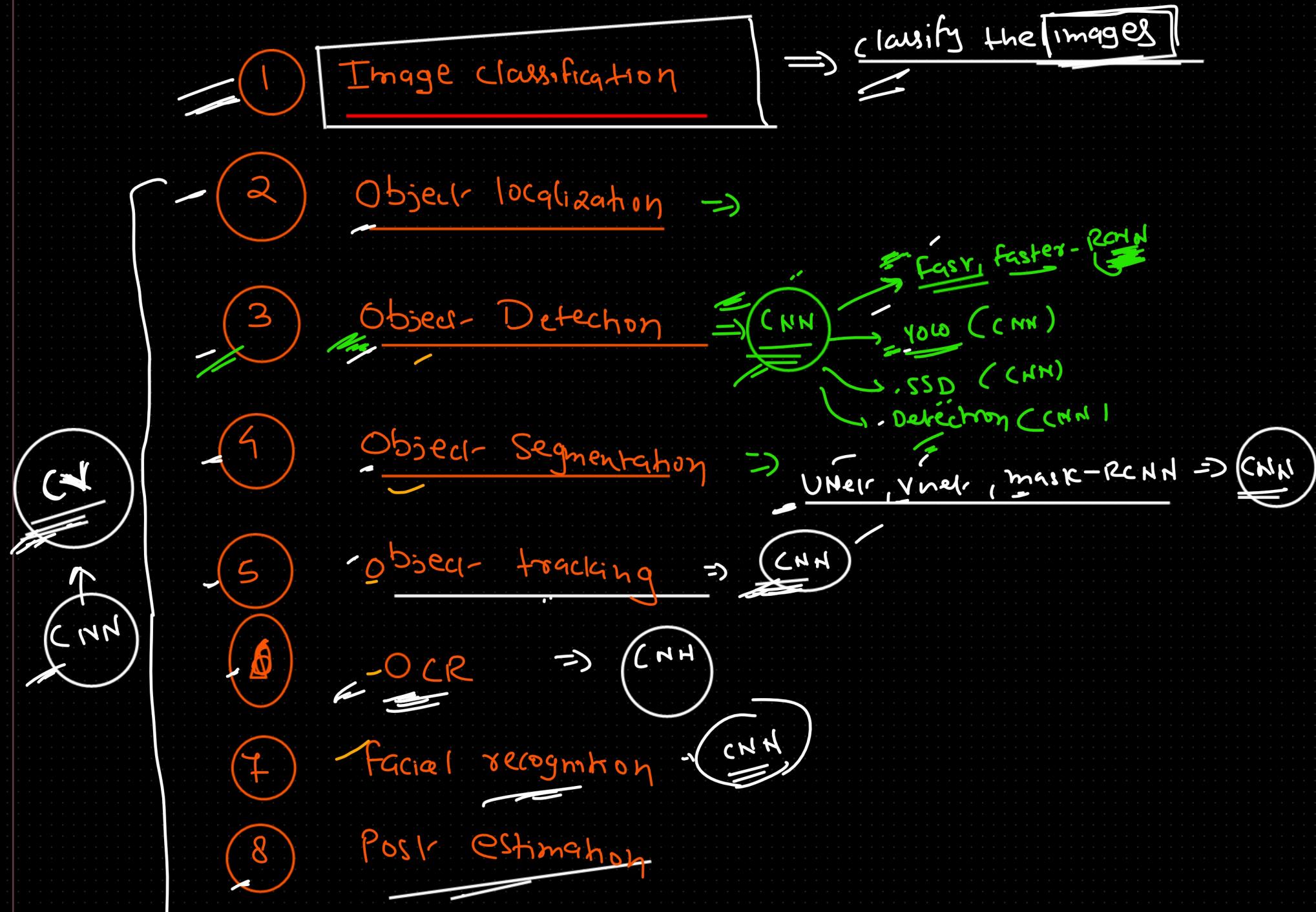
\Rightarrow (Con \rightarrow Pooling)

128 \times 128

\downarrow
256 \times 256

↑
Padding

Application of CNN ~~(Image, Videos)~~



5

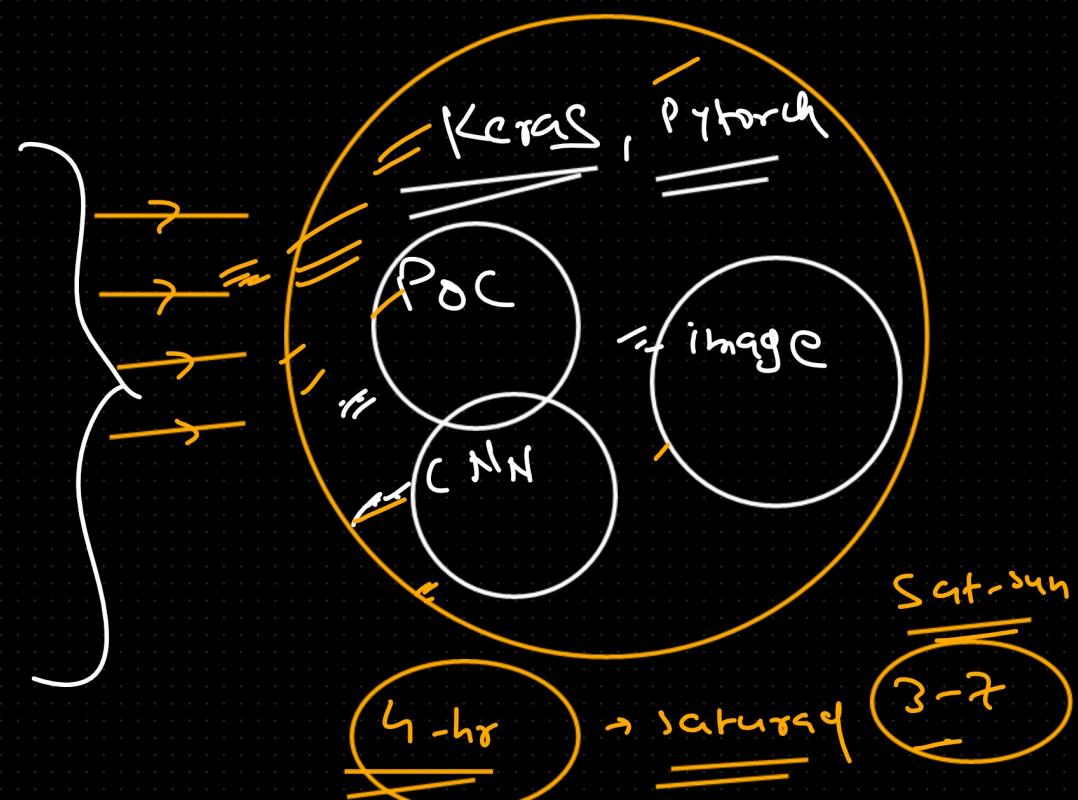
Gray to Color, Super resolution \rightarrow CNN

OpenCV \Rightarrow Python Lib \Rightarrow CV

(high level overview)

Convolution mathematically

- 1 Filter, Kernel, feature
- 2 Convolution
- 3 Relu \rightarrow use
- 4 Stride, Padding
- 5 Pooling



Data augmentation

Popular CNN Architecture (LeNet, Alexnet, VGG, Resnet, GoogleNet)

(transfer learning) \Rightarrow

