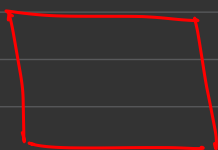# Convolutional Neural Network

What is an Image
What type of problems (AI)
using Images
ANN is a bad choice
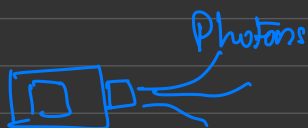
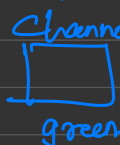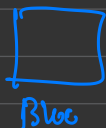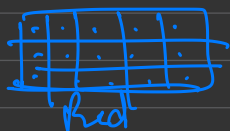(CNN)

0-255
depth

(H)

(W)

Image is a rank 3
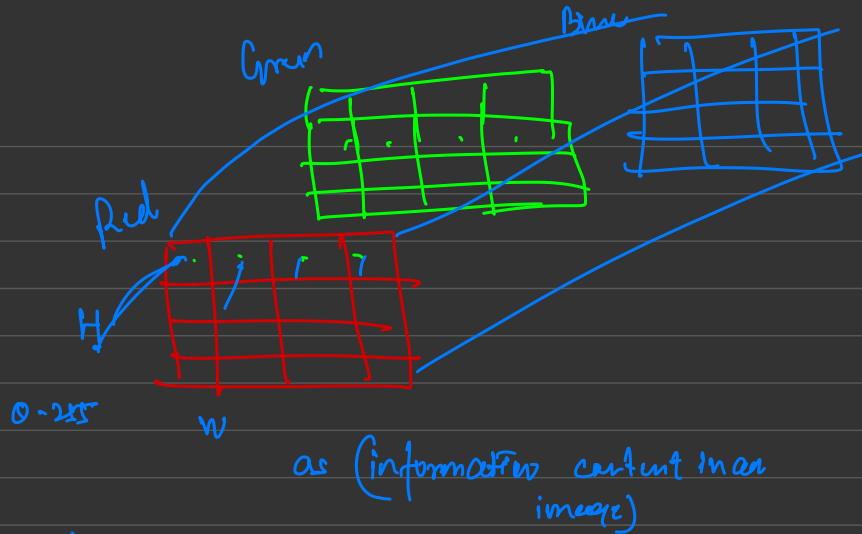tensor
with dimensions of H×W×d.
these many cells are
present

within these cells we have some numbers (0~255)

Red
Green
Blue

Photons

Photons → Sensors → voltage (Red, Green, Blue
Channels)

Red   Blue   green

Green
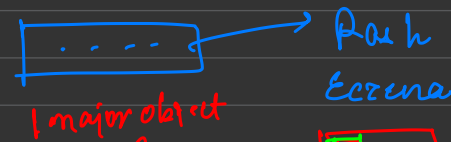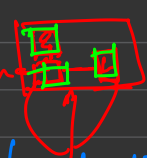
Blue

Red

H

0 - 255

W

as (information content in an image)

→ Variation in the pixel values across the Red, Green, Blue Channel.

Cat

detect an object in an image
→ image classification

Rach
Ecrena

1 major object

AI Problems:
① image classification
② object detection and localization

Person

CCTV Cameras

SD > 2.0m
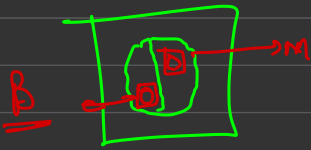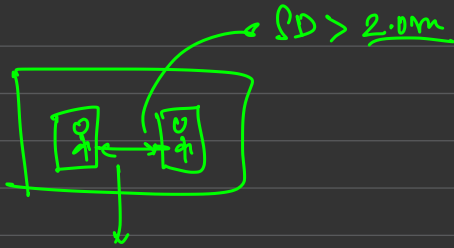
Facial Recognition System (Siamese network)

Login Phone

Spatially colocated

28

information

W
28

784

x_1 x_2 x_3

784 x500

54

10

CNN

20	30	40	60
10	100	70	80
40	120	130	110
70	60	30	20

4

2

filter will move throughout
the image and extract features

movement of the filter throughout
the image is called Convolution

Image

20	30	40	70
100	100	180	170
60	120	230	140
110	150	170	255

Convolution

1	0
0	1

160
$20\times1 + 30\times0 + 100\times0 + 140\times1$

210
$40\times1 + 70\times0 + 180\times0 + 170\times1$

210
$60\times1 + 120\times0 + 110\times0 + 150\times1$

385
$130\times1 + 140\times0 + 170\times0 + 255$

Feature map →

160	210
210	255

extracted feature from the image.

that the filter convoluing on an image
is basically a feature extraction process

Edges
Boundaries Curved
Complex Boundaries
Colour variation

That the feature extraction

tu1 w2
w2 l2

learnable

Convolutional neural network

FM