quantity

Augementation

| labelled data |

Computer Vision

Data improvement

quality

Preprocessing of data

E1 → 100

E2 → 98

f3 → 105

f4 → 36

f5 → 48

N1

x_1

w_1

N2

x_2

w_2

b

N4

$\Sigma | f$ → $\hat{y}$

N3

x_3

w_3

I/P

O/P

There are two important rules -

A. Input layer neurons do not perform any computation on data, rest all neurons are computational neurons

B. Every computational neuron performs two step mathematics -

a. Weighted sum with bias

$$Z = x_1 w_1 + x_2 w_2 + x_3 w_3 + b$$

b. Activation function

$$N_4 = f(Z)$$

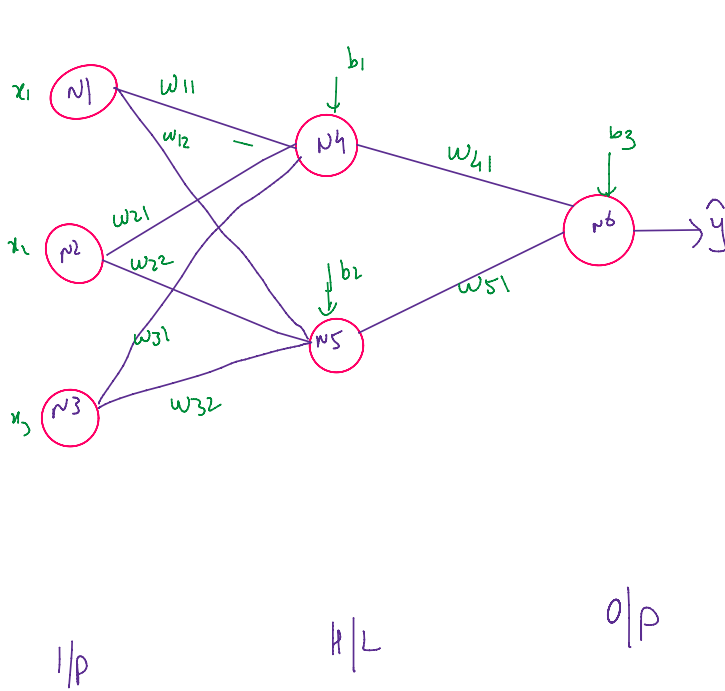$$\hat{y} = N_4 = f(x_1 w_1 + x_2 w_2 + x_3 w_3 + b)$$

$f(x) = $ identity function $= f(x) = x$ → Linear Regression

$f(x) = $ Sigmoid fn. $= f(x) = \dfrac{1}{1 + e^{-x}}$ → logistic Regression

feed forward process
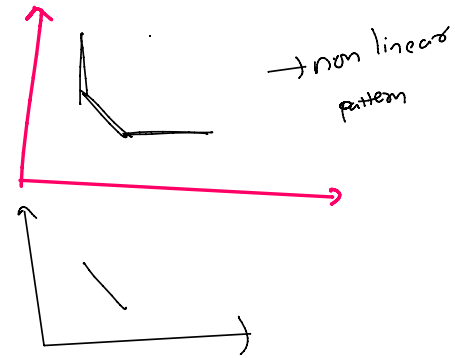
$$N_4 = f(x_1 w_{11} + x_2 w_{21} + x_3 w_{31} + b_1)$$

x_1 (N1) w_{11} b_1
.|

$$N_4 = f\left(x_1 w_{11} + x_2 w_{21} + x_3 w_{31} + b_1\right)$$

$$N_5 = f\left(x_1 w_{12} + x_2 w_{22} + x_3 w_{32} + b_2\right)$$

$$N_6 = f\left(N_4 w_{41} + N_5 w_{51} + b_3\right)$$

→ non linear pattern

I/P   H/L   0/P

Iteration - for the learning algorithm one cycle of feeding data, calculating error and updating parameters

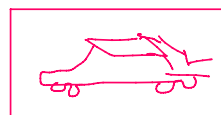Epoch - training the learning algorithm with the whole training dataset for one time

If we feed whole data all at once, then 1 epoch = 1 iteration
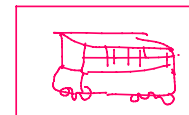If we feed data in batch, lets say total data = 10000, we are using batch_size = 1000
Then 1 epoch = 10 iterations

Kid → Recognizing a bus v/s car

100 Pictures of car   100 pictures of bus

1) How to detect a vehicle?

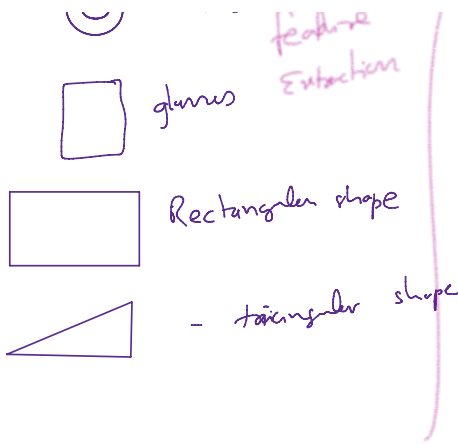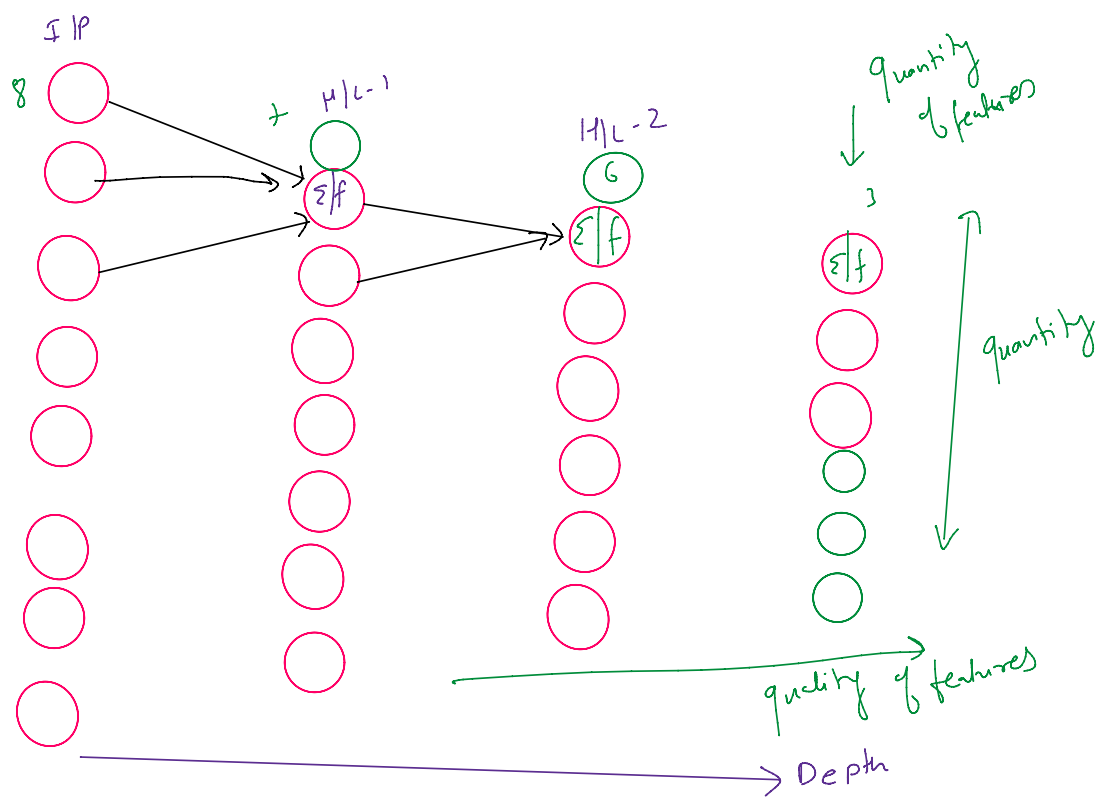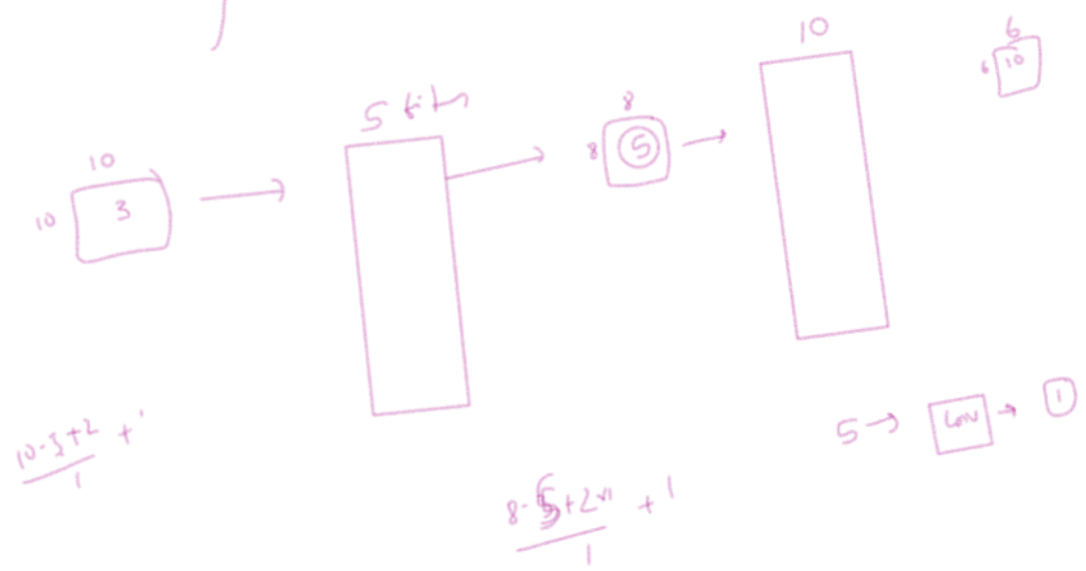2) Whether the vehicle is car / bus?

○ wheels
□ doors

feature Extraction

Classification

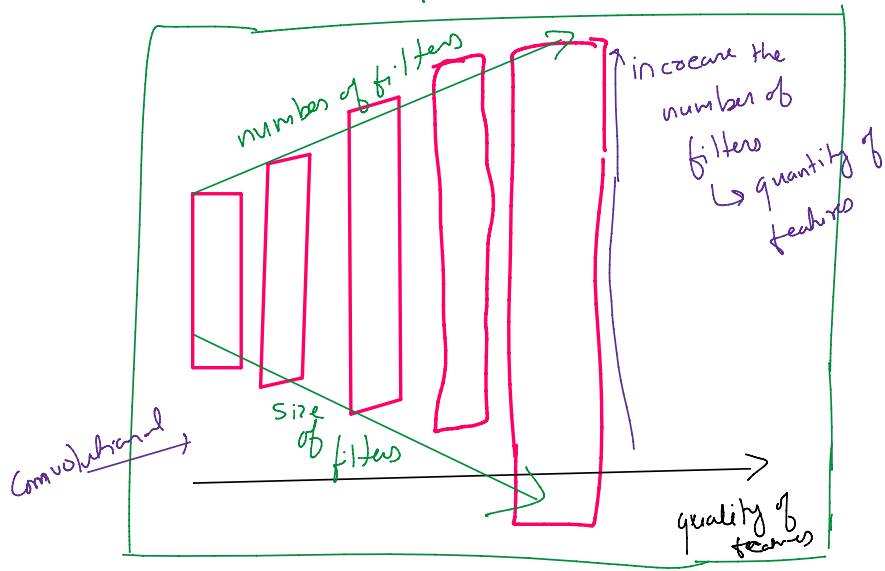|	Car	bus
Wheels	4	24

feature
Extraction

glasses

Rectangular shape

- triangular shape

Cao

Whells → 4 | 24

- low height | high height
  low width | hight width

[rectangle]

[triangle] present | Absent

10
10 [3] →

S filter

[tall rectangle] → 8 [⑤] 8 →

10
[tall rectangle]

6|10

$\frac{10-5+2}{1} + 1$

$\frac{8-5+2\cdot1}{1} + 1$

5 → [conv] → ①

I/P

8 ○
  ○
  ○   + H/L-1
  ○   ⑥
  ○   [Σ|f]   H/L-2
  ○   ○   ⑥
  ○   ○   [Σ|f]
  ○   ○   ○
  ○   ○   ○
  ○   ○   ○

quantity
of features
↓
3
[Σ|f]
○
○
○
○
○

quantity

quality of features

→ Depth

Feature dectection   Classification

Feature detection

numbers of filters

increase the
number of
filters
↳ quantity of
features

Convolutional

size of filters

quality of features

classification

Dense

num of
narons

quality