Day-1

Deep-learning → heart of DL

NN → How will you describe NN in simple words?

1.1

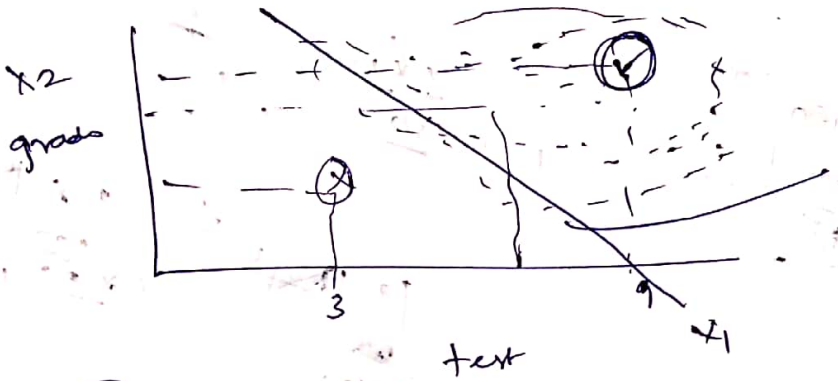
1.2

Stud-1: test 9-10, 8/10 ✓

Stud-2: test 3-10, exam 4/10 ✗

Stud-3: test ?, grade 1/10, grade 6/10 ?

Classification problem 2D.



how do we find the line?

② Boundary line

$\Rightarrow 2x_1 + x_2 - 18 = 0$

$w_1x_1 + w_2x_2 + b = 0$

$wx + b = 0$

$w = (w_1, w_2) \rightarrow$ weights

$x = (x_1, x_2) \rightarrow$ inputs

$y \Rightarrow$ labels 0 or 1

↓ red — rejected

↓ blue — not rejected

③ Higher Dimension

Grades

test

test

Boundary plane

$w_1x_1 + w_2x_2 + w_3x_3 + b = 0$

$wx + b = 0$

$\hat{y} = \begin{cases} 1 & \text{if} \\ 0 & \end{cases}$

Predictor

$\hat{y} = \begin{cases} 1 & \text{if } wx + b \geq 0 \\ 0 & \text{if } wx + b < 0 \end{cases}$

④ n-dimensional space

	x_1	x_2	...	x_n	y
s1					1 (yes)
s2					0 (no)
...					
sn					1 (yes)

n-dimensional space

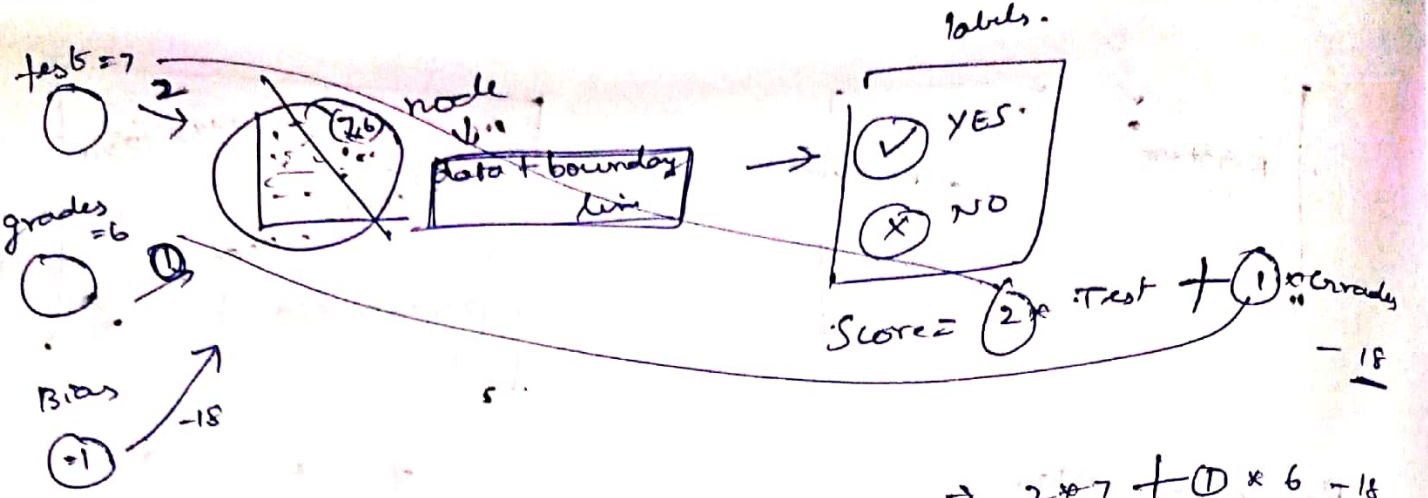
$x_1, x_2, \ldots x_n$

Boundary

(n-1) dimensional hyperplane

$w_1x_1 + w_2x_2 + \ldots + w_nx_n + b = 0$

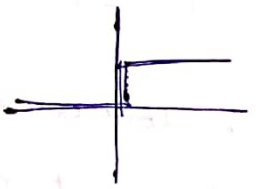
Perceptrons:



$\Rightarrow 2*7 + 1*6 - 18$

$14 + 6 - 18$

$20 - 18 = 2$ Yes



Step function:

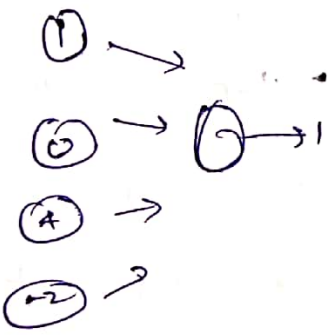
1 if $x \geq 0$

0 if $x < 0$

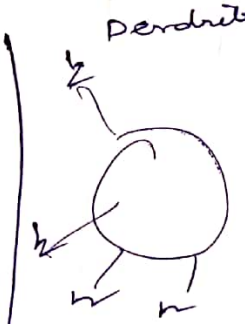
why it is called NN?

Perceptrons kind of looks like of Neurons in brain

Perceptrons



Dendrites

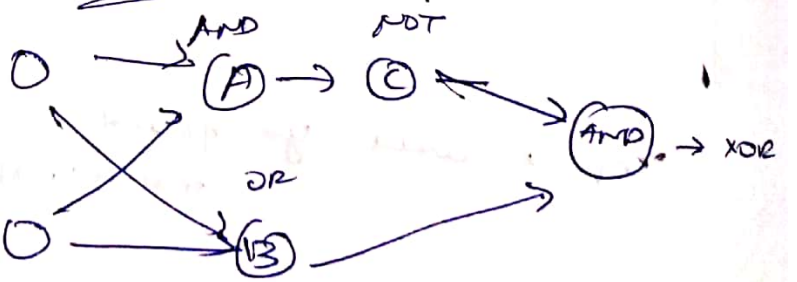


it takes the input from input & decides if it outputs a nerve impulse or not through axon

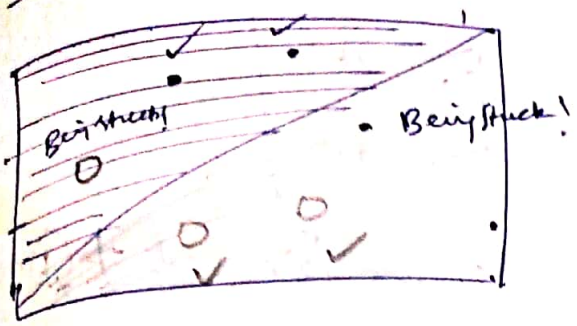
Perceptron

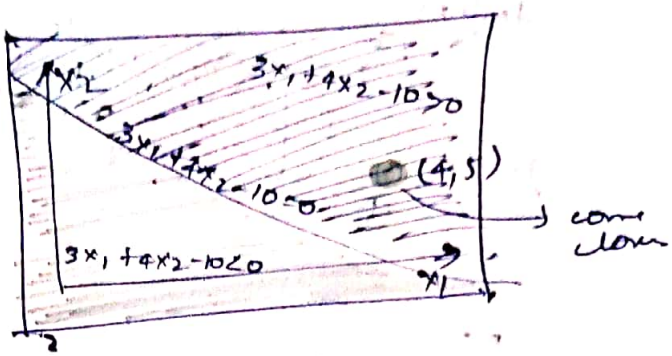
AND OR XOR

Framing a XOR



Perceptron





Perceptron Algo:

For every misclassified pt:

if pred == 0:

(red pt in Blue area)

for i ← 1 to n:

update $w_i \leftarrow w_i + \alpha x_i$

update $b \leftarrow b + \alpha$

if pred == 1:

(Blue pt in red area)

for i ← 1 to n:

update : $w_i \leftarrow w_i - \alpha x_i$

update $b \leftarrow b - \alpha$

Repeat until you found no-error.

3 4 −10

(4) (5) (1)

(−) (−) (−)

−1 −1 −11

∴ we don't want the drastic moves bcoz it misclassifies the others too! :(

we need to take small step

So Here Comes Learning rate

multiply with LR LR = 0.1

3 4 −10

− 0.4 0.5 0.1

2.6 3.5 −10.1

$2.6x_1 + 3.5x_2 - 10.1 = 0$

now the line shift & correctly classifies now!