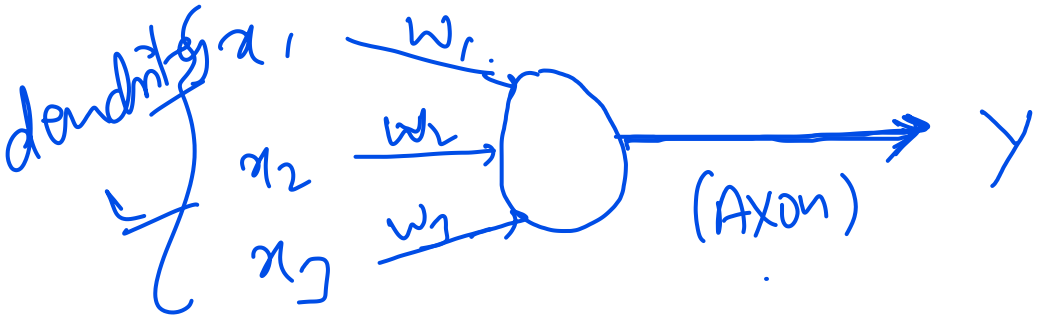
1/Nov/2021

* Artificial Neural Networks
* Neurons
* The perceptron & Single layer Neural network.



Simple of ANN

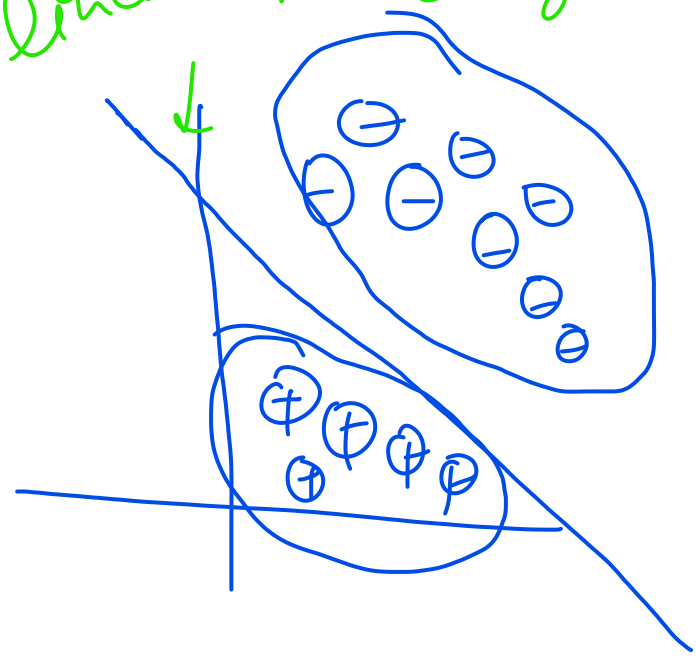
Perceptron :-

Binary classifier - 0, 1

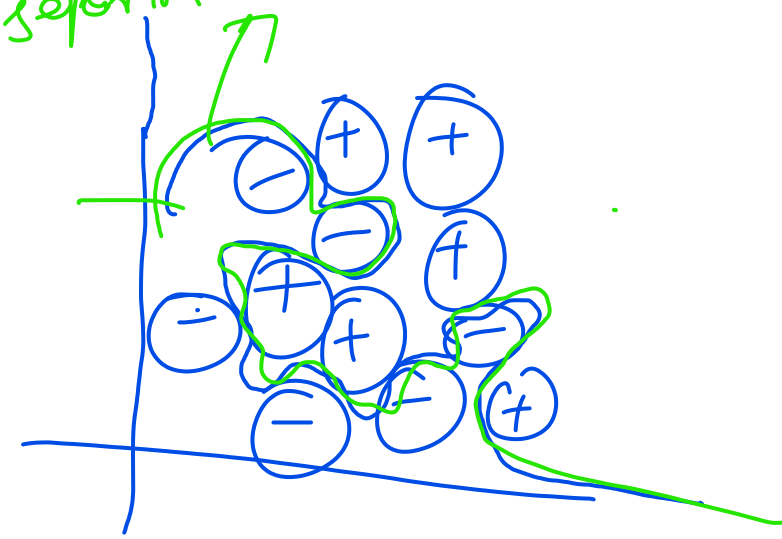
eg

* It is generally used for binary classification or for linear pattern classification.

Linear separable classifier



Non-linear separable classifier



* It is a supervised learning algo which means

Diabetic Dataset

S.L	P.R	Age	F History	Y
232	—	—	—	0
450	—	—	—	1
—	—	—	—	—

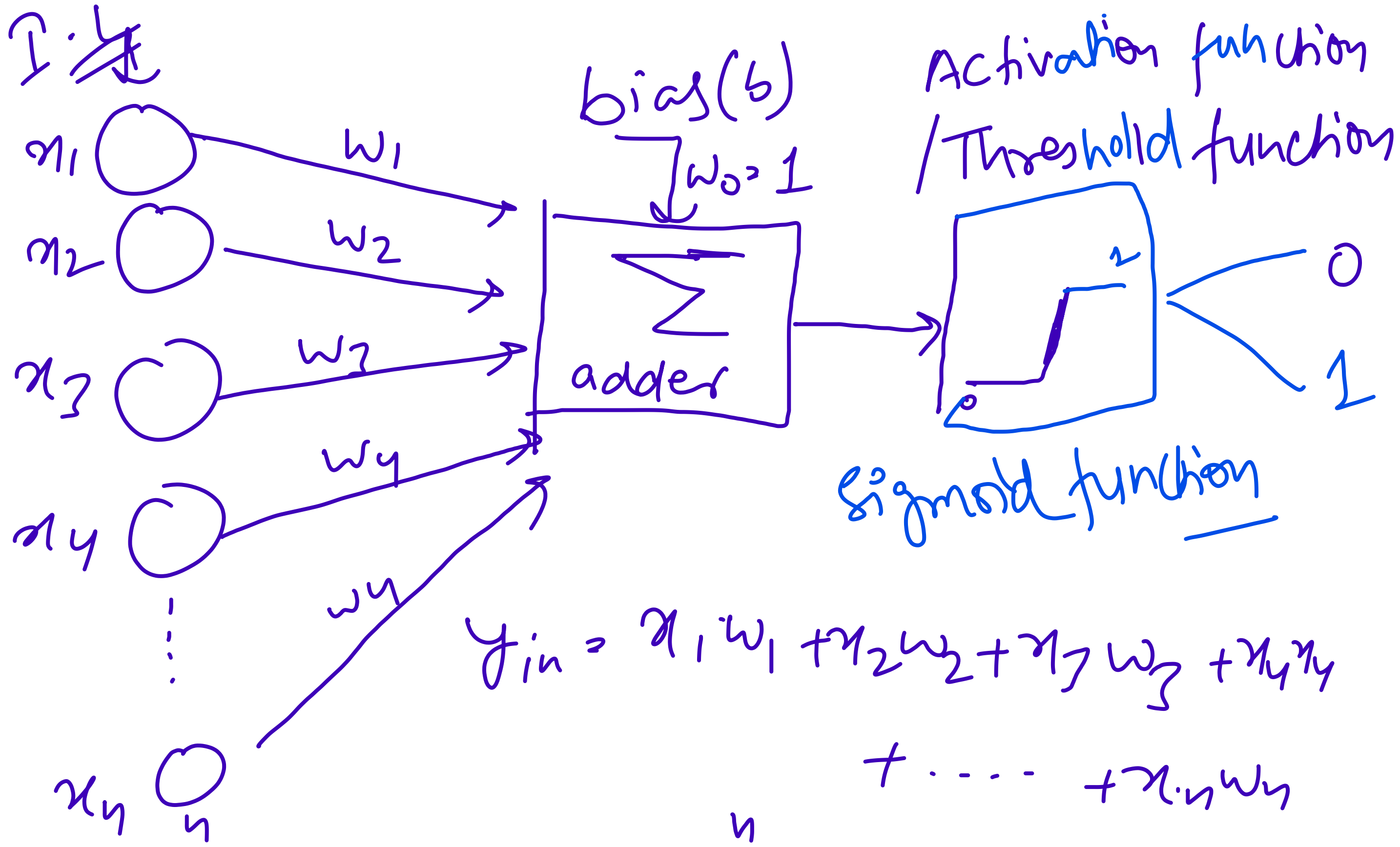
X

Y

D → 1
ND → 0

10 rows

70 : 30
— Train's test



$$y_{in} = x_1 w_1 + x_2 w_2 + x_3 w_3 + x_4 w_4 + \dots + x_n w_n$$

$$y_{in} = \sum_{i=1}^{n} x \cdot w + b \quad + 1 \times b$$

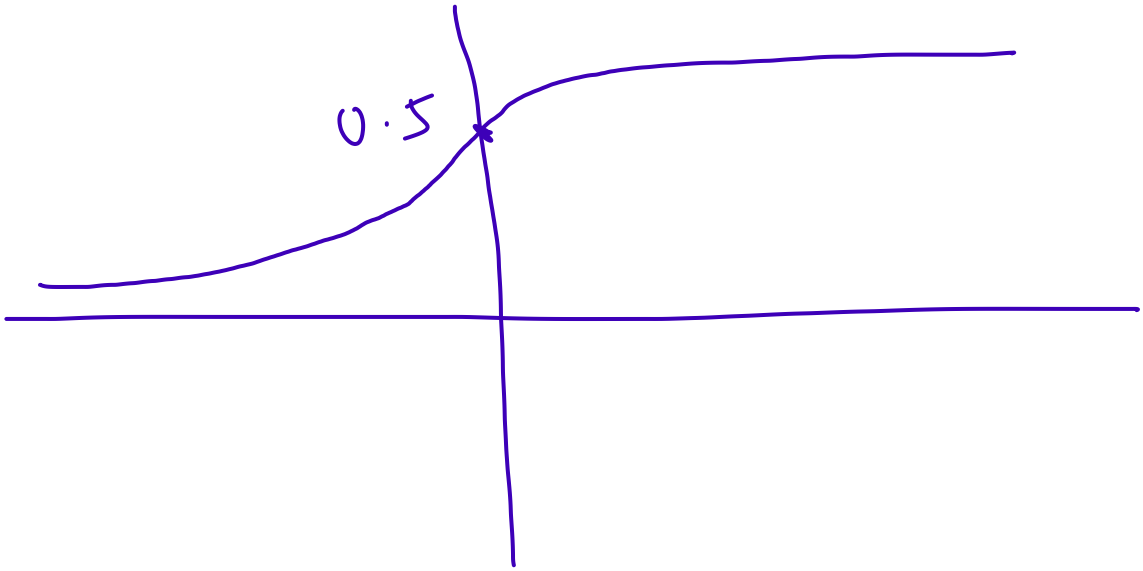
$$Y = \begin{cases} 0 & \text{if } w \cdot x + b < 0 \\ 1 & \text{if } w \cdot x + b > 0 \end{cases}$$

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}, \quad W = \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix}$$

Activation function- classifier into 0 & 1

=> Sigmoid

$$f(x) = \frac{1}{1+e^{-x}}$$



X	Y
232	1
161	0
152	1
137	0

$$w^{new} = w^{old} + \alpha \cdot (y_i - \bar{y}_i)$$

y_i : Target o/p

$\bar{y}_i$: predicted o/p

Algo

Step 1 :- initialize weights = 0

bias = 0

set α . (0 & 1)

Step 2 :- While stopping criteria is false do step 3 to step 7.

Step 3 :- for each training pair (x, y) do step ④ to ⑥

Step ① Calculate the o/p unit response

$$y_{in} = b + \sum_{i=1}^{n} w_i x_i$$

activation function

$$y = \begin{cases} 1 & \text{if } y_{in} > \theta \\ 0 & \text{if } -\theta \le y_{in} \le \theta \\ -1 & \text{if } y_{in} < \theta \end{cases}$$

Step ② update the weight & bias

if target(t) ≠ predicted o/p.

if $t \neq y$ && $x_i \neq 0$

$w_i^{new} = w_i^{old} + \alpha \cdot t \cdot x_i$

$b^{new} = b^{old} + \alpha \cdot t$

else

$$w_i^{new} = w_i^{old}$$

$$b_i^{new} = b_i^{old}$$

Step 5 :- Test the stopping criteria
it may be weight changes.