

Classification

Perceptron Algo \rightarrow Basis of NN

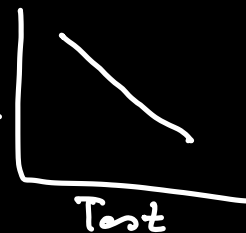
Separate classes based on features

e.g.

Test Score, Grade Score \Rightarrow Accepted/Rejected

$$w_1 x_1 + w_2 x_2 + b = 0$$

Grade



Test

$$w x + b = 0$$

$$[w_1 \ w_2] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + b = 0$$

$$\text{Prediction } \hat{y} = \begin{cases} 1 & |w x + b| > 0 \text{ Accept} \\ 0 & |w x + b| < 0 \text{ Reject} \end{cases}$$

Goal is to have \hat{y} close to y

When 3 Parameters

$$w_1 x_1 + w_2 x_2 + w_3 x_3 + b = 0$$

$$[w_1 \ w_2 \ w_3] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + b = 0$$

$$w x + b = 0$$

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

N-dimensional space

$$w_1 x_1 + w_2 x_2 + \dots + w_n x_n + b = 0$$

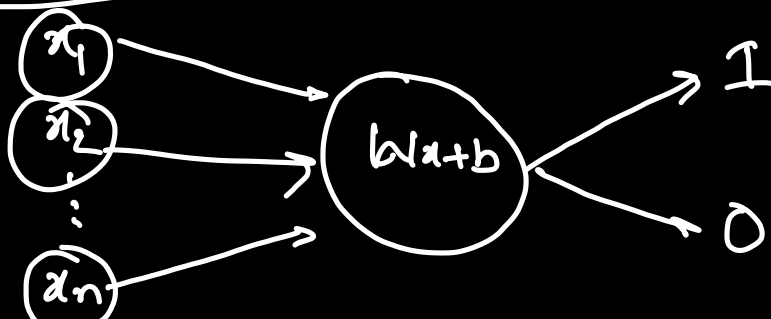
$$w x + b = 0$$

$$w = [w_1, w_2, \dots, w_n] \quad \text{weights}$$

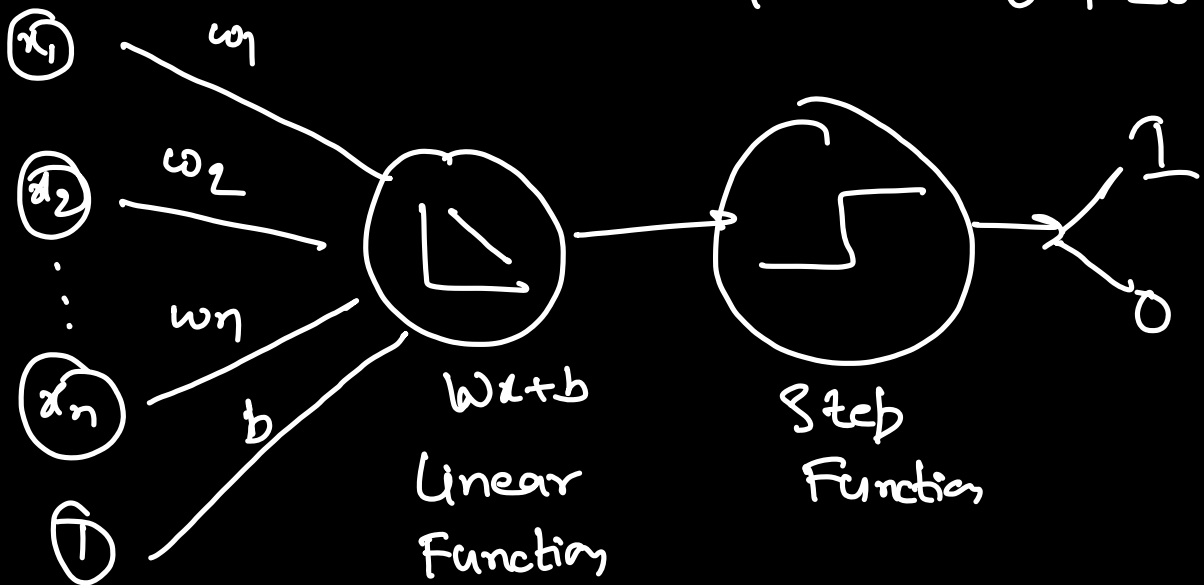
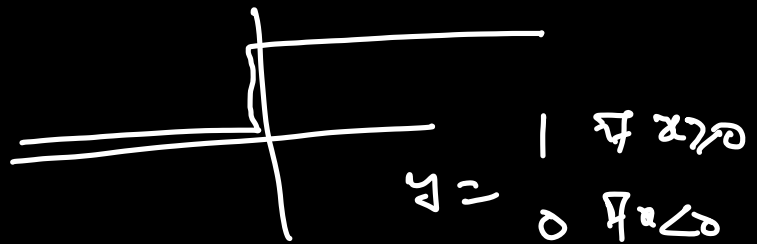
$$x = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} \rightarrow \text{Input features}$$

$b \rightarrow$ Bias

Perceptron is building block of ANN



Set Function



we can have different step functions

Perceptron Algo

→ Start with random weights
 w_1, w_2, \dots, w_n, b

→ For every misclassified point (x_1, \dots, x_n) :

If pred. = 0	}	means actually 1
$w_i \leftarrow w_i + \alpha x_i$		
$b \leftarrow b + \alpha$		

If pred. = 1
 $w_i \leftarrow w_i - \alpha x_i$ and $b \leftarrow b - \alpha$