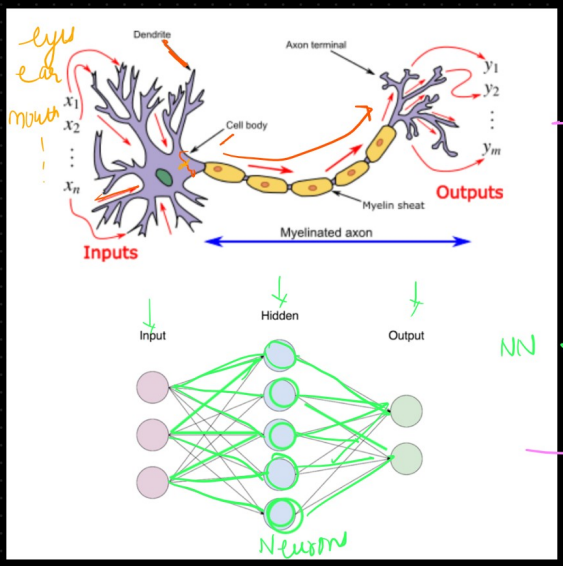
Artificial Neural Network

Artifical Neural Network (ANN)



→ Biological Neurons

NN → Neural Network

→ Artifical Neurons

Neural Network → human brain → computational model

Neural → Neurons + layers

Nodes

Neurons : Building Block of Neural Network

① Each Neurons receives inputs.

Layers :

Input layer → receive the input

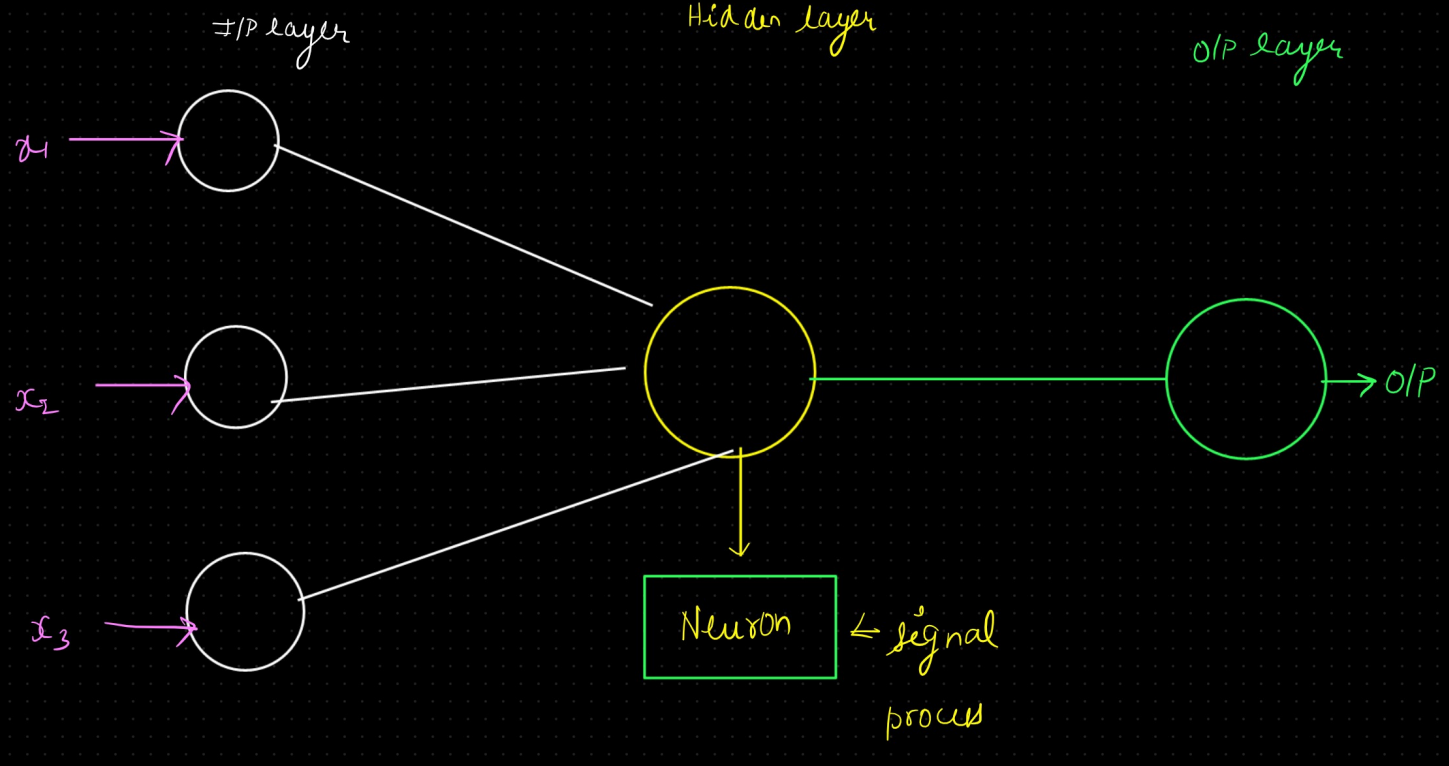
Hidden layer → Neural Network → operation

Output layer → final output

ANN

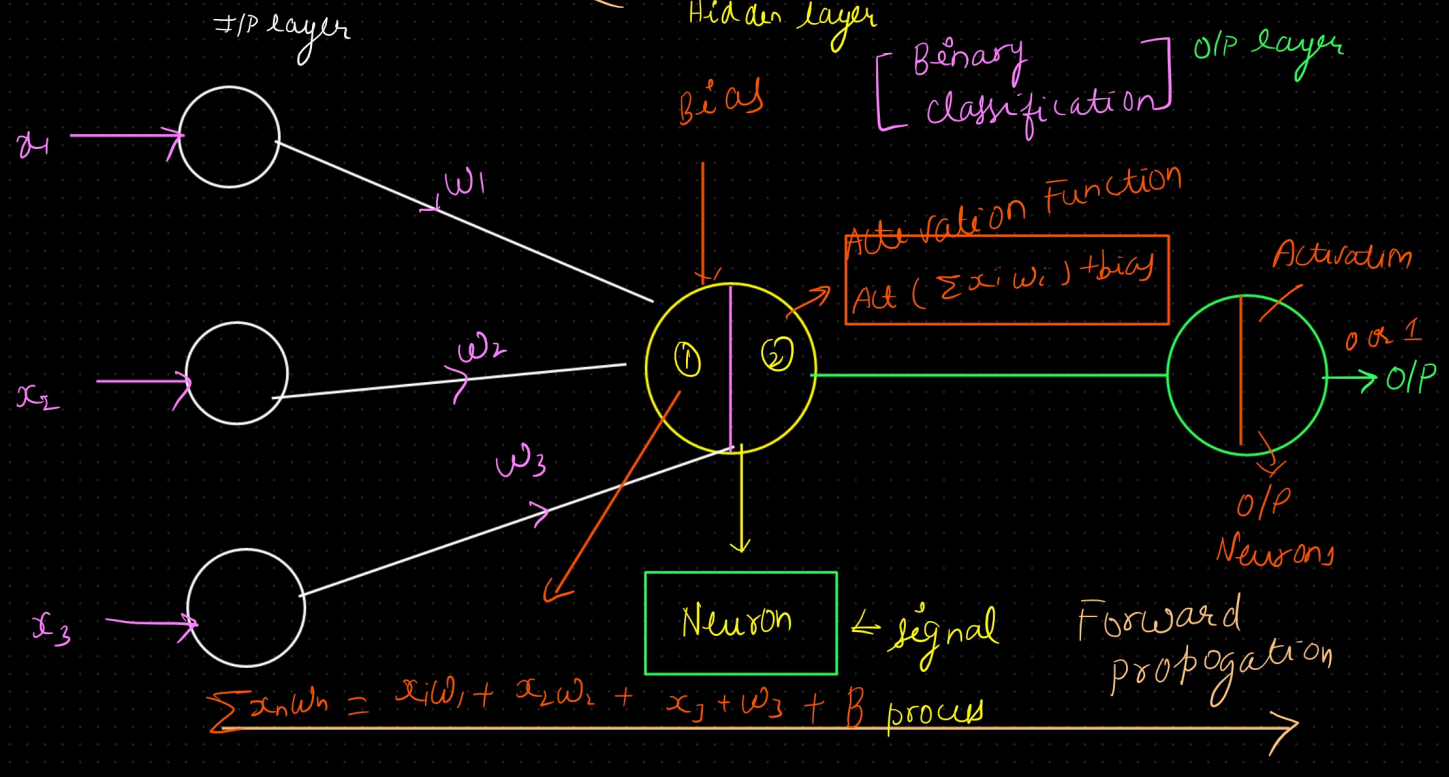
Perceptron

Single layered Neural Network



Simplest form of Neural Network is perceptron

Backward propogation



Simple linear Regression

$y = x_i w_i + B$ ⟷ $y = mx + C$

$y = \beta_0 + \beta_1 x$

x_i = data points

w = weight

B = Bias

Slope, Intercept

β_1 — β_0 constant → Bias

$w \rightarrow$ strength of connection

eg → You're learning to ride a bicycle

↓

paddles, balance

practise → perfect

↓

Bicycle

Strong → Neurons

⟶ Weight is a parameter that determine the strength of connections b/w neurons in different layers

Bias → It allows to neurons activate even when inputs are zero.

$$y = x_i w_i + B$$

$$y = B$$

input = 0

Binary Classification

↳ sigmoid → Activation Function

Activation Function

$$\sigma = \frac{1}{1 + e^{-y}}$$

$$= \frac{1}{1 + e^{-(\sum x_i w_i + b)}}$$

$[0, 1]$

$\geq 0.5 \Rightarrow 1$

$< 0.5 \Rightarrow 1$

Mathematical Intution

ANN ⟶ Concept of Perceptron

↓

A simple model of neurons

① Inputs → $x_1, x_2, x_3 - - - x_n$

② Inputs × weight ⇒ $x_1 w_1, x_2 w_2, x_3 w_3 - - - x_n w_n$

③ $x_1 w_1 + x_2 w_2 + x_3 w_3 + b$

↓

bias

④ The output of the perceptron → Apply Activation Function

$$y = \sqrt{\quad}\left(w_1 x_1 + w_2 x_2 + w_3 x_3 + \cdots + w_n x_n + b\right)$$

$\sqrt{\quad}$ → sigmoid

$y \rightarrow$ truth value

$\hat{y} \rightarrow$ predicted value

$[y - \hat{y}] \rightarrow$ minimise