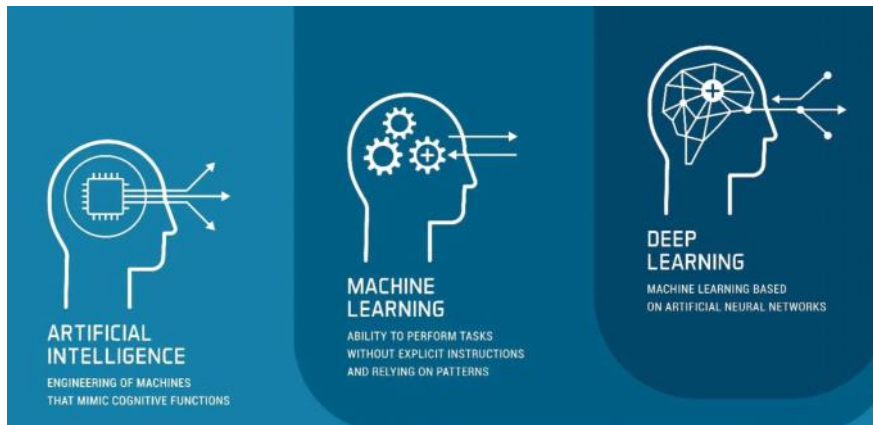
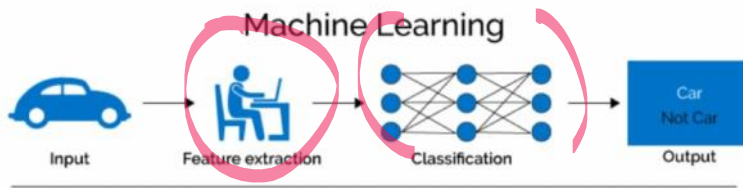


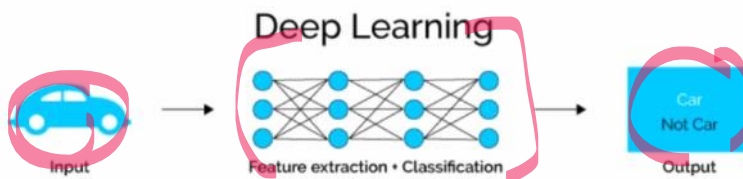
Introduction
 What is Deep Learning
 ML vs DL Vs AI
 Why Deep Learning And Why Now
 What is a Neural Network?
 Building Blocks
 Basic Neural Network
 Biological Neurons Vs Artificial Neurons
 Single Layer Perceptron
 Multi-Layer Perceptron
 Forward and backward propagation
 Feed-forward neural networks
 Neural Network layers
 How a Single Neuron works?
 Example 1: AND
 Example 2: OR
 Example 3: NOT
 Work Around With TensorFlow Creating Some Tensors
 Why multi-layer networks are useful?
 Case 1: $X1 \text{ XOR } X2 = (A' \cdot B') + (A \cdot B)$
 General Structure of a Neural Network



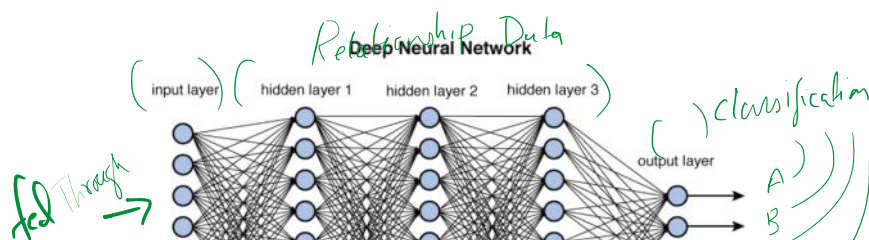
Low Data ↓



Massive Data ↑



⇒ CNN
Me/Someone



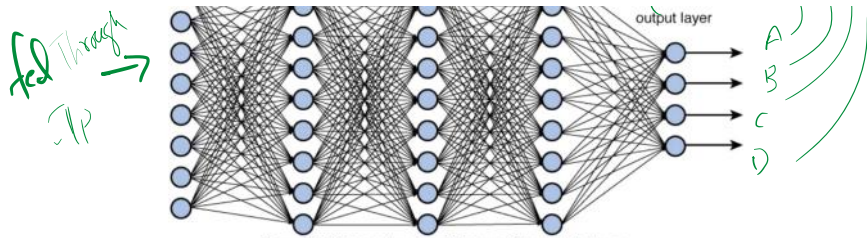
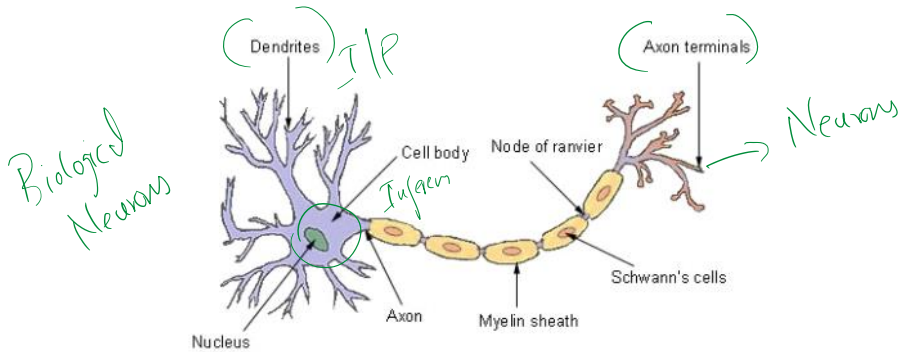


Figure 12.2 Deep network architecture with multiple layers.



Why Deep Learning And Why Now

Hidden layers
(Dense)

High computing
Hardware expensive
GPU + TPU
RTX3050

- 1) **Data** → feed NN → 20 → Social post
Text
Commerce ↑↑
- 2) **Computing Power**
- 3) **libraries**

OC
Third party Imple
open Source Libraries

As Task
Fine tune → **IX**

Deep learning < **Machine learning**

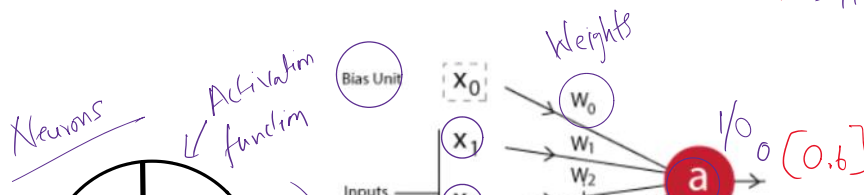
⊗ High Data
⊗ lot of computing

(✓) low data
(✓) less computing

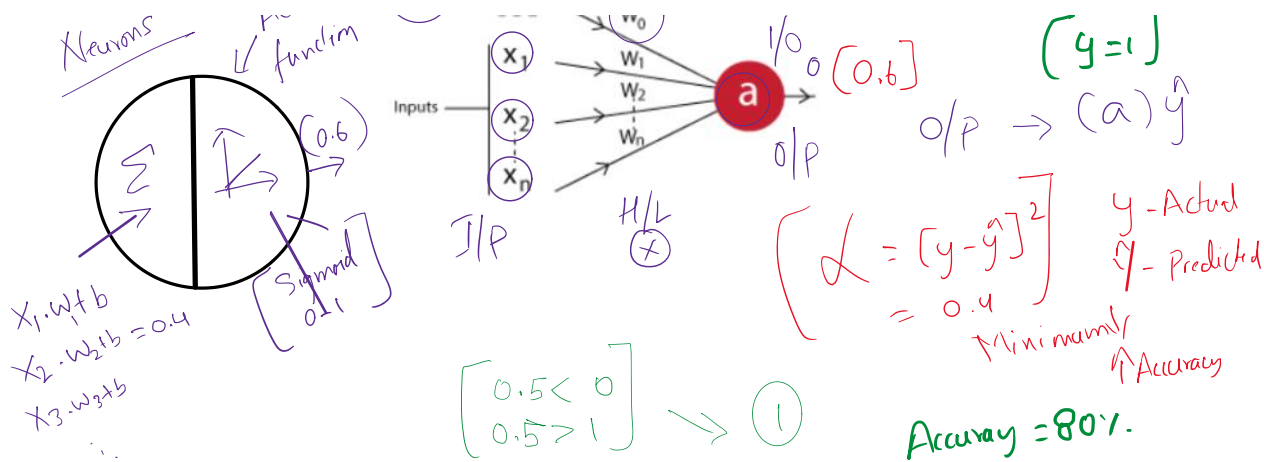
Single Layer Perceptron

I/P → Forward propagation → O/P

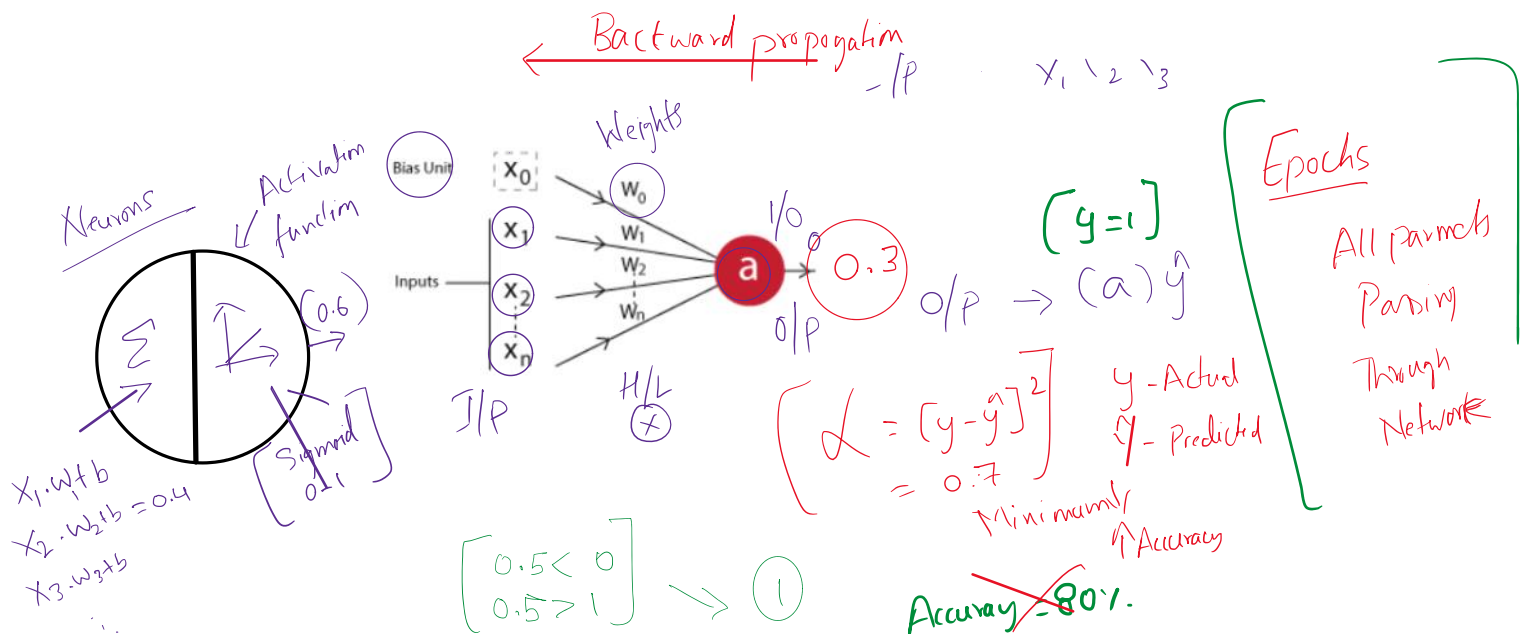
x_1, x_2, x_3



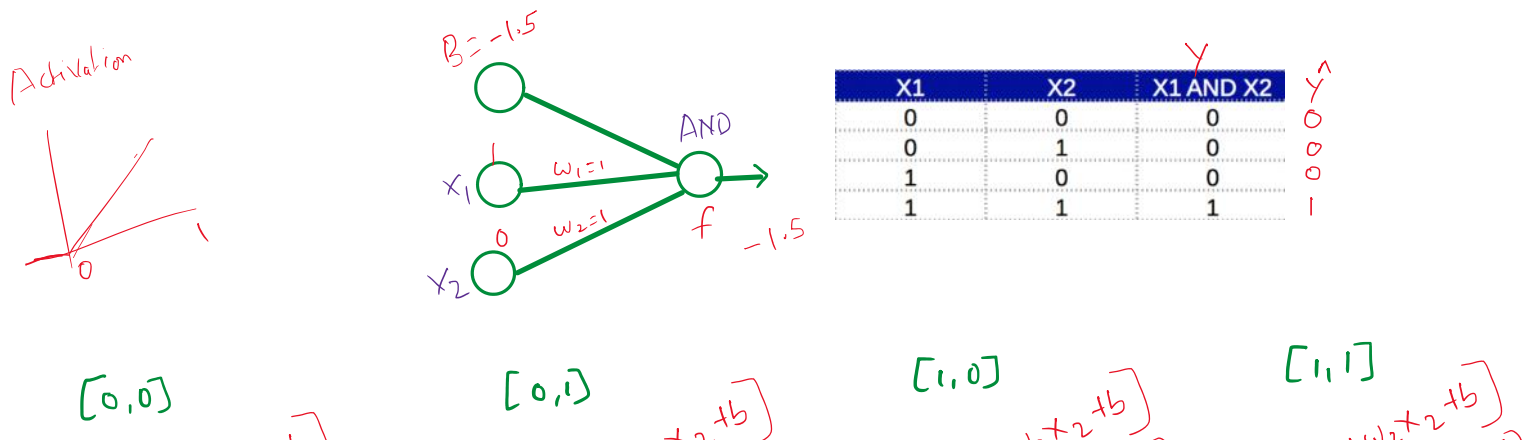
$(y=1)$
(2) ↑



Other Scenario



Single Layer Network AND Gate



$$[0,0]$$

$$(y = w_1x_1 + w_2x_2 + b)$$

$$= (1.0) + (1.0) + (-1.5)$$

$$= 0 + 0 - 1.5$$

$$= -1.5$$

$$[0,1]$$

$$(y = w_1x_1 + w_2x_2 + b)$$

$$= (1.0) + (1.1) + (-1.5)$$

$$= 0 + 1 - 1.5$$

$$= -0.5$$

$$[1,0]$$

$$(y = w_1x_1 + w_2x_2 + b)$$

$$= (1.0) + (1.1) + (-1.5)$$

$$= 1 + 0 - 1.5$$

$$= -0.5$$

$$[1,1]$$

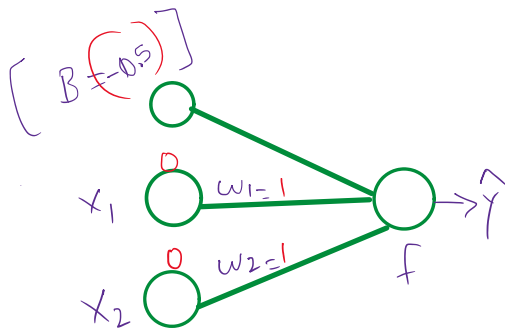
$$(y = w_1x_1 + w_2x_2 + b)$$

$$= (1.0) + (1.1) + (-1.5)$$

$$= 1 + 1 - 1.5$$

$$= 0.5$$

Single Layer Network OR Gate

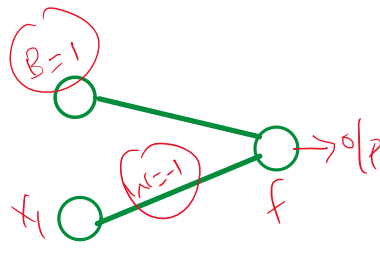


X1	X2	X1 OR X2
0	0	0
0	1	1
1	0	1
1	1	1

$$\begin{matrix} -0.5 \\ 0.5 \\ 0.5 \\ 1.5 \end{matrix} \begin{bmatrix} y \\ 0 \\ 1 \\ 1 \\ 1 \end{bmatrix}$$

$$[f = 1x_1 + 1x_2 + B]$$

Single Layer Network NOT Gate



$$\hat{y} = 1, 0$$

X1	NOT X1
0	1
1	0

Need Of Multiple Layer Neural Network

$$(X1 \text{ XNOR } X2) = (A'.B') + (A.B)$$

$$= \text{NOT}[(A+B).(A+B')]$$

$$\begin{aligned}
 (X1 \text{ XOR } X2) &= (A \cdot B) + (A \cdot B) \\
 &= \text{NOT}[(A+B) \cdot (A+B')] \\
 &= (A+B)' + (A+B')' \\
 &= (A' \cdot B') + (A \cdot B)
 \end{aligned}$$

