Deep Learning

$\int$ AI $\Rightarrow$ Artificial Intelligence

→ ML

→ Deep Learning $\Rightarrow$ Multilayered Neural Networks

⇓

Mimic the Human Brain

Deep Learning

① ANN ⟶ Artificial Neural N/W → Classification → Regression

② CNN ⟶ Convolutional Neural N/W → I/P : Images, Video frames ⟶ RCNN, MASKED RCNN, Detection, Yolo V5, V6, V7

Computer Vision
Objection Detection
⇑

③ RNN ⟶ Recurrent Neural N/W ⟶ NLP → NLP, Time Series

I/p: Text, Time Series

⇓

{ Word Embedding, LSTM RNN, GRU RNN, Bidirectional LSTM RNN, Encoder Decoder, Transformers, BERT }

FRAMEWORK

TENSORFLOW

End to End Project

② Why Deep Learning Is Becoming popular?

2005 ⟶ Facebook, Youtube, Whatsapp, Linked, Twitter } ⟹ Social Media platform

2011-2012
⟱
DATA WAS GENERATED
Exponentially

Image, Text, Documents,
Vidios
↳ [Big DATA] ⟶ HADOOP → unstructured
DATA
⟱
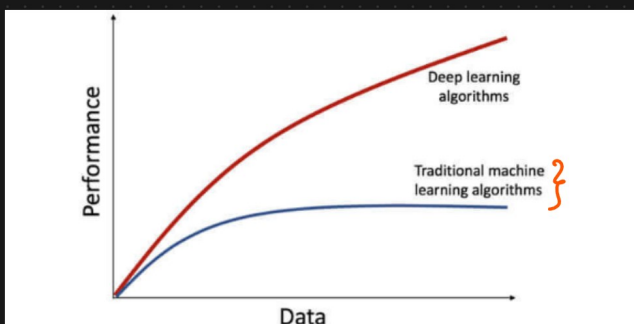[2011] ⟹ Cloudera, hortun works

Netflix → movie streaming
⟱ Platform
Recommendaton System
⟱
Increase Revenue

2011-2012 :

① Hardware Requirement ⟶ GPU's cost↓↓↓ → NVidia GPU
TRAIN MODELS   Price↓↓↓

② Huge amount of data is getting generated → Deep Learning
Models Perform well

③ Deep Learning is been used in Many Domains

① Medical
② Ecommerce
③ Retails
④ Marketing · · · · ·

④ Frameworks Opin source

Community size ↑↑

Tensorflow

$\Downarrow$

Google

Pytorch

$\Downarrow$

Facebook

$\Downarrow$

More Research

③ Perceptron [Artificial Neuron or Neural Network Unit]

① Input Layer ✓
② Hidden Layer ✓
③ Weights ✓
④ Activation function ✓

[Single Layered NN]
⬇
Binary Classifer

DATASET

x_1 IQ	x_2 No. of study hours	o/p Pass/Fail
→ 95	3	0
→ 110	4	1
→ 100	5	1

I/p Layer   1   ↑Noise   Hidden Layer 1
bias (b)
↗loss
W_1 Error function
x_1 Step 1 | Step 2   1 - 0 = 1
$\Sigma x_i w_i + b$ | Act(Z)
W_2
x_2 ↳ Neuron

$Z = W_1 x_1 + W_2 x_2 + b$
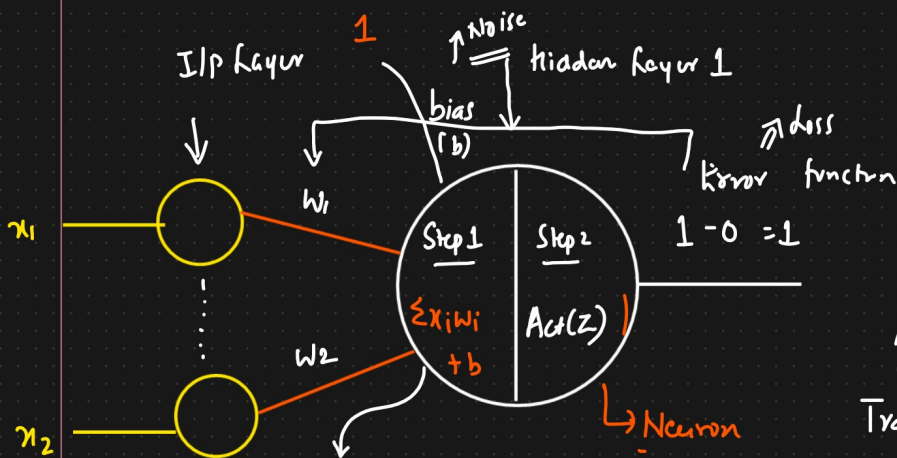
$Z = \sum_{i=1}^{n} x_i w_i + b$

Activation function

Transform the output

between 0 to 1

-1 to 1

Perceptron is a linear classifer

Step Function

1
0   →Z
0 to 1   Threshold val = 0
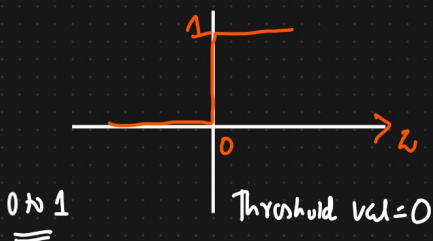
$\begin{cases} 0 & Z \leq 0 \\ 1 & Z > 0 \end{cases}$

Sigmoid Function

1
0.5
0
Threshold = 0.5   0 to 1
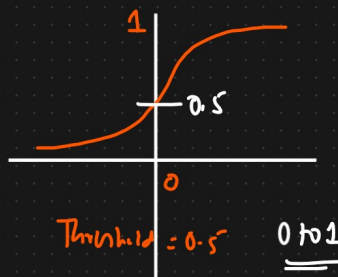
$\begin{cases} 1 & Z > 0.5 \\ 0 & Z \leq 0.5 \end{cases}$
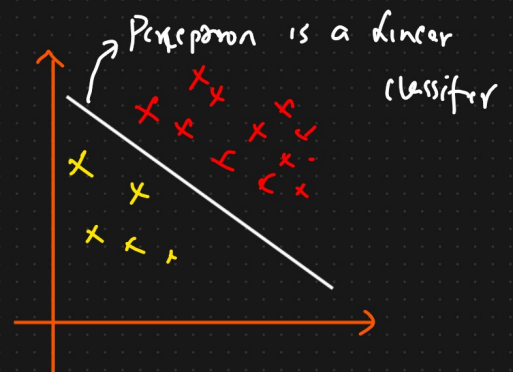
Step 1

$Z = \sum_{i=1}^{n} W_i x_i + b$

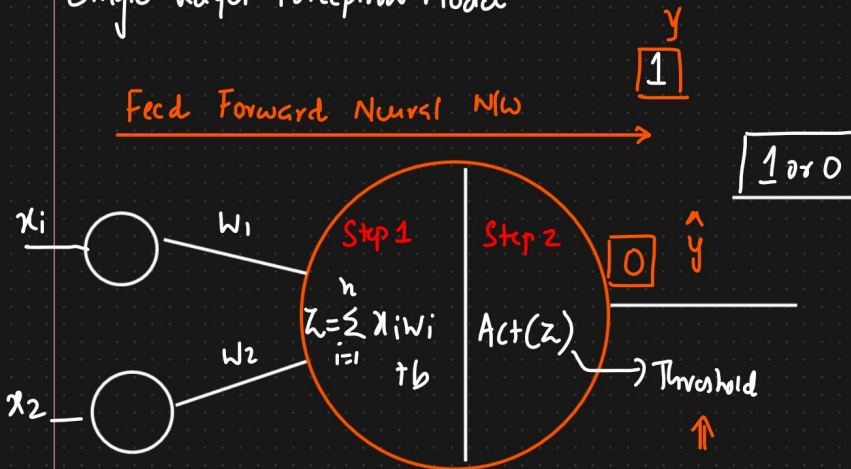$Z = b + W_1 x_1 + W_2 x_2 + W_3 x_3 + \cdots + W_n x_n$ ←

$\Downarrow$

$y = mx + c$

$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 \; - - - + \beta_n x_n$ $\leftarrow$ Linear problem Statement

Perception Models

Single Layer Perception Model

$[ANN]$ $\Downarrow$

Multi Layered Perception Model

① Forward Propogation

② Backward ''

③ Loss functions

④ Activation functions

⑤ Optimizers

Feed Forward Neural N/W

y
$\boxed{1}$

$\boxed{1 \text{ or } 0}$

x_i ◯ W_1

Step 1

$z = \sum_{i=1}^{n} x_i W_i$ $+ b$

Step 2

$Act(z)$

$\boxed{0}$ $\hat{y}$

$\rightarrow$ Threshold
$\Uparrow$

x_2 ◯ W_2

Linear Seperable problem

Binary classification
$\Downarrow$
Linearly separable

Non Linear separable

$\Rightarrow$ Multi Layered NN