

Deep Learning

- ① What is Deep learning?
- ② Why Deep learning?



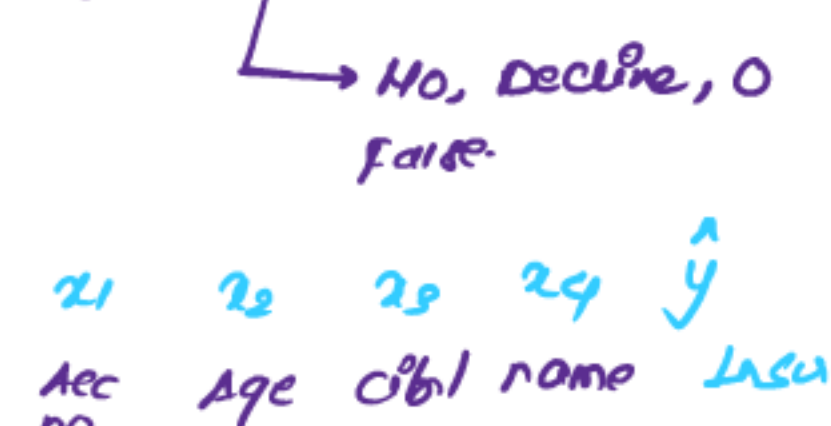
Deep learning is subset of AI and machine learning.

Machine Learning

whenever mathematical things or statistical things or involve machine learning is used.

Deep Learning

it follows the logical structure to whatever decision that we take in our daily life.



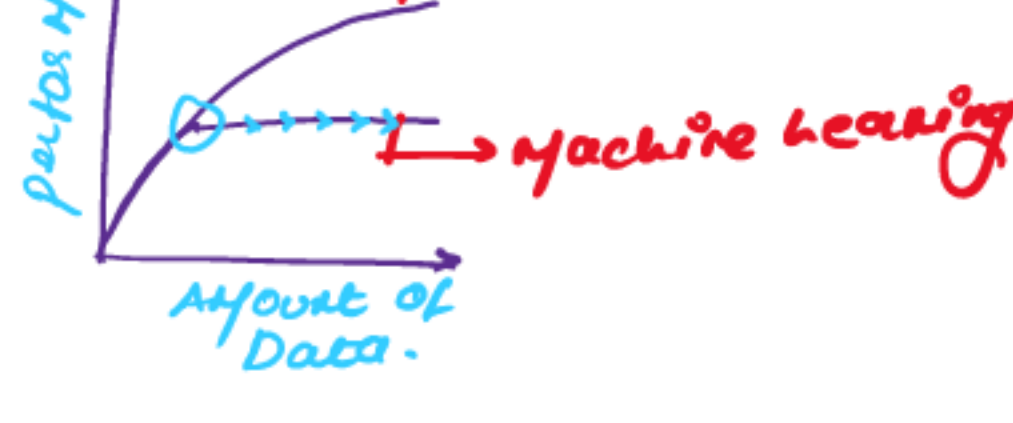
x1	x2	x3	x4	y
acc	age	obl	name	insurance
no				
✓	✓	✓	✓	✓

In case of Deep learning we feed the data and model itself analyse the data and gives the prediction.

Deep Learning is nothing but representation of human brain.

Why Deep Learning?

- ① Data Requirement.



Data Size	performance.
↑ ML	stagnant
↑ DL	↑

② Hardware

CPU = Affordable
GPU = No

But was expensive earlier but now a day it is affordable to some extent. Main reason we have seen major changes in Deep learning.

③ Training time

Training time

ML ↑

DL ↑

hrs, 1 day, weeks, months

Time ↑

memory ↑

④ Feature selection

xyz	①	②	xyz	③
x1	x2	x3	x4	y
acc	age	obl	name	1, 0
no				
✓	✓	✓	✓	✓

True age, obl

False acc, name

DL

x1	x2	x3	x4	y
acc	age	obl	name	
no				

Weights

x2, x3 importance ↑ weight ↑

x1, x4 importance ↓ weight ↓

[-∞ to ∞]

- ① Deep learning models are Black Box models

⑤ Domain Expertise

[DL] In case of Deep learning Domain Expertise is not required.

[ML] In case of Machine Learning Domain Expertise is required.

Applications

- ① Health care Tumor detection.
- ② Self driving cars.
- ③ Robotics
- ④ Recommendation
- ⑤ Speech Recognition.
- ⑥ Image classification.
- ⑦ Automatic game playing.
- ⑧ Chatbots
- ⑨ Text detection (OCR)
- ⑩ Traffic control
- ⑪ Virtual assistance

Ecosystems

TensorFlow, Google
PyTorch, Facebook
CNTK, Microsoft

Caffe, DL4J, Chainer, H2O, etc.

Frameworks → Frameworks

Architecture of Neural NetworksANN

Artificial Neural Network

for tabular data.

CNN

Convolution Neural Network

for image related video related.

RNN

Recurrent Neural Network

for time series analysis

stock prices

text generation

climate forecast

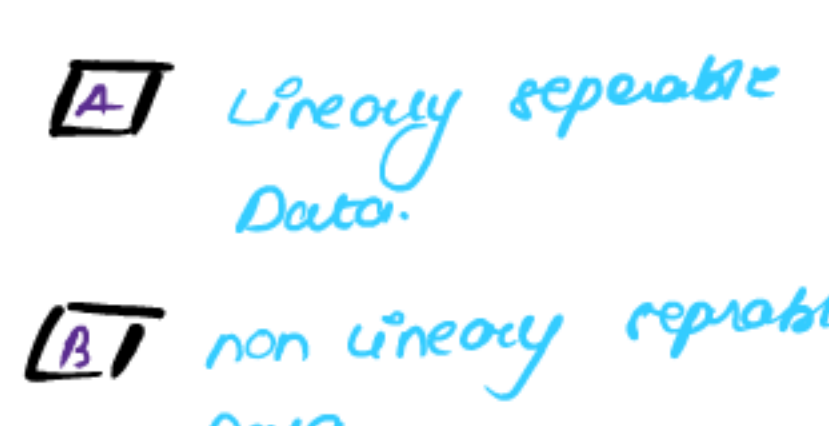
GAN

Generative Adversarial Network

Preexisting Models

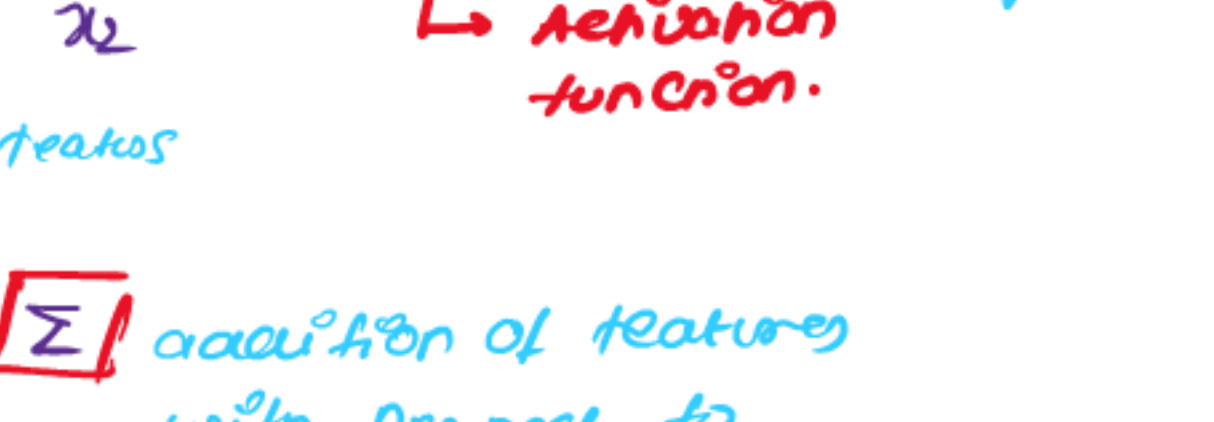
- ① Image classification: RESNET
- ② Text: BERT
- ③ Image segmentation: UNET
- ④ Object detection: YOLO

you only look once.

Histogram

[A] Linearly separable data.

[B] non linearly separable data.



[Σ] acquisition of features with respect to its weight

$$= x_1 w_1 + x_2 w_2 + \text{bias}$$

$$y = wx + b$$

↑ output

↑ input

[A] Activation function

whenever we are processing input is called activation fn.

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

step ①

$$y = x_1 w_1 + x_2 w_2 + \text{bias}$$

step ②

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

input range -∞ to ∞

output range 0 to 1



[0.6] → class 1

[0.3] → class 0