Deep learning

AI

ML
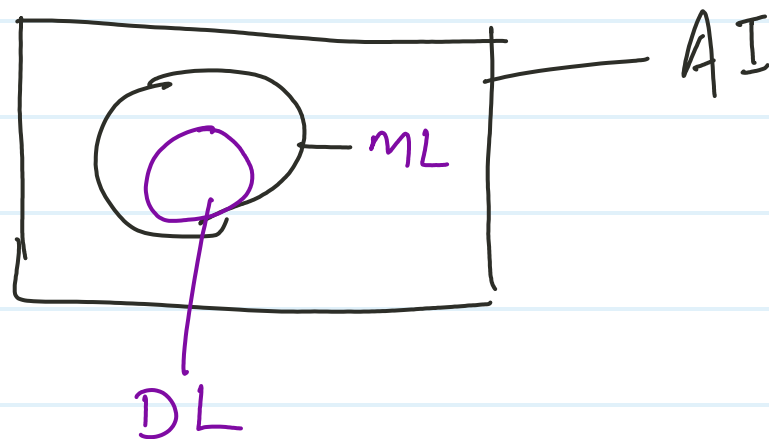
DL

why deep learning?

Human brain mimic

2005 — social media
FB / Orkut — beiging

2011 — exponential growth data

1 TB/y / 100 TB /daily

Big Data

Huge data store

Data Engg —
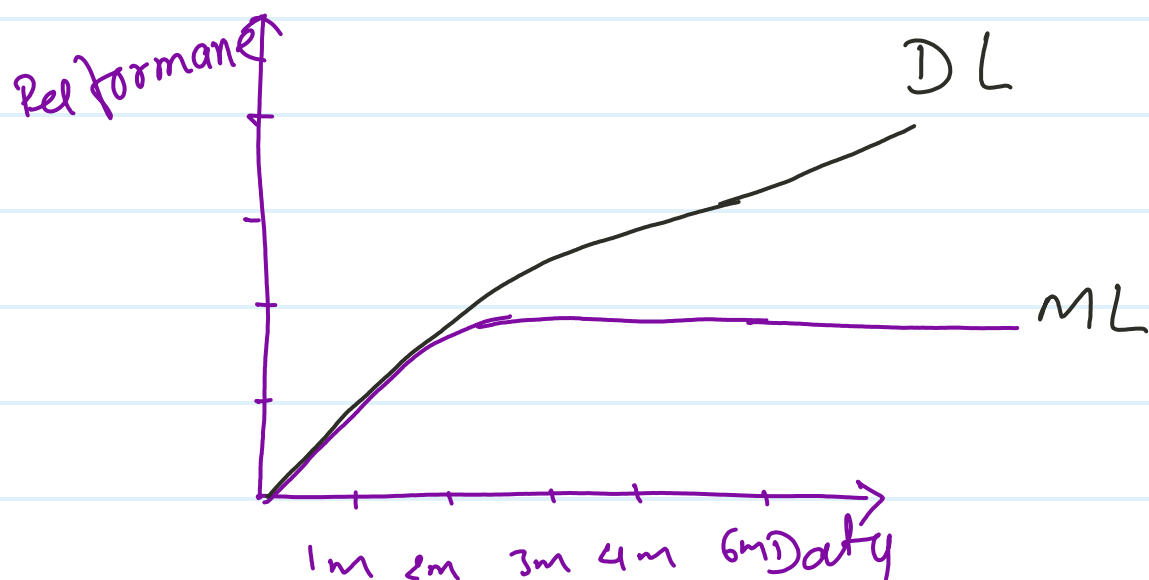
cloudera — structure data
unstructure data

2015 — Data science ✓

Research — DL /Fast

ML — CPU

DL — GPU   Nvidia ↓ Price
                  AMD

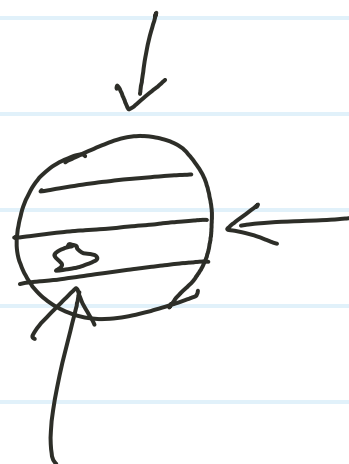Performance vs Data graph showing DL and ML curves with x-axis labeled 1m 2m 3m 4m 6m Data

① Hardware (GPU)

② On huge amount of data we can make better model

③ Deep learning is been used in many domains

X-Ray − 2D − ML

MRI Scan − 3D − DL

ML   vs   DL

| ML	DL
① Subset of AI	Subset of ML
② work-well on small to medium size data	work well large amount of dataset
③ manually select and extract feature	Learn feature automaticall during training.
④ model - LR/DT SVM/ RF	CNN / ANN / RNN Transformation
⑤ CPU	GPU
⑥ Fast training	slower training
⑦ Good Accuracy on tabular data	Higher accuracy on unstructur data image / Text / voice etc.

⑧ Reccomndation
system / fraud detection
personlee system

Image detection
Text translator
voice command

Deep learning

Neural Network

I/p layer → □ 0.1,
                0.05,   Hidden Layer ↓
                0.5   □ → o/p

→ eye

weight ↑

1

bias
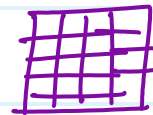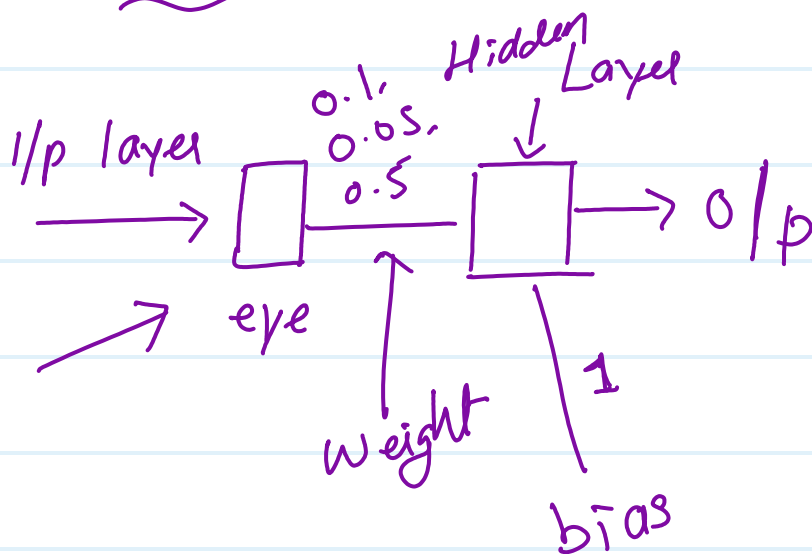
① ANN — Artificial Neural N/w

It works on tabular data like ML

Regression / classification / clustering
LR / SVM   LR / DT   K-mean

② CNN — Convulutional Neural N/w
   CV — Computer vision

It works on data like image / video frame
VGG, masked, yolo, Detectron

③ RNN — Recurrent Neural N/w
   NLP or Time series
                                                voice
It works of Time series data and text data

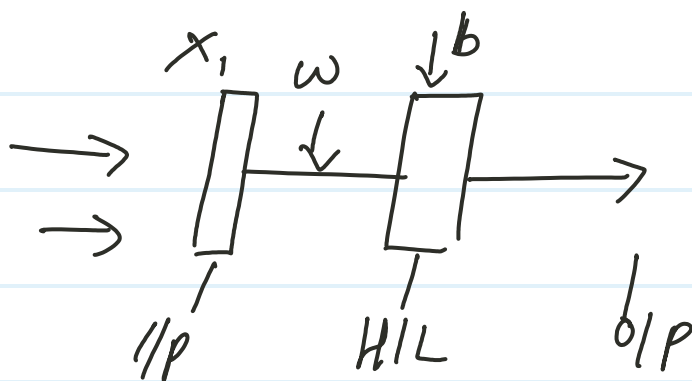[LSTM RNN, Encoder decoder, RNN GRU, BERT]

Important key elements in the DL

① Neural N/w

② Perceptron

③ Layer [I/P | O/P]

④ weight

⑤ bias

⑥ Activation function

⑦ Loss function

⑧ Forward propogation

⑨ Backward propogation

⑩ Optimizer

⑪ Epoch & Batchs

⑫ Learning Rate

⑬ Regulaization

Neural N/w

① I/p layer

② Hidden

③ output

x_1 w $\downarrow b$

→

→

I/p   H/L   o/p

Single Neural N/w

x_1

→ w_1 $\downarrow b$ $\downarrow$

w_2 w_7

w_3

→ x_2 w_4 w_8

w_5

→) w_6 $\downarrow b$

O/P

x_3