

Deep learning is a subfield of AI and ML that is inspired by structure of a human brain

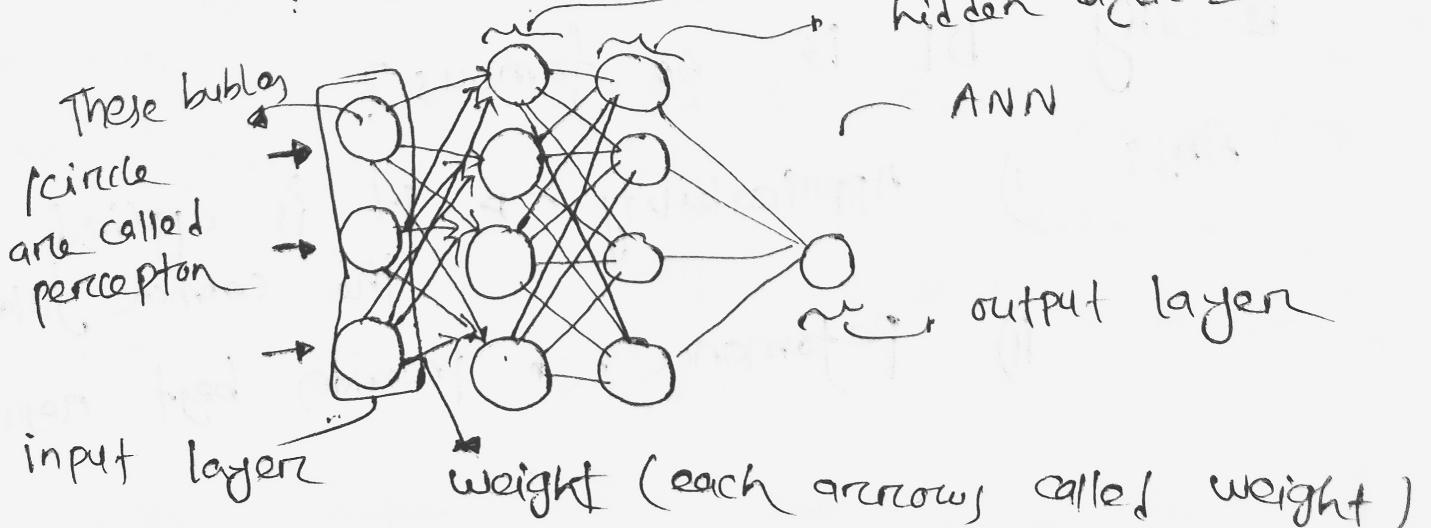
* Deep learning algorithms attempt to draw similar conclusions as human would by continually analyzing data with a given logical structure called Neural Network



Difference

- * ML depend on statistical technique
- * DL u/focus on logical structure (NN)
inspired by human logic

An example of NN: hidden layer 1



- * we can add multiple hidden layers.
- * called DL because the model builds on multiple hidden layers

Types of Neural Network :

- ANN → simply called umbrella term for all types of Neural Network
- i) RNN - Recurrent Neural Network
 - ↳ Time series (data)
- ii) CNN - convolution Neural Network
 - ↳ Image/ video processing, object detection
- iii) FANN - Feed forward NN
 - ↳ Basic classification and regression
 - ↳ (MLP)

- Why DL is so famous?

Ans:

- i) Applicability → It is applied most of the common field → Medical, business
- ii) Performance → provides best result.

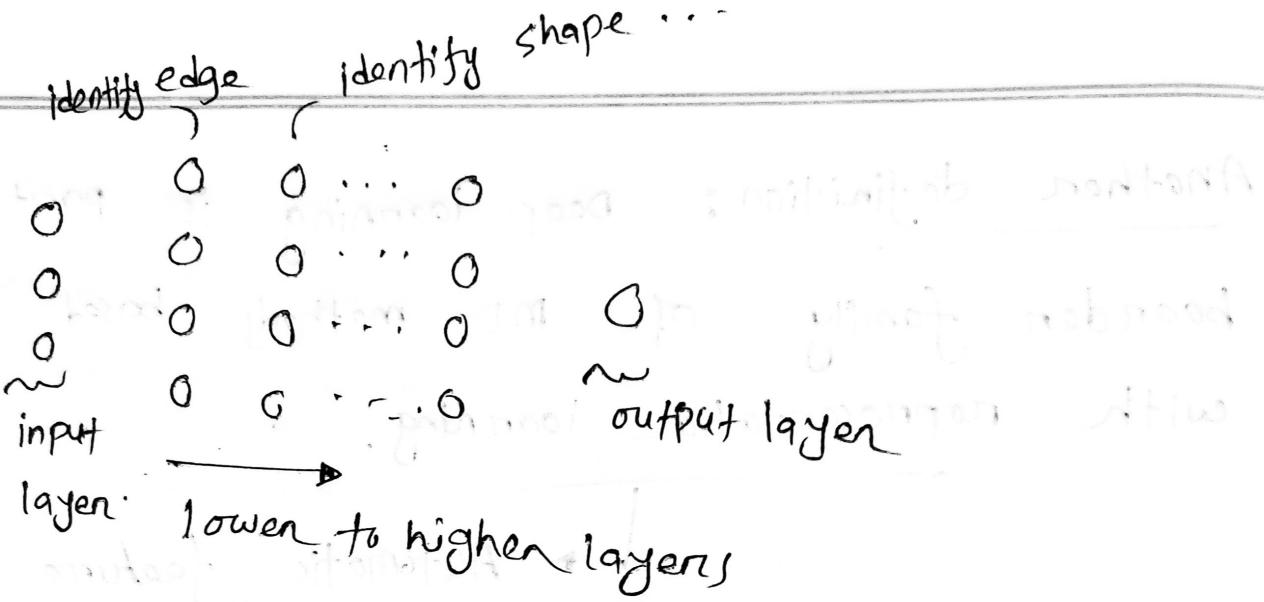
Another definition: Deep learning is part of a broader family of ML methods based on ANN with representation learning.

→ Automatic feature engineering / extraction / selection

Example:

We want to predict an animal whether dog or cat in ML we have to provide some features like size, weight, color etc. to predict cat or dog. But in DL we just have to provide image nothing else. It will capture the image then after analyzing and learning the image it will automatically predict (dog or cat) output.

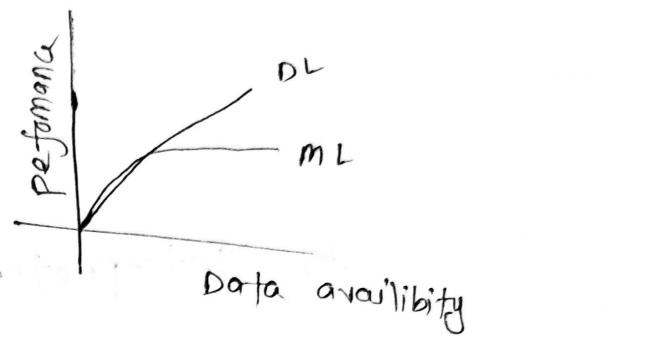
Deep learning algorithm uses multiple layers to progressively extract higher level features from raw input. For example: In image processing lower layers may identify edges, while higher layers may identify the concept digits or letters or faces.



④ Deep learning vs Machine learning :

① Data dependency :

DL : ଏହା ଯାଇ କେବଳ କିମ୍ବା କିମ୍ବା ଦେଖନ୍ତେ
ଏ ସାଧନ୍ତେ performance ବାଧୁଣ୍ଡ
higher ରହିଛା।



ML : ଏହାର ଫଳଗୁଡ଼ି ଅନେକ କେବଳ କିମ୍ବା କିମ୍ବା ଦେଖନ୍ତେ
ଶୀଘ୍ରାବ୍ଦୀ କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା କିମ୍ବା model performance ଏବଂ କେବଳ ଯାଏବା।

② Hardware dependency :

light ↪ ML : Train on simple machine like CPU

heavy ↪ DL : Needs GPU also (powerful)

③ Training Time :

ML :

DL : Training time higher than ML in
comparison to training time to ML

But prediction time in DL so fast

④ Feature selection:
↳ through representation learning in DL

↳ in ML we need manual features

⑤ Interpretability:
↳ High in ML

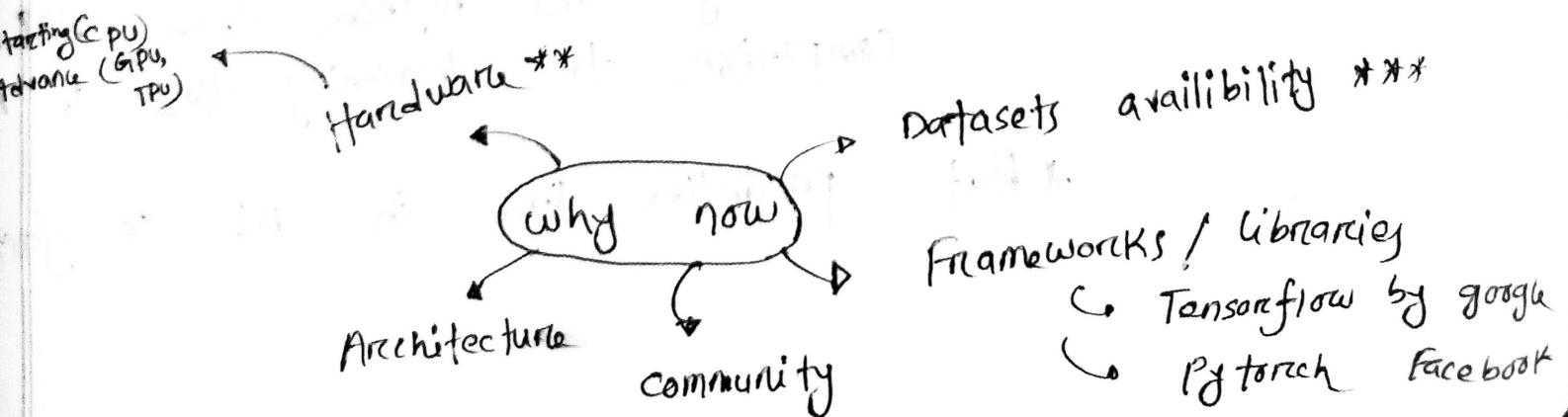
↳ Low in ML

↳ it ^{clarifies} means the reason of output which is given.

NB: Deep learning is a good better tool than ML but in some cases DL can't replace ML.

Deep learning was invented in 1960

But it became famous after 2012

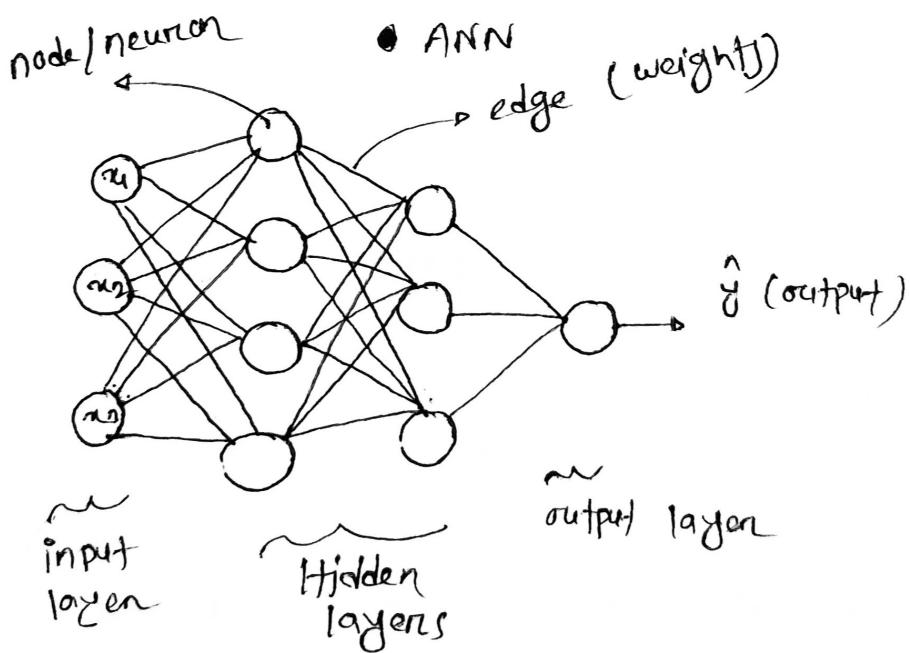


purpose
industry useful

Initially tensorflow was difficult to use then google adjust Keras library with tensorflow for simplicity. (2014)

Pytorch was invented 2016 by FB it becomes famous to AI researchers in 2018 they launched another library named Caffe 2 aimed to deploy pytorch model in server such that more people can use it.

Architecture:



Some researchers trained model on different architecture and got best accuracy level, by default we can use those architecture for our purpose.

These are ready to use, we can use by downloading the needy one. This is called "Transfer learning".

For multiple task:

Architecture

- i) Image classification — RosNET
- ii) Text classifier — BERT
- iii) Image segmentation — UNET
- iv) Image translation — Pix2pix
- v) Object detection — YOLO
- vi) Speech generation — WaveNET
- ... many more