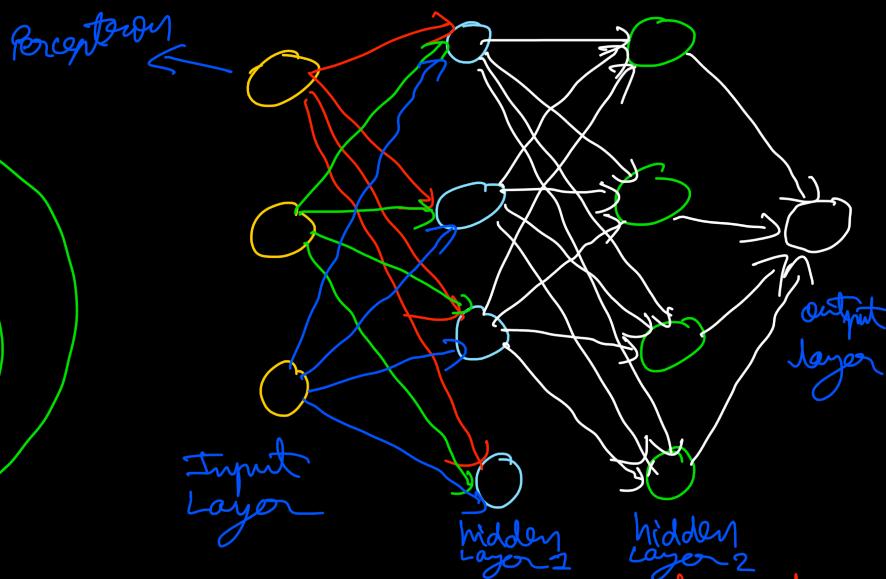
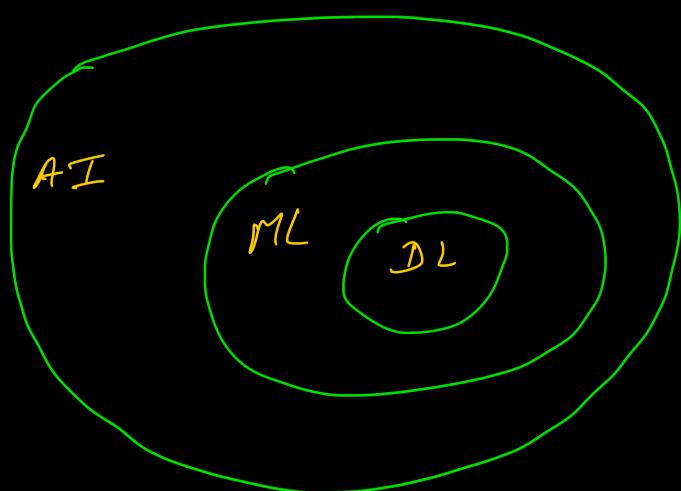


What is Deep Learning? Deep Learning Vs Machine Learning

What is Deep Learning?

Deep Learning is a subfield of Artificial Intelligence and Machine Learning that is inspired by the structure of a human brain.

Deep Learning algorithms attempt to draw similar conclusions as humans would by continually analyzing data with a given logical structure called Neural Network.



ML → Statistical relationship
DL → Logical structure

ANN	→ Artificial NN
CNN	→ Convolutional NN → Images
RNN	→ Recurrent NN → Speech / Text
GAN	→ Generate (text) / Images

Why DL getting so famous?

- (i) Applicability : Applicable in many domains
- (ii) Performance : State-of-the-art performance / also learning behind human experts

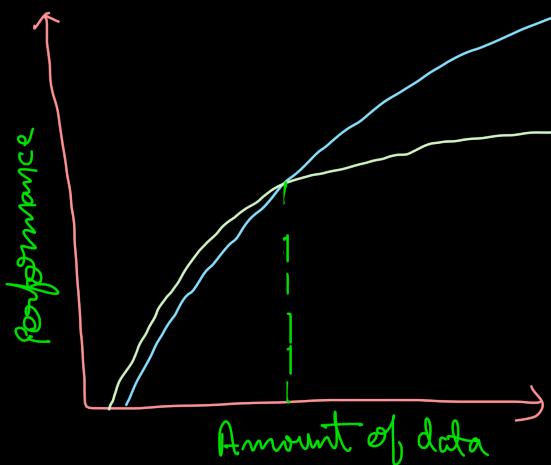
Another Defⁿ: Deep learning is part of a broader family of Machine Learning methods based on artificial neural networks with representation learning. Deep learning Algorithms uses multiple layers to progressively extract higher-level features from the raw input. For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces.

In Machine learning, feature learning or representation learning is a set of techniques that allows a system to automatically discover the representations needed for feature detection or classification from raw data. This replaces manual feature engineering and allows a machine to both learn the features and use them to perform a specific task.

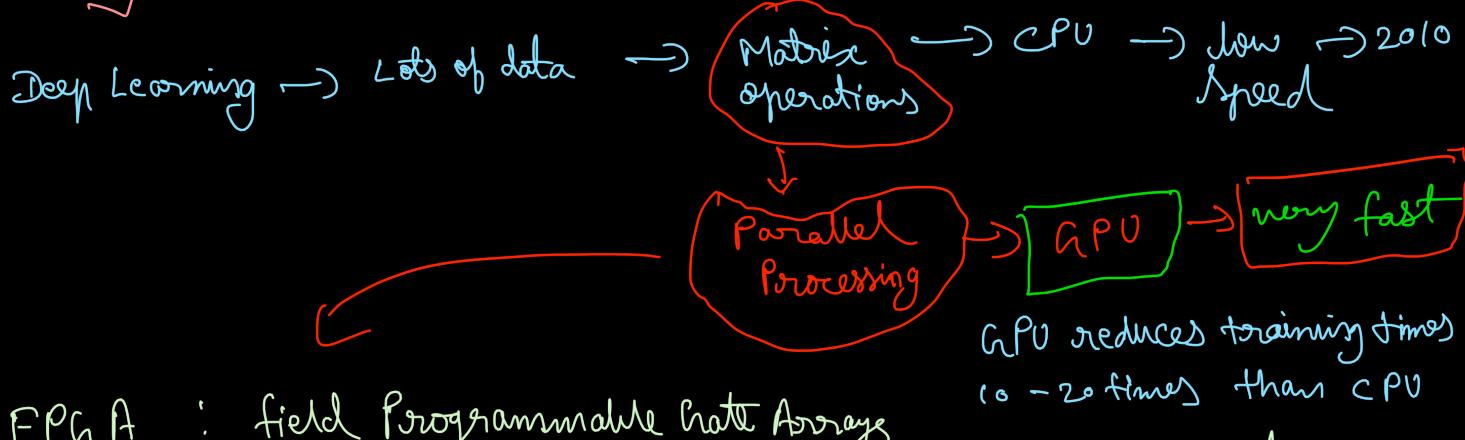
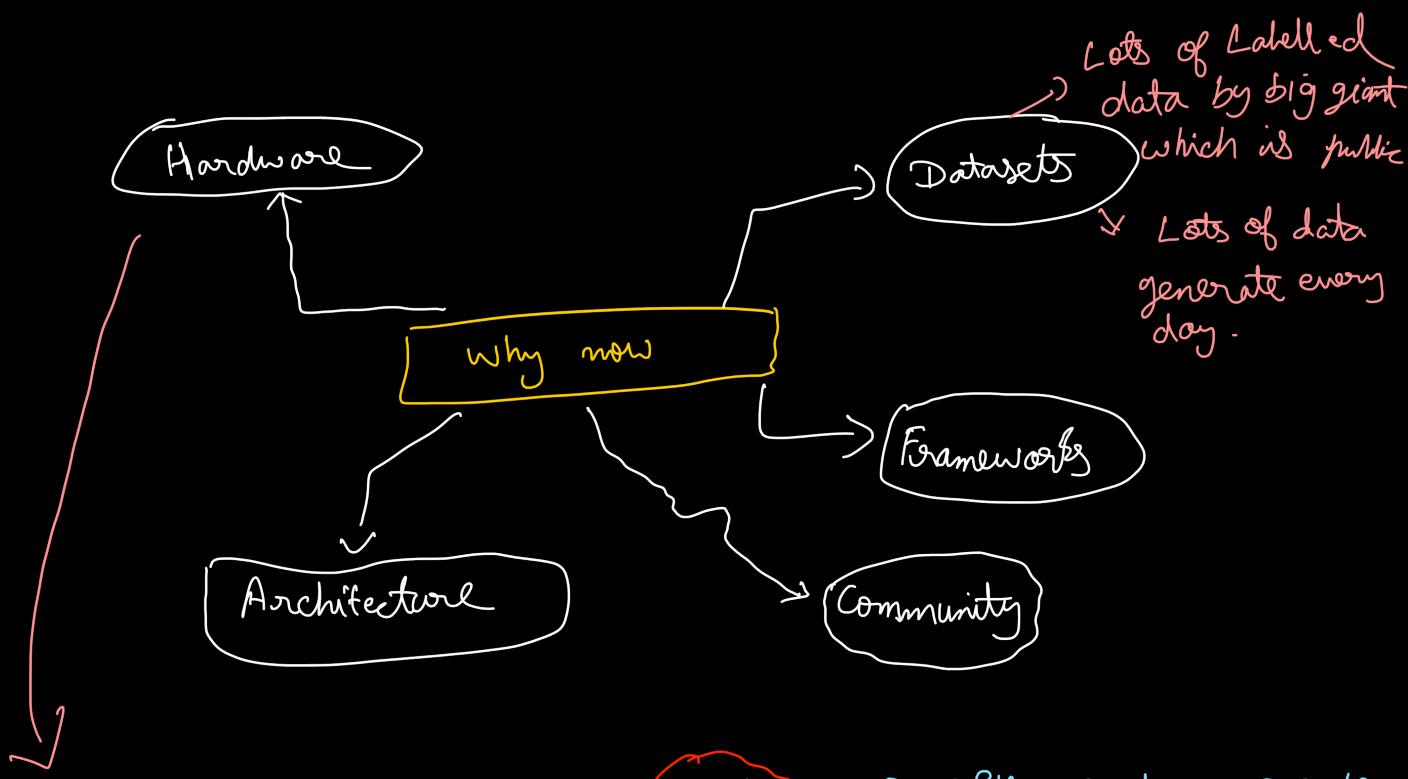
Two things from this def^m: (1) Deep Learning uses representation learning, which means feature extraction done automatically.
(2) How it works? → layers

Deep Learning VS Machine Learning

1. Data Dependency Deep Learning is Data hungry
2. Hardware Dependency DL need Powerful GPU
3. Training Time DL Model training is very high
4. Feature Selection DL use Representation Learning
 In ML we have to do this part
 by own using domain knowledge.
5. Interpretability Less interpretability of DL
 Model (behind the scene)
 how DL model predict
 we don't get to know.



DL is a black box. Andr wne
Kya Socha, use hi pta hai.



FPGA : field Programmable Gate Arrays

- fast
- run in low power
- re-programmable
- custom solⁿ run easily
- very expensive

Microsoft Bing Search engine AI
part run on FPGA

Xilinx
leading manufacturer

- ASIC : Application specific Integrated circuit
 - expensive
 - Custom made chips
- TPU : Tensor Processing Unit made by google, hardware to train DL models.
 - google Colab has TPU option
- Edge TPU : for edge devices
- NPU (Neural Processing unit) : for smart phones

framework: frameworks / libraries

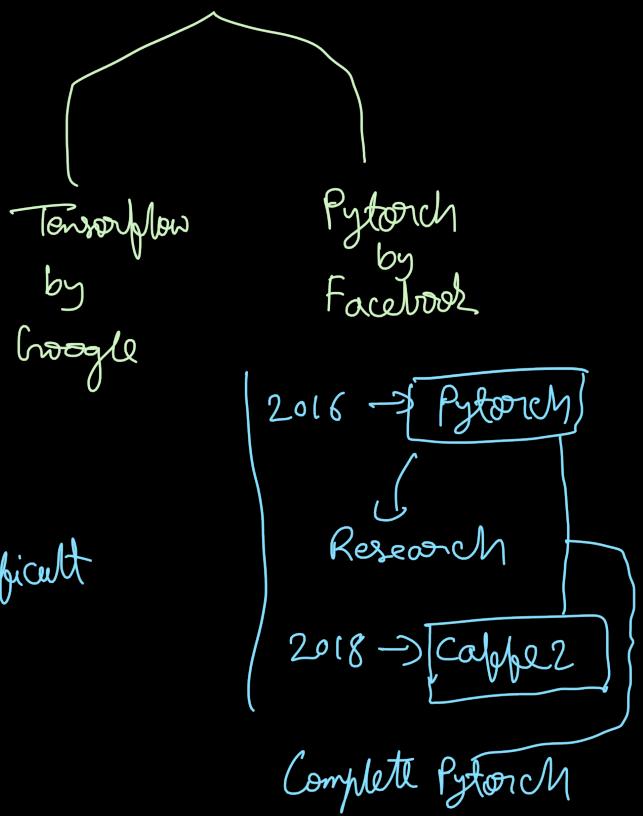
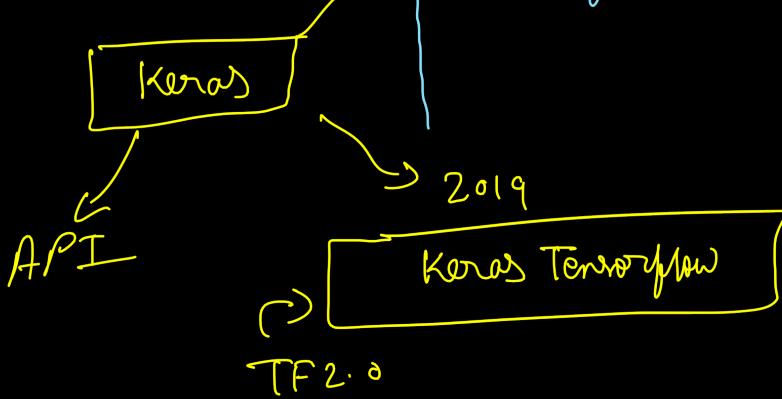
train → difficult → Scratch
↑
Code

Deep Learning
Dist Belief framework

→ google

↳ 2015 → Tensorflow

→ Powerful → but difficult



Google Auto ML
Microsoft Custom vision AI

Deep Learning Architecture

- different ways to create neural network.
- It takes experiment to know which architecture works better.
- lots of existing architectures we can use (Transfer learning)
 - trained on large dataset, which has state of the art performance.

Image classification → ResNet

object detection → YOLO

Text classification → BERT

Speech generation → WaveNet

Image Segmentation → UNet

Image translation → Pix2Pic

Community : Community has contributed lot from year 1960. All DL researchers, professors, teachers students, Kaggle Community has contributed lot and still contributing to take it another height.