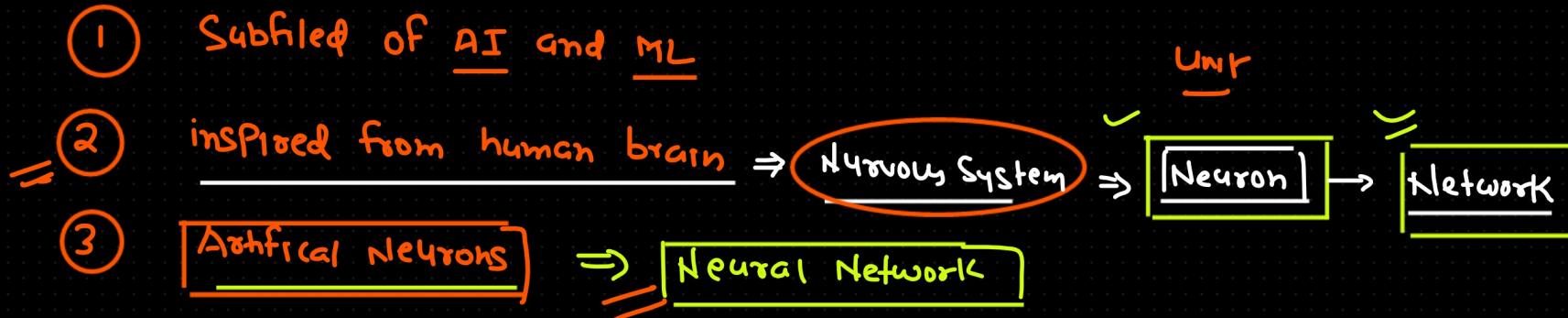
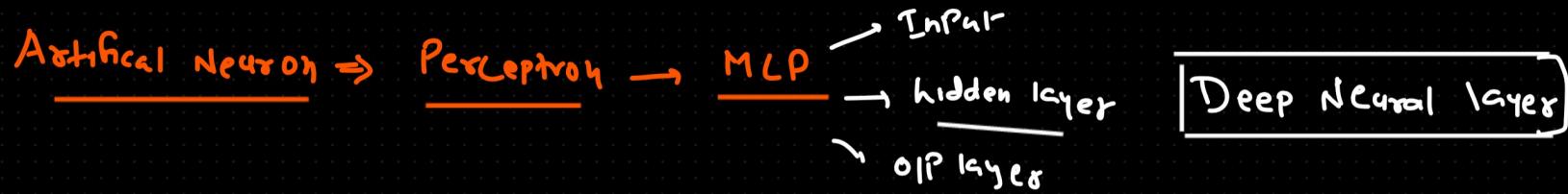


- 1 DL Landscape
- 2 ML and DL
- 3 Why DL is Popular
- 4 Application
- 5 DL / ANN history
- 6 Perceptron | MLP
- 7 first use case DL



Human Neuron Image

= Artificial Neuron Image



ML vs DL

1 \equiv ID \Rightarrow Model \rightarrow Mathematical \Rightarrow Pattern
 \Downarrow Statistical techniques

2 \equiv AN \Rightarrow Artificial Neuron \Rightarrow Neural Network
 \Downarrow ANN (Artificial Neural Network) $-$ CNN (Convolution Neural Network)

Basic Unit of DL

Convolution + ANN

GAN
 \Downarrow ANN

RL ANN
 \Downarrow α -learning

\Downarrow Deep Q NN

RNN (Recurrent Neural Network)

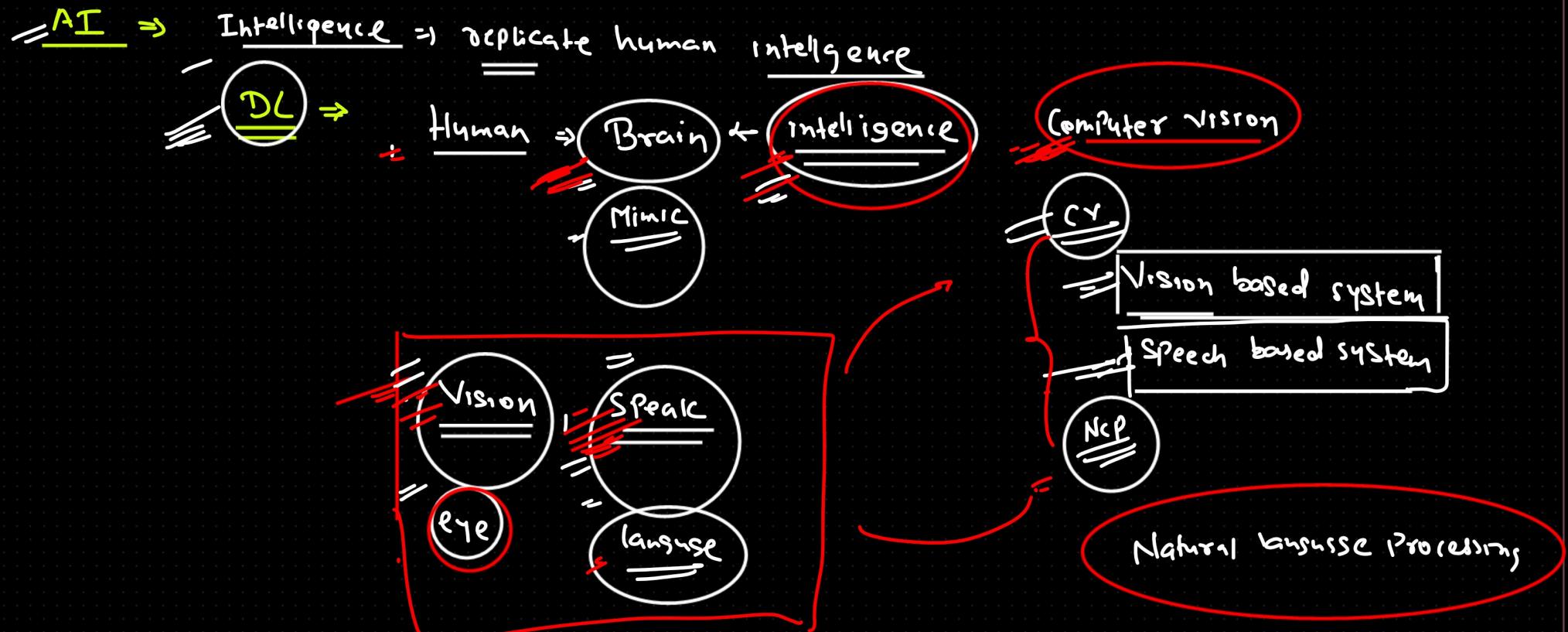
ANN + Recurrence $\xrightarrow{\text{BT}}$
 \Downarrow LSTM GRU

Why this DL is too much famous

1

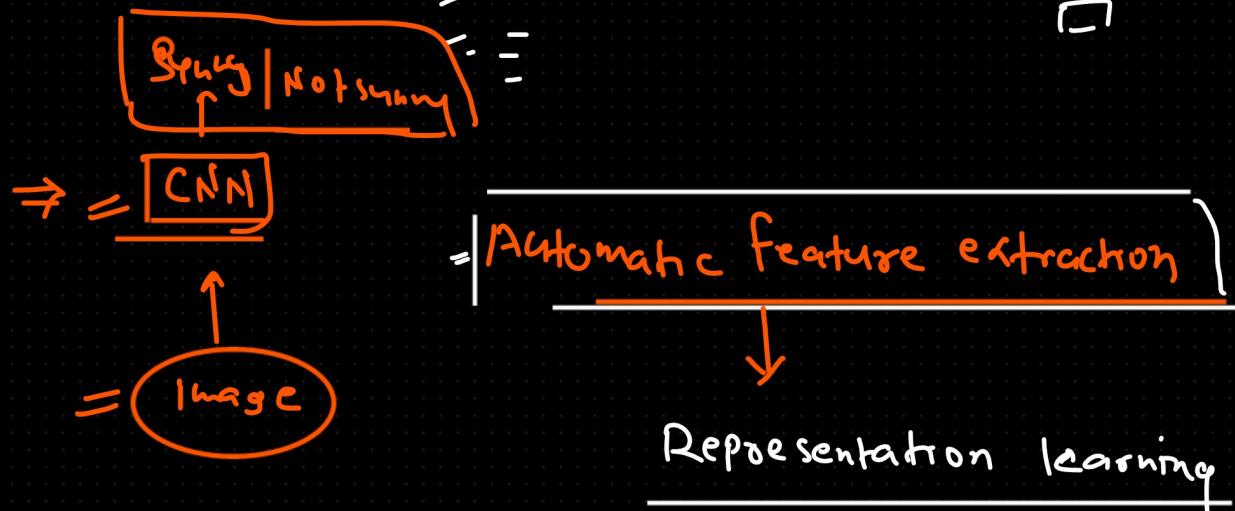
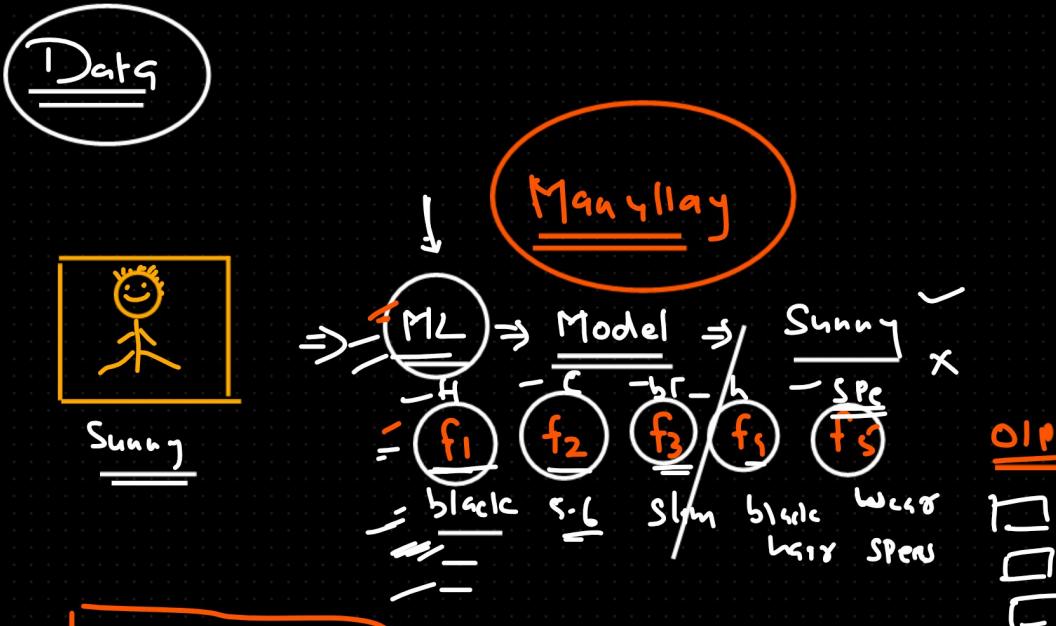
Applicable in each and every Domain

Vast amt of Problem, Wide Domain of Problem

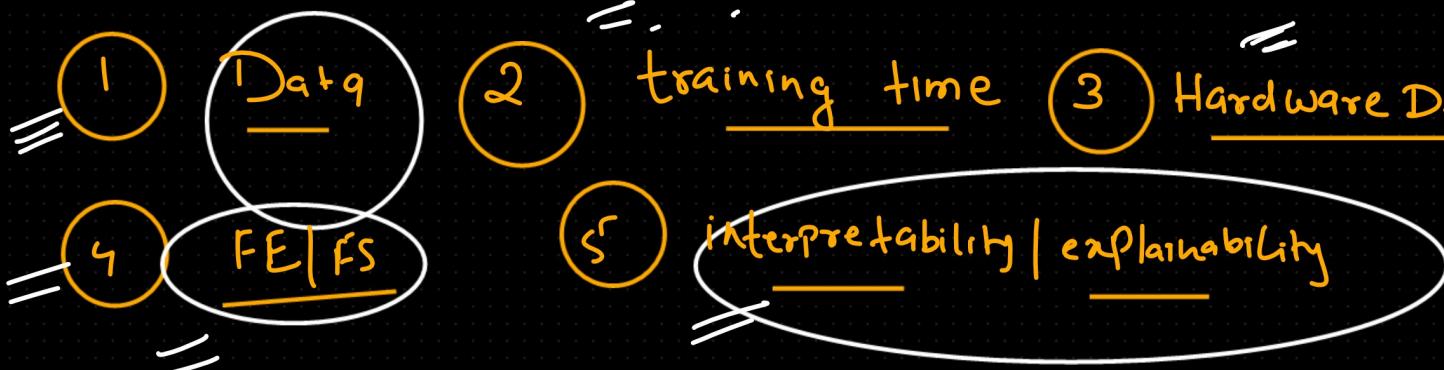


ML, DL

Feature extraction



Representation learning

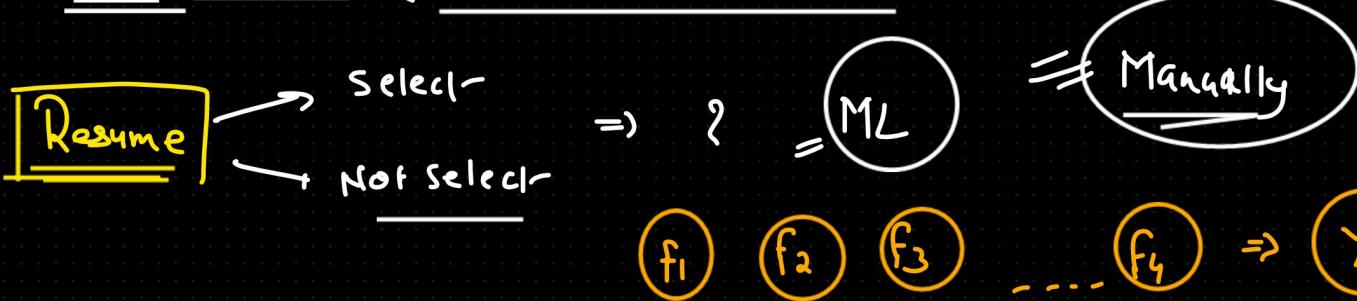


1

DL \Rightarrow huge amr of Data

ML \Rightarrow Not required (low amr of Data)

Problem



DL

\Rightarrow CNN \Rightarrow Image classification

\Rightarrow

\Rightarrow Object Detection

segmentation

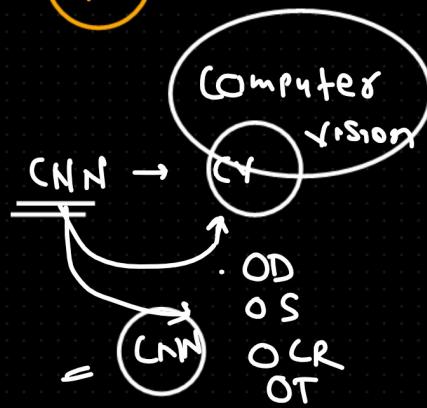
OCR

NLP

RNN

!!!
text-extraction

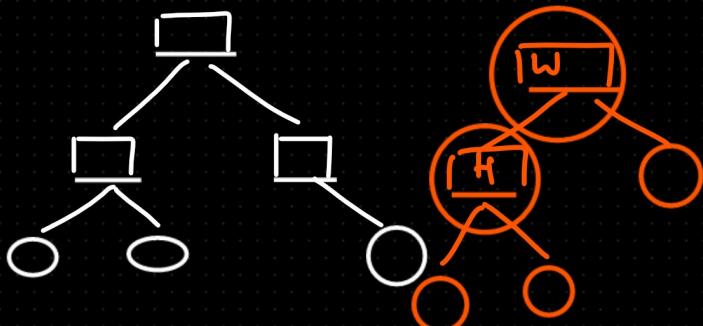
Automate



ML

Linear reg \Rightarrow $|y = mx + c|$

DT



= weights height - BMI

$$BMI = m_1 \times w + m_2 \times h + c$$

$$0.5 \times w \quad 0.8 \times h$$

Interpretation | Explain

DL

Interpretation

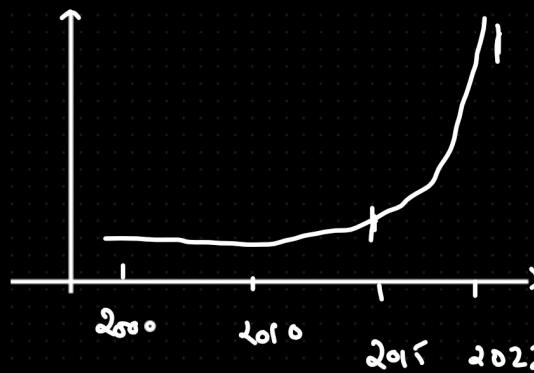
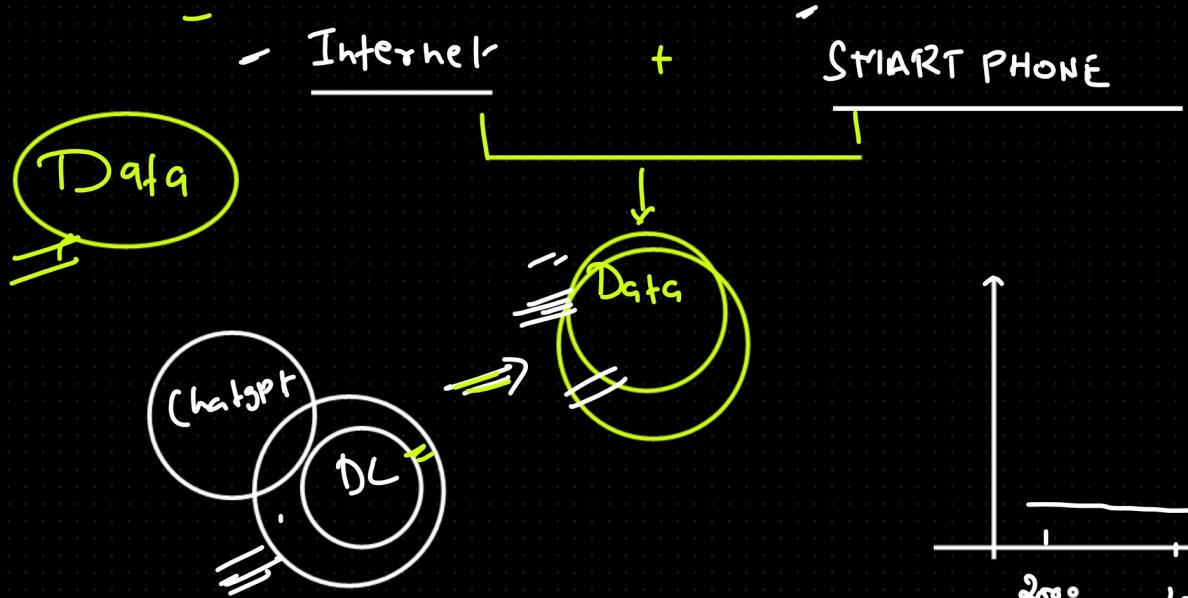
is little complicated

tough

Black box

Explanation

ANN, CNN, RNN



- M → Meta, Microsoft
- A → Apple, Amazon
- N → Netflix
- G → Google
- L → LinkedIn

= (2005 - 2010)

= (2005 - 2010)

Data → Not labeled

↓
labeled

↑
DP

Big data

100
50

Open

ImageNet, COCO

MNIST

Video-

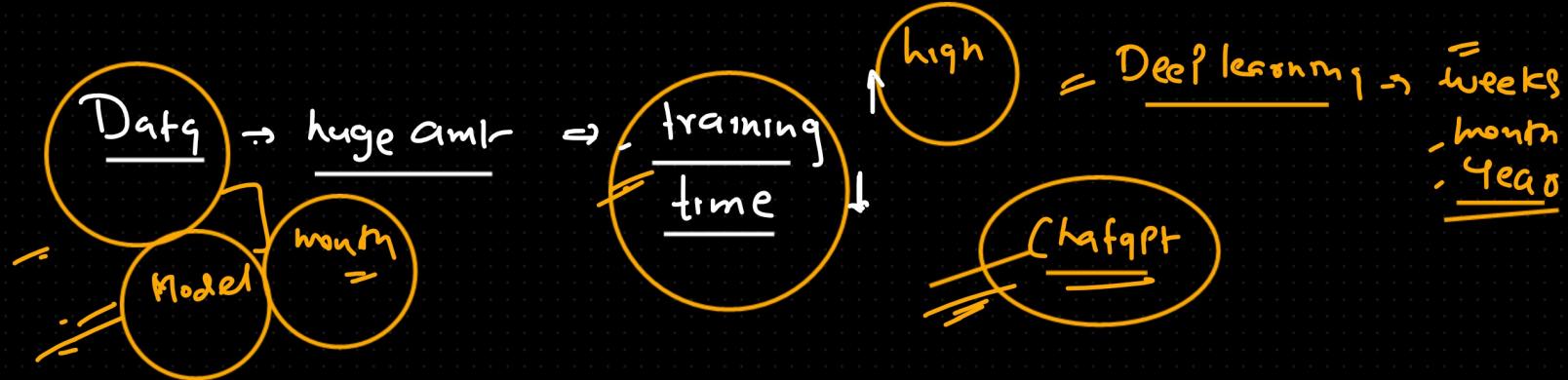
squad

text

Supervised

DL

Algorithm



Hardware

- ML ⇒ CPU
 - DL ⇒ GPU

~~CPU~~

= GPU

Edge device

~~Google~~

TPU

Parallel

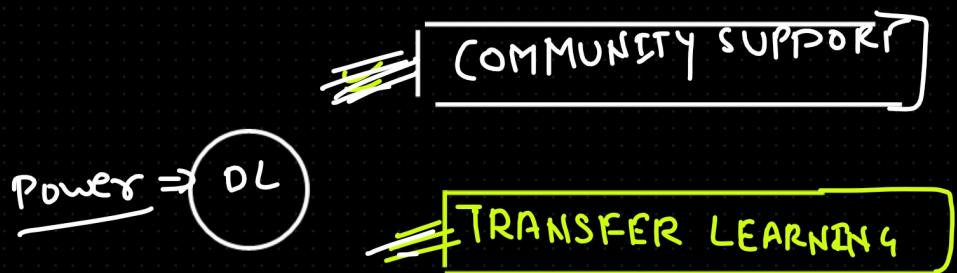
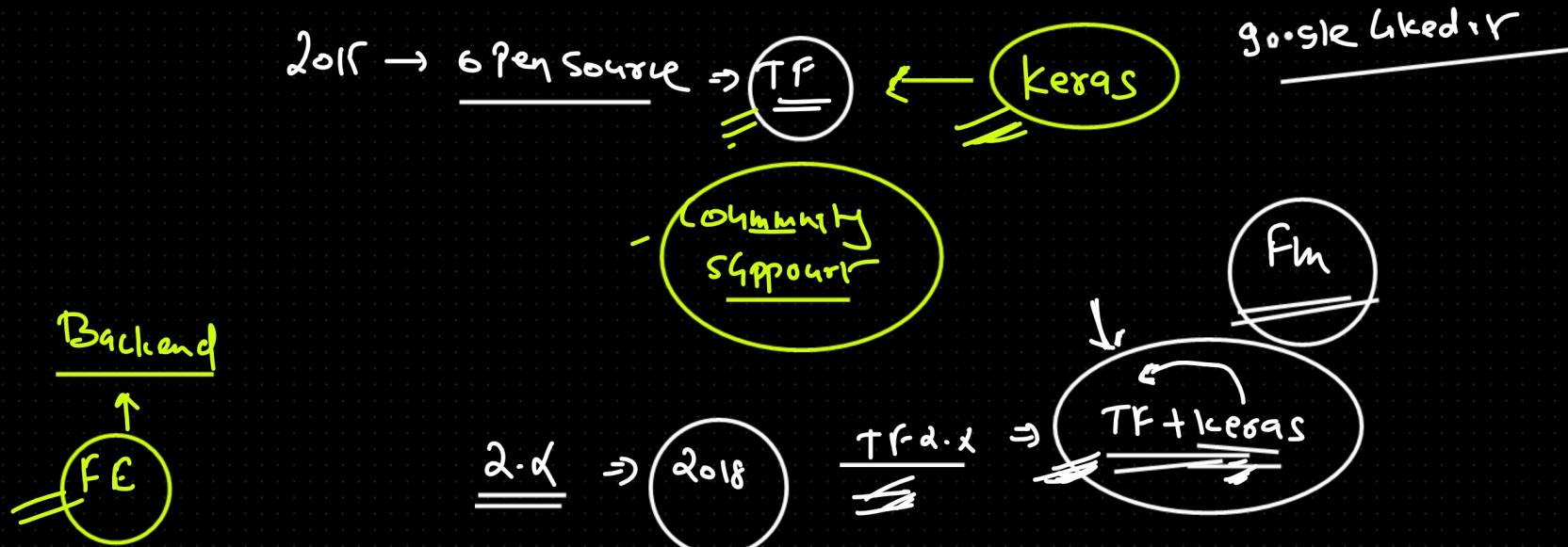
~~Nvidia~~

Framework

- ML ⇒ Scikit learn

- DL ⇒ tensorflow
 ↳ google

pytorch
 ↳ fb



- If someone already trained model on the data you want to use it for your purpose you can do it \rightarrow fine tune Model \rightarrow Download

Image classification \Rightarrow $\begin{cases} \text{ResNet} \\ \text{GoogleNet} \end{cases}$

Object Detection \Rightarrow $\begin{cases} \text{YOLO} \\ \text{SSD} \\ \text{Fast, faster RCNN} \end{cases}$

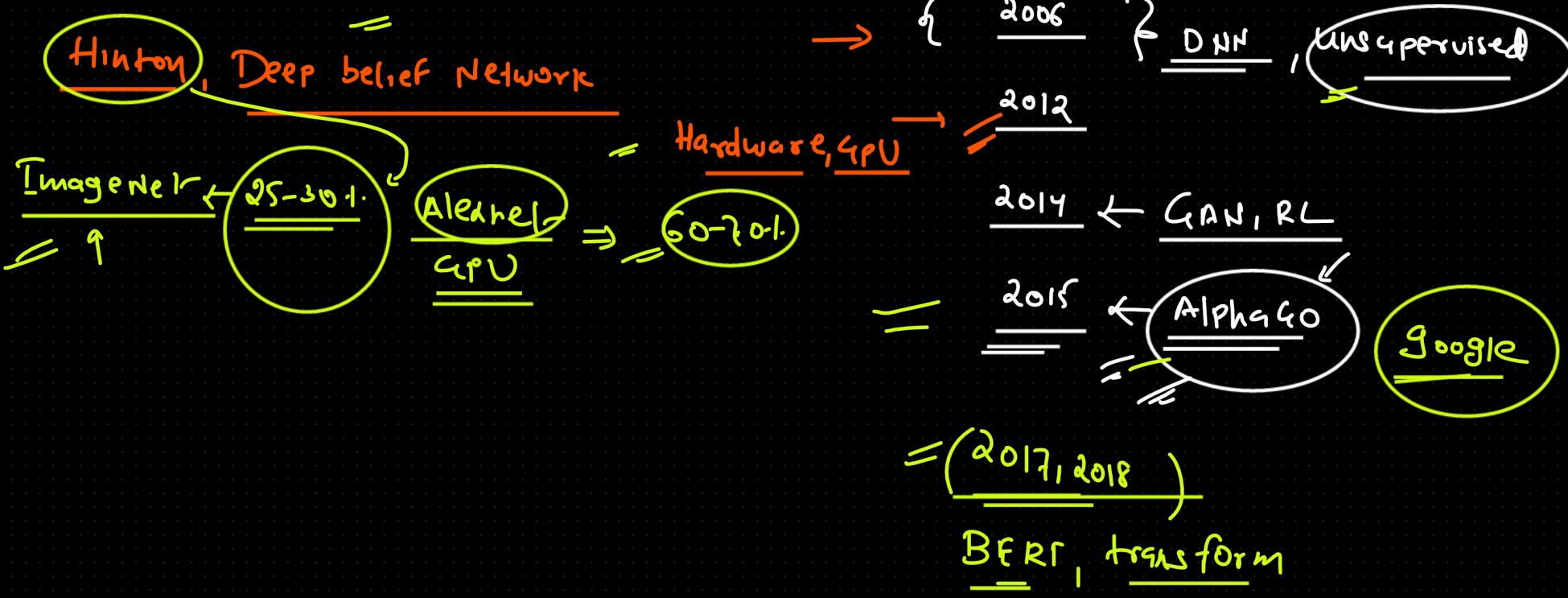
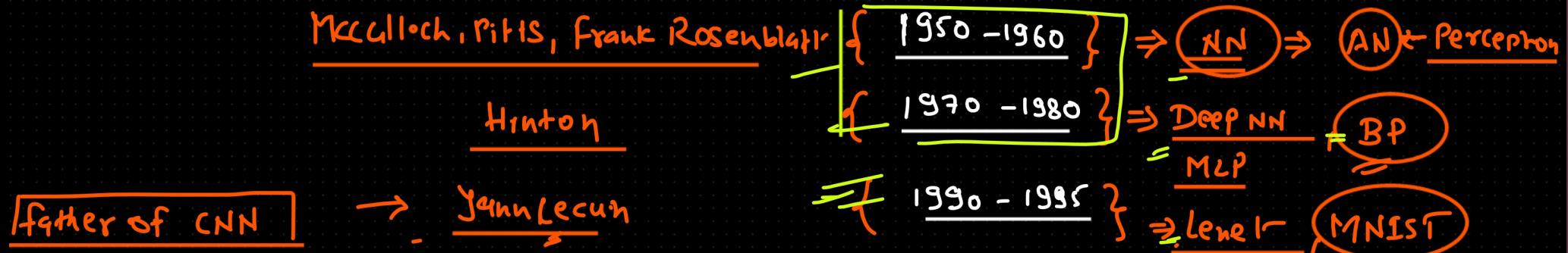
Object Segmentation \Rightarrow $\begin{cases} \text{Mask RCNN} \\ \text{U-Net} \\ \text{V-Net} \end{cases}$

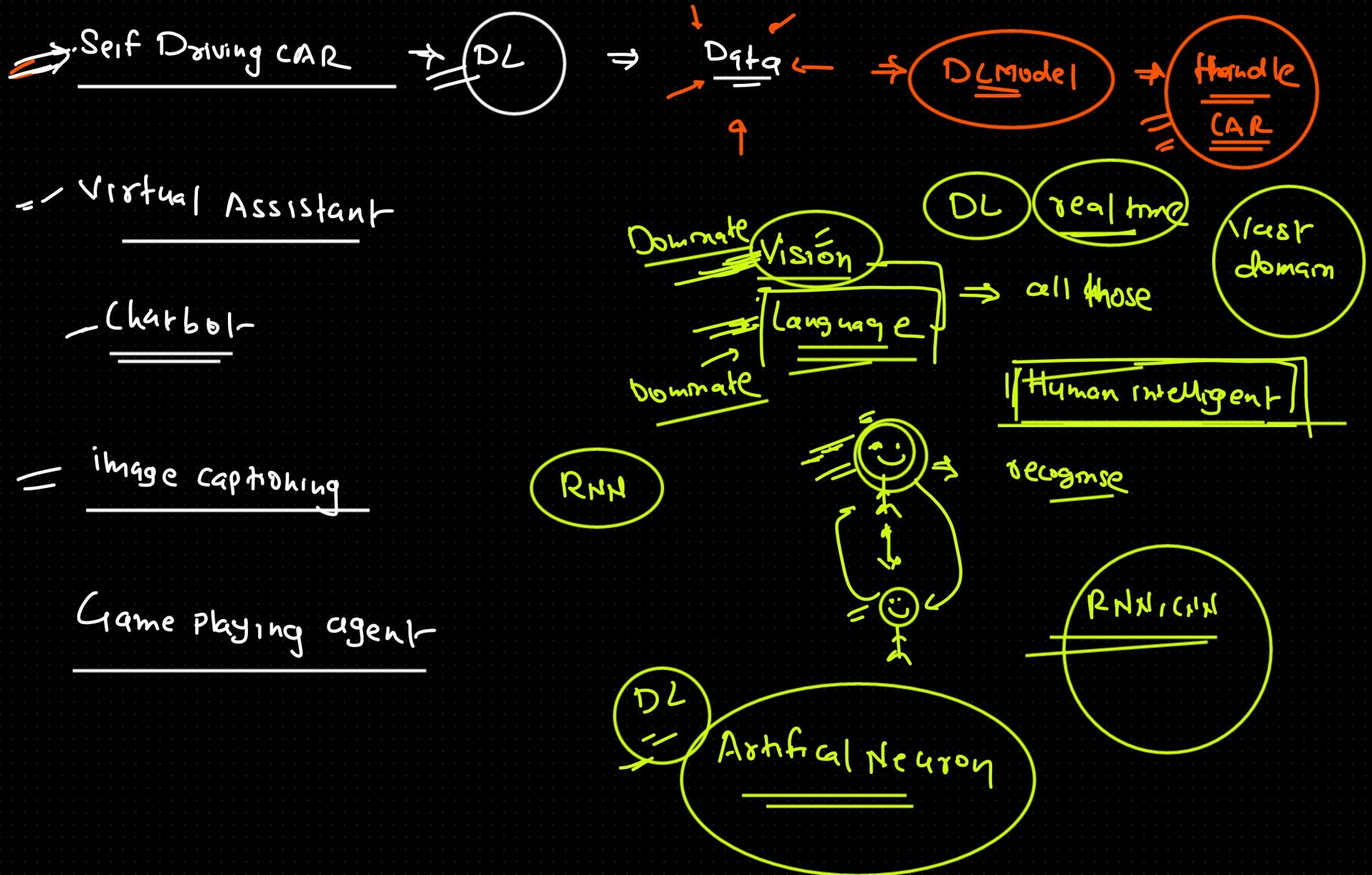
Image translation \Rightarrow Pixel to Pixel

Speech generation \Rightarrow WaveNet

Text classification \Rightarrow BERT

HISTORY \Rightarrow Old History + New History
Modern





RoadMap \Rightarrow

DL



MULTIlayer Perception

Python \Rightarrow TF, PT

activation

loss

optimizer

Vanishing gradient

Exploding gradient

Regulation, Normalization (L_1, L_2 , BatchN,

Droouts)

Hyperparameter tuning (kerastuner)

tensorboard

CNN =

- 1 Convolution
- 2 Poolings
- 3 Kernels
- 4 LeNet, Alexnet, Vgg, ResNet, GoogleNet
- 5 Practical \Rightarrow CNN App
 - 6 Object Detection $\xrightarrow{\text{SSD}}$ $\xrightarrow{\text{RCNN}}$ $\xrightarrow{\text{YOLO}}$
 - 7 Obj Seg
 - 8 framing, OCR
- 9 GPU, Edge devices
- 10 Projects

OpenCV

RNN

- 1 RNN
- 2 LSTM, GRU
- 3 Encoder, Decoder
- 4 types of RNN
- = (seq to seq)
- 5 attention
- 6 Self attention, transformer
- 7 BERT (LM) =
- 8 GPT
- 9 OpenAI (ChatGPT)
- 11 Project

Wordembedding

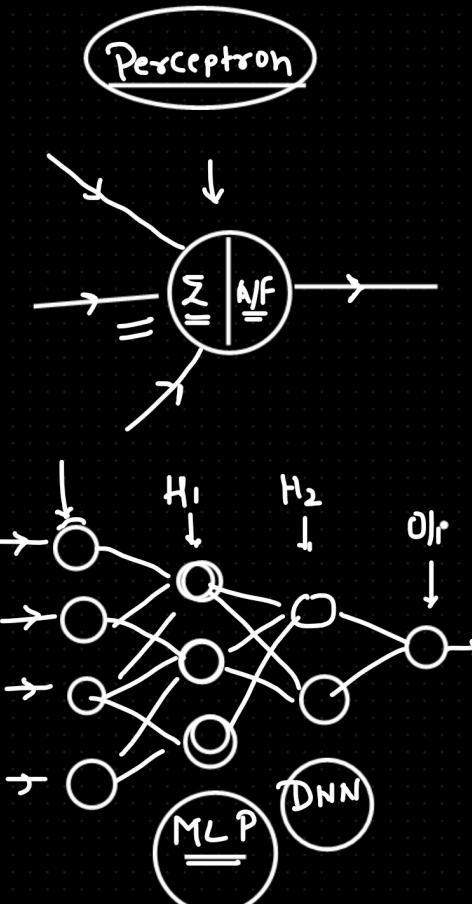
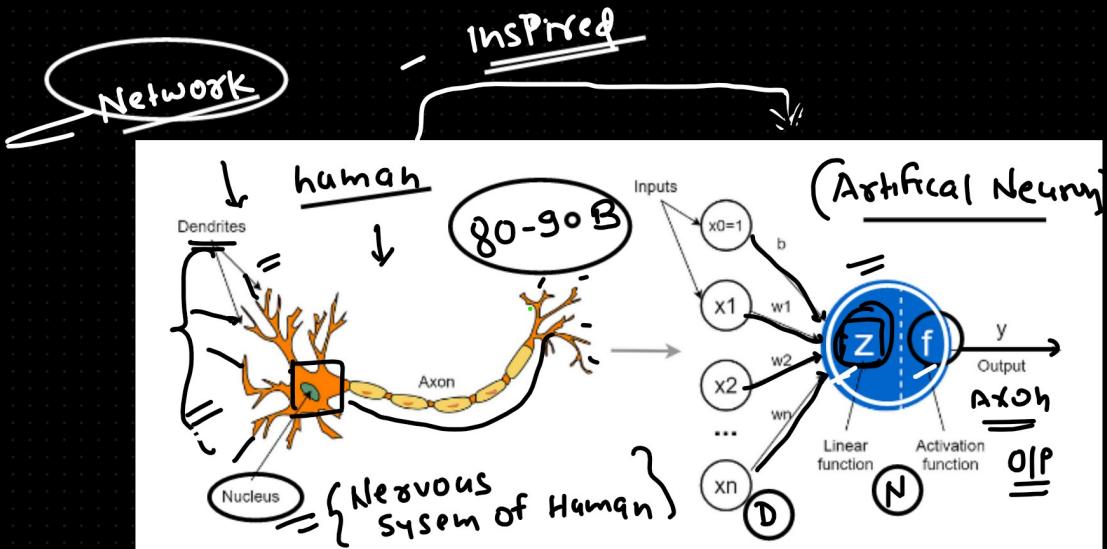
- Word2Vec
- Elmo

= Hugging face

GAN

RL

Array and tensor



Height | weight | O/N

Training \Leftarrow DL
Prediction \Leftarrow DC

{ Feed forward NN }
 BP
 \Leftarrow

H

w_1, w_2

$\Sigma | A/F$

O/P

b

$= [\Rightarrow H \times w_1 + w \times w_2 + b]$

$\Rightarrow Act(Hw_1 + w \times w_2 + b) \Rightarrow O/P$



Linear reg \Rightarrow $Ax + By + C = 0$ \Rightarrow equation of line

$$y = mx + c$$

Step F/n

$x \geq 0$	<u>Obese</u>
$x < 0$	<u>Not obese</u>

Sigmoid, tanh, Softmax, Step, Linear

loss

BP \Rightarrow GD, SGD, Minibatch, Adagrad, RMS
SGD with Momentum PROP

Adadelta, ADAM

Pytorch, TF