

Artificial Intelligence (AI) - 1st June 2024

- ✓ → ANN/DNN/MLP - Tabular
 - ✓ → CNN/ConvNets - Image
 - RNN/LSTM/GRU - Text | ~~Translation~~ | Audio to Text
 - NLP
 - Transformer, BERT, GPT | Text to Audio
 - Computer vision/OpenCV - Face recog, Self drive
 - Re-inforcement learning -
 - GANs & Autoencoders - unsup
- * Gen AI - LLM
- Basic to Adv
- June, July, Aug, Sep - 1st week

Webinar Chat

fantasy images ?

yes sir

Gunanidhi Mohanty to Hosts and panelists

GM yes

Ch Usha Kumari to Hosts and panelists

CU yes sir

Aishwarya Singh to Hosts and panelists

AS just a suggestion whatever you teach, please write so that we can make note

PRAMOD K. to Hosts and panelists

PK yes. sir. Sir this is the introduction? I miss 15 min

Santoshkumar Pandit to Hosts and panelists

SP yes Sir understanding...

Aishwarya Singh to Hosts and panelists

AS okay sir

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To: Hosts and panelists

Type message here...

Industrial Revolution

- ① Steam-based Machine - 18th century
- ② 19th - 20th century — 2nd revolution
→ Electrical energy-based manuf prod
- ③ late 20th century — computer & Internet based knowledge
- ④ 4th Revolution - 21st century — 2012

AI & IT

$$2 + 2 \div 2 = 3$$

↑ ↑

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Ch Usha Kumari to Hosts and panelists

CU Human

Gunanidhi Mohanty to Hosts and panelists

GM true in some sense

both are true

Sourav K to Hosts and panelists

SK Yes..

Aishwarya Singh to Hosts and panelists

AS yes sometimes

Ch Usha Kumari to Hosts and panelists

CU yes possible

Gunanidhi Mohanty to Hosts and panelists

GM GPS is one of the example

PRAMOD K. to Hosts and panelists

PK true but not 100%

yes

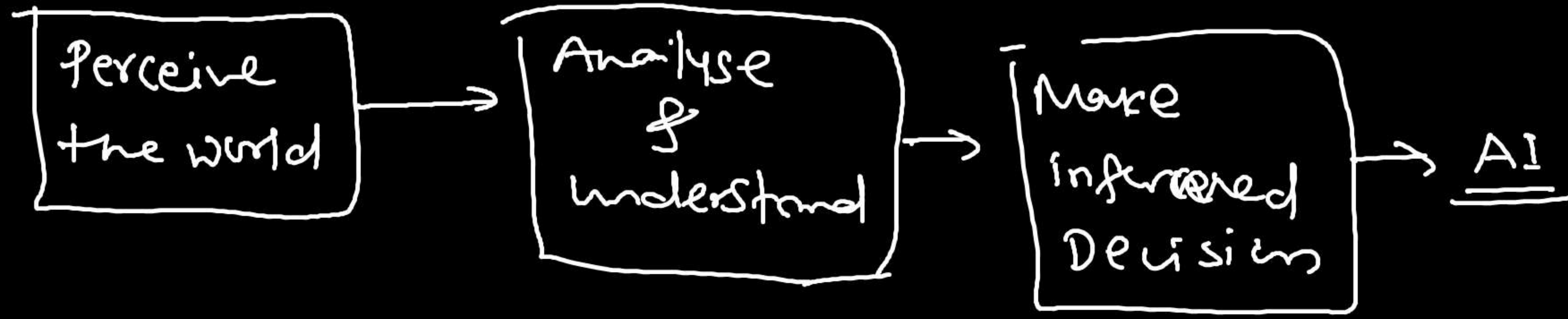
Aishwarya Singh to Hosts and panelists

AS yes

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Act → Learn → Sense

① Rule Based AI

→ if, else condition

x_1	x_2	x_3	y
1	1	2	0
3	4	5	1
0	1	2	0

② Machine / Deep Learning / Statistical Based AI

$x_1 + x_2 + x_3 > 5, 1$
otherwise zero

Rules are very hard or we don't know rules - Tent

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yes

Aishwarya Singh to Hosts and panelists

AS yes

Sourav K to Hosts and panelists

SK Can we say, using AI we develop cognitive function in machines?

Aishwarya Singh to Hosts and panelists

AS 0

PRAMOD K. to Hosts and panelists

PK yes

Sourav K to Hosts and panelists

SK Yes

Ch Usha Kumari to Hosts and panelists

CU yes

Gunanidhi Mohanty to Hosts and panelists

GM This is a program right? any role in AI here?

PRAMOD K. to Hosts and panelists

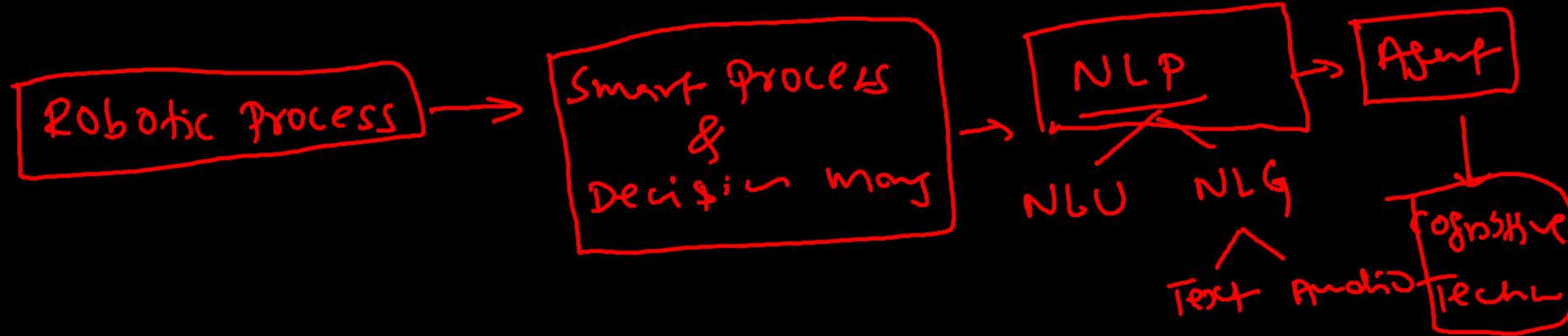
PK yes

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AI Solution



Game Theory

Markov Decision Process -

ML

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GM no

Ch Usha Kumari to Hosts and panelists

CU difficult

PRAMOD K. to Hosts and panelists

PK yes

Ch Usha Kumari to Hosts and panelists

CU clear sir

Gunanidhi Mohanty to Hosts and panelists

GM yes got it

PRAMOD K. to Hosts and panelists

PK ok..

PRAMOD K. to Hosts and panelists

PK NLG full form?

ok

Aishwarya Singh to Hosts and panelists

AS yes

PRAMOD K. to Hosts and panelists

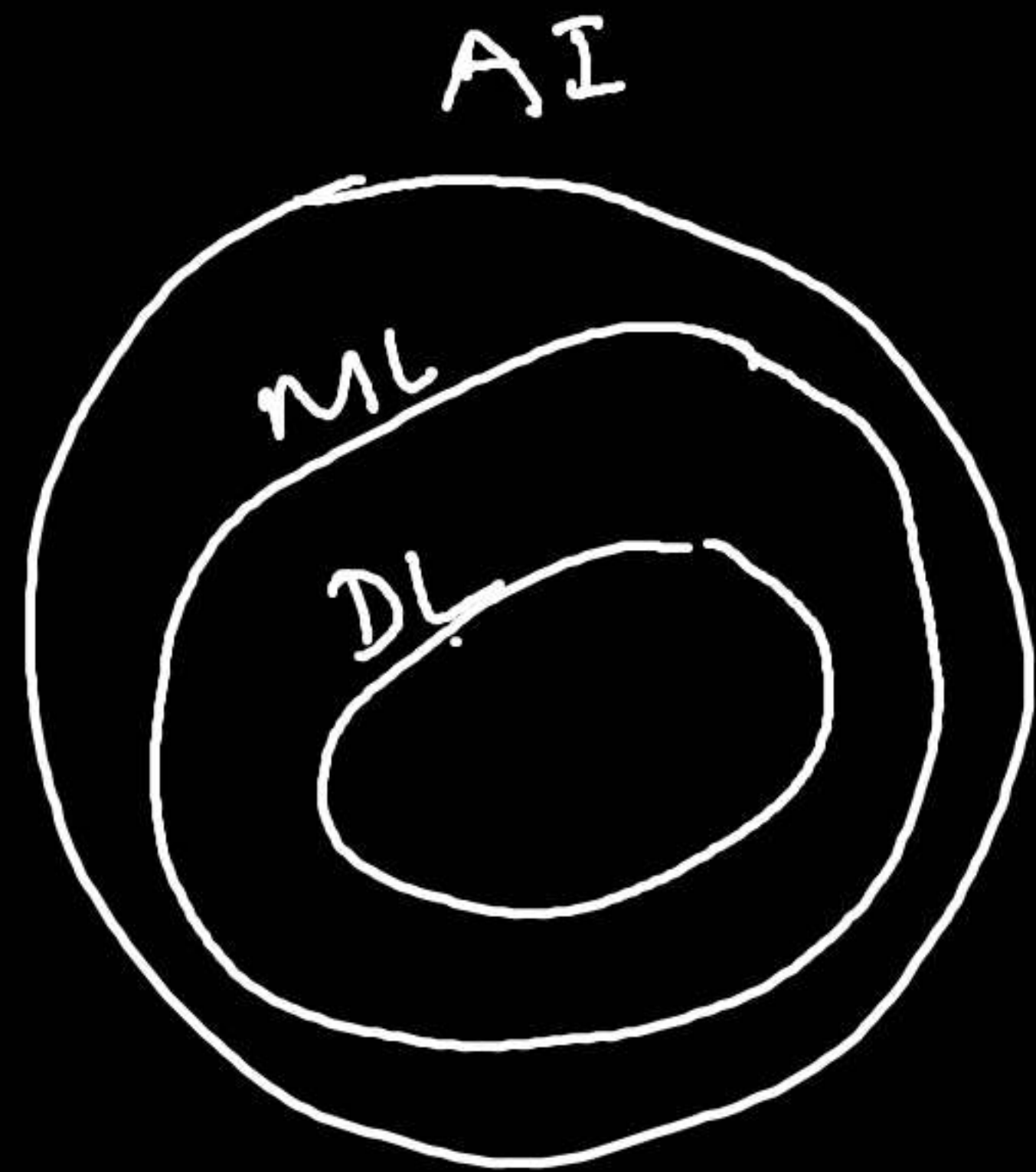
PK yes

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Deep Learning



DL vs ML

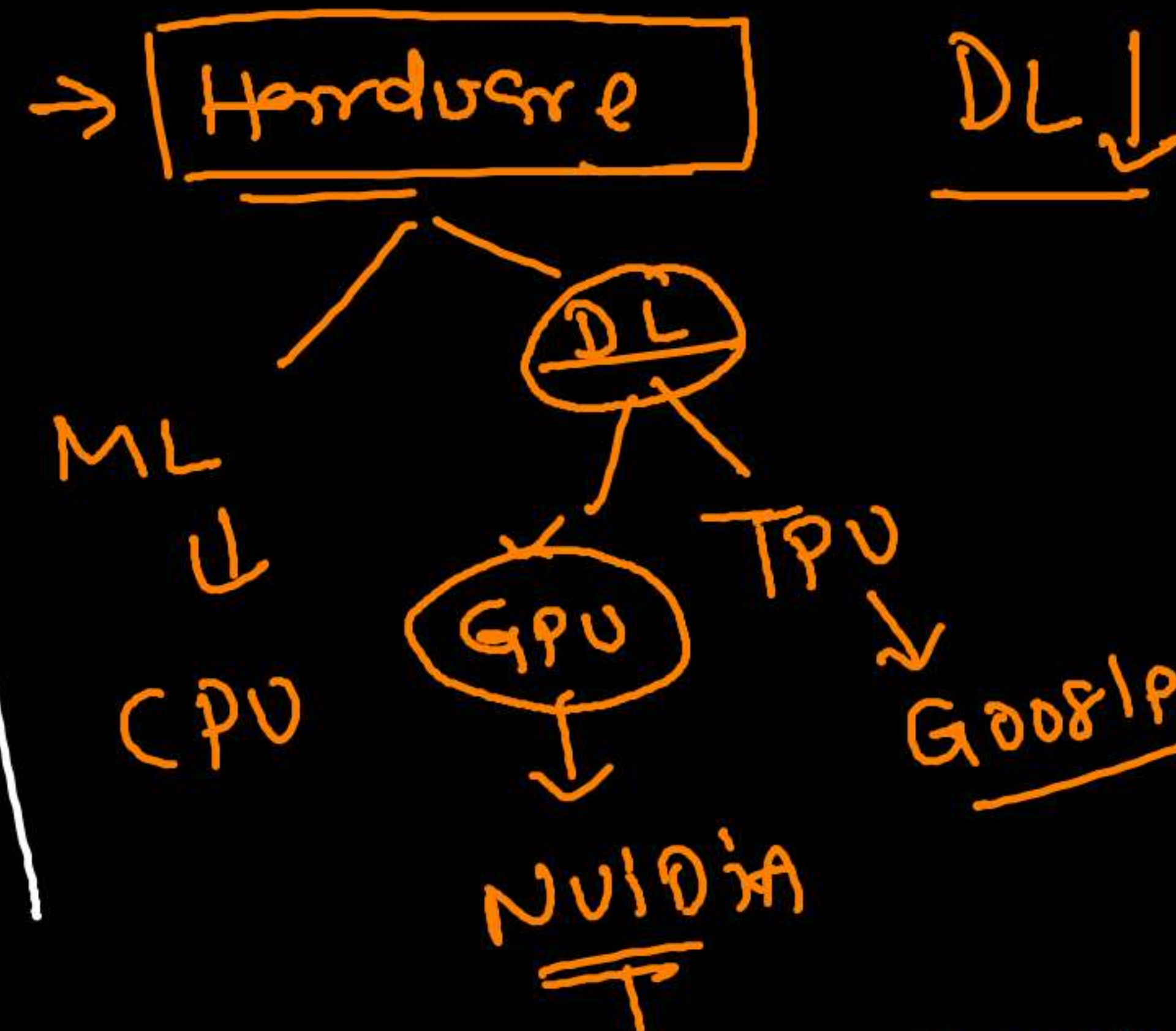
- ① Hardware dependency
- ② Software dependency
- ③ Data dependency

④ Training & Test Time

⑤ Feature Selection

⑥ Interpretability

⑦ Algorithm



2012 - Deep Learning
↳ Gaming company

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Gunanidhi Mohanty to Hosts and panelists

GM yes

Aishwarya Singh to Hosts and panelists

AS nope

Mansoor Ali to Hosts and panelists

MA No

PRAMOD K. to Hosts and panelists

PK explain once again

got it

Ch Usha Kumari to Hosts and panelists

CU yes sir

abhishek to Hosts and panelists

A curse of dimensionality

PRAMOD K. to Hosts and panelists

PK yes

Gopala Krishna to Hosts and panelists

GK DL more

ok

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Software

ML

Numpy, pandas, sklearn,
plotly etc - -

DL

Tensorflow, keras, pytorch,
Theano, NLTK, Spacy,
Textblob, gensim etc.

Data Dependency

ML - less data / less variable

↓
DL X

↳ more/wgt dataset - 50K / 5Million / b31

↳ Data hungry ==

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GM yes

Santoshkumar Pandit to Hosts and panelists

SP yes sir

PRAMOD K. to Hosts and panelists

PK yes

Mansoor Ali to Hosts and panelists

MA Yes

Joel Ratnam to Hosts and panelists

JR yes sir

PRAMOD K. to Hosts and panelists

PK yes

yes

Gunanidhi Mohanty to Hosts and panelists

GM yes

Aishwarya Singh to Hosts and panelists

AS nope

Mansoor Ali to Hosts and panelists

MA No

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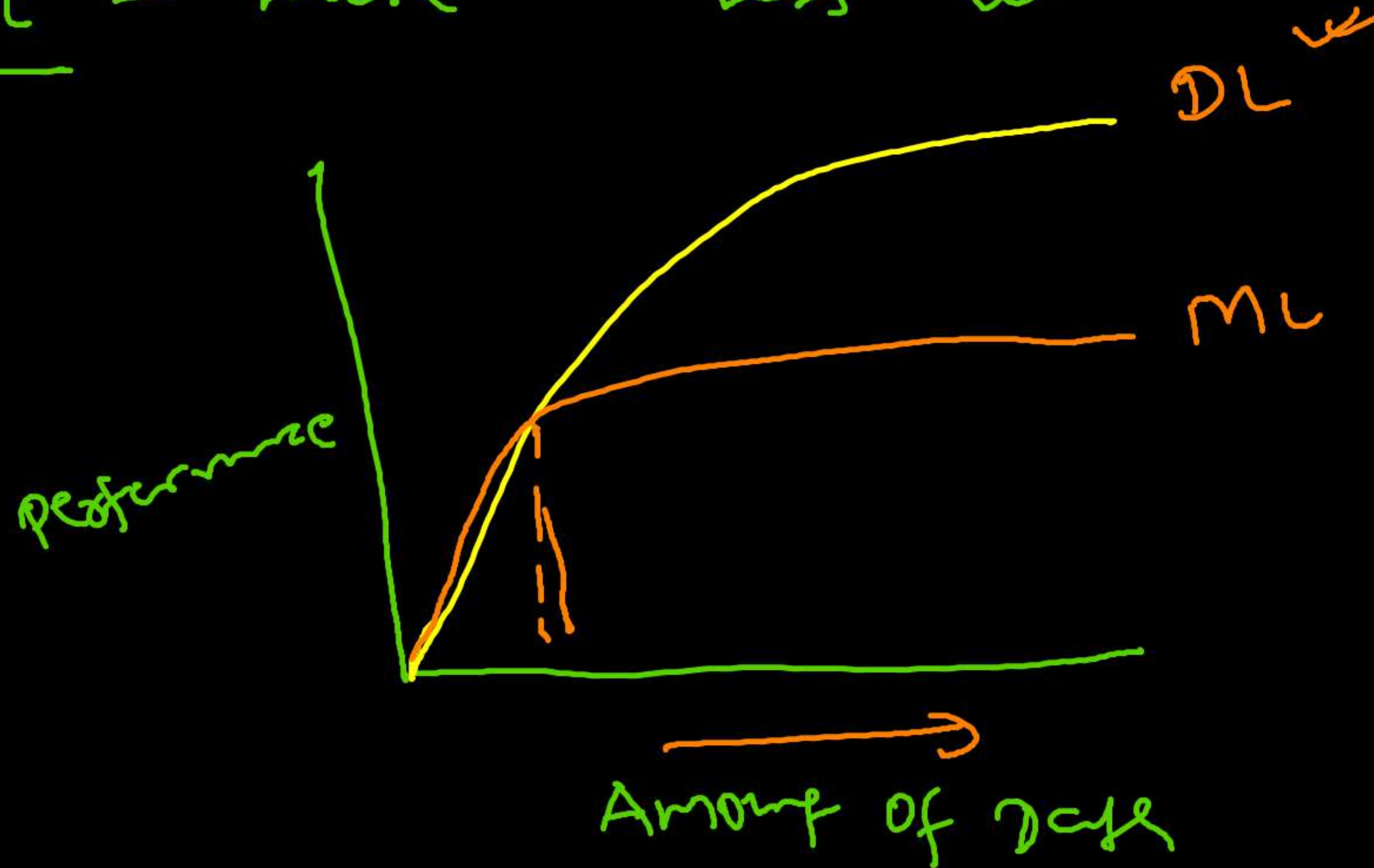
Training & Test Time

✓ ML - less

more

DL - more

less ✓



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Mansoor Ali to Hosts and panelists

MA Yes

Joel Ratnam to Hosts and panelists

JR yes sir

PRAMOD K. to Hosts and panelists

PK yes

yes

Gunanidhi Mohanty to Hosts and panelists

GM yes

Aishwarya Singh to Hosts and panelists

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CU yes sir

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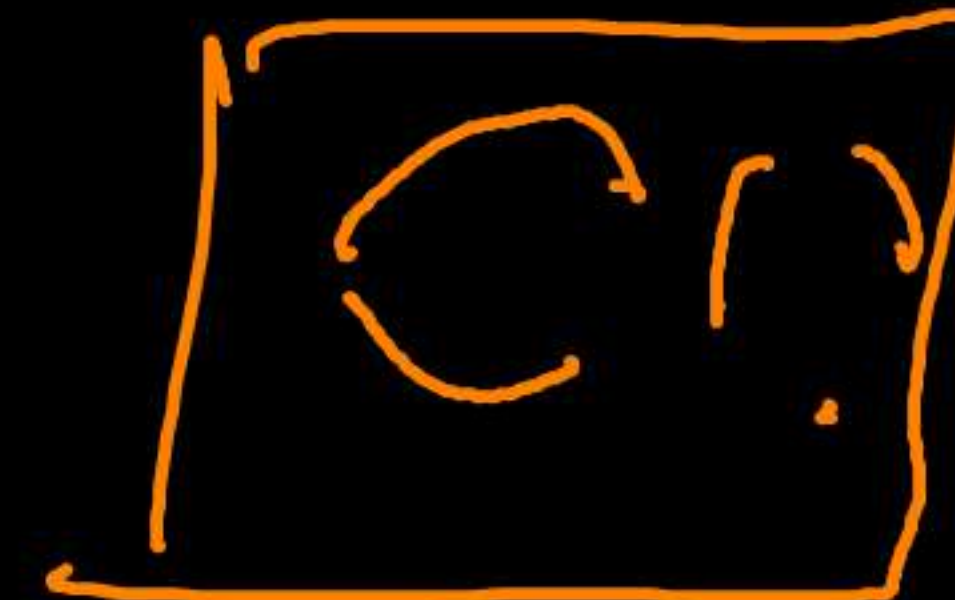
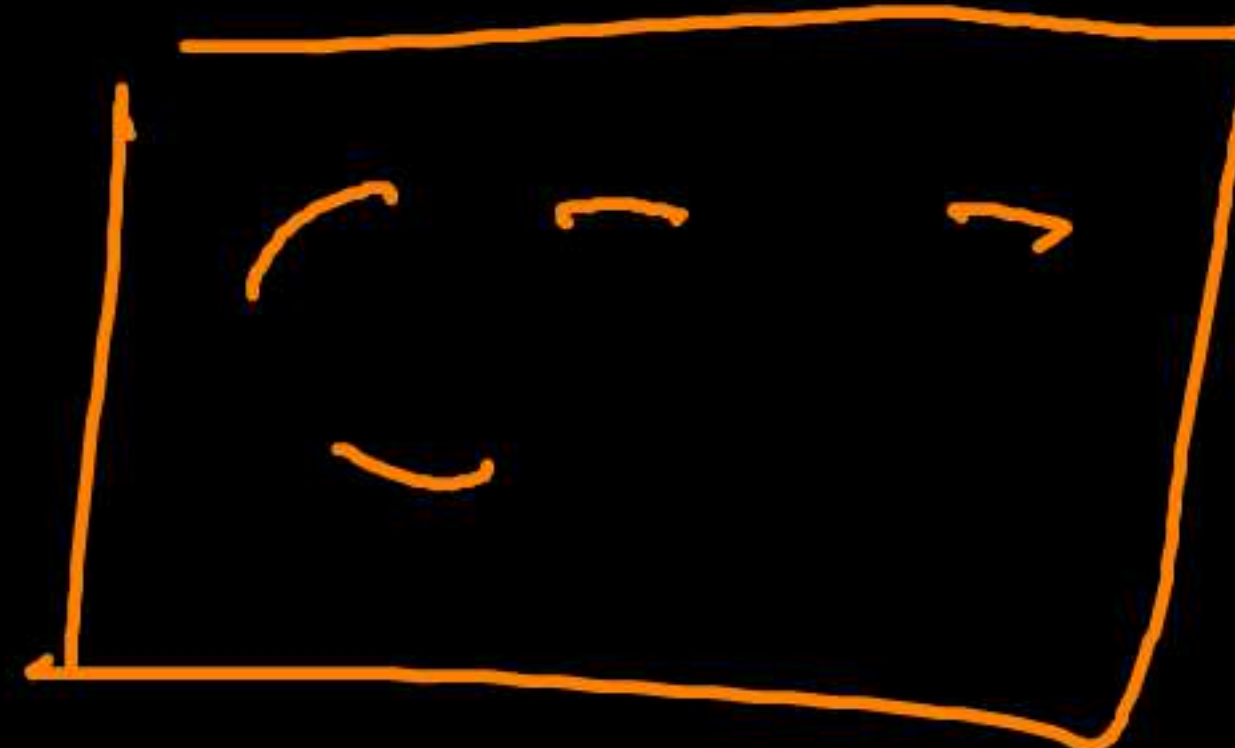
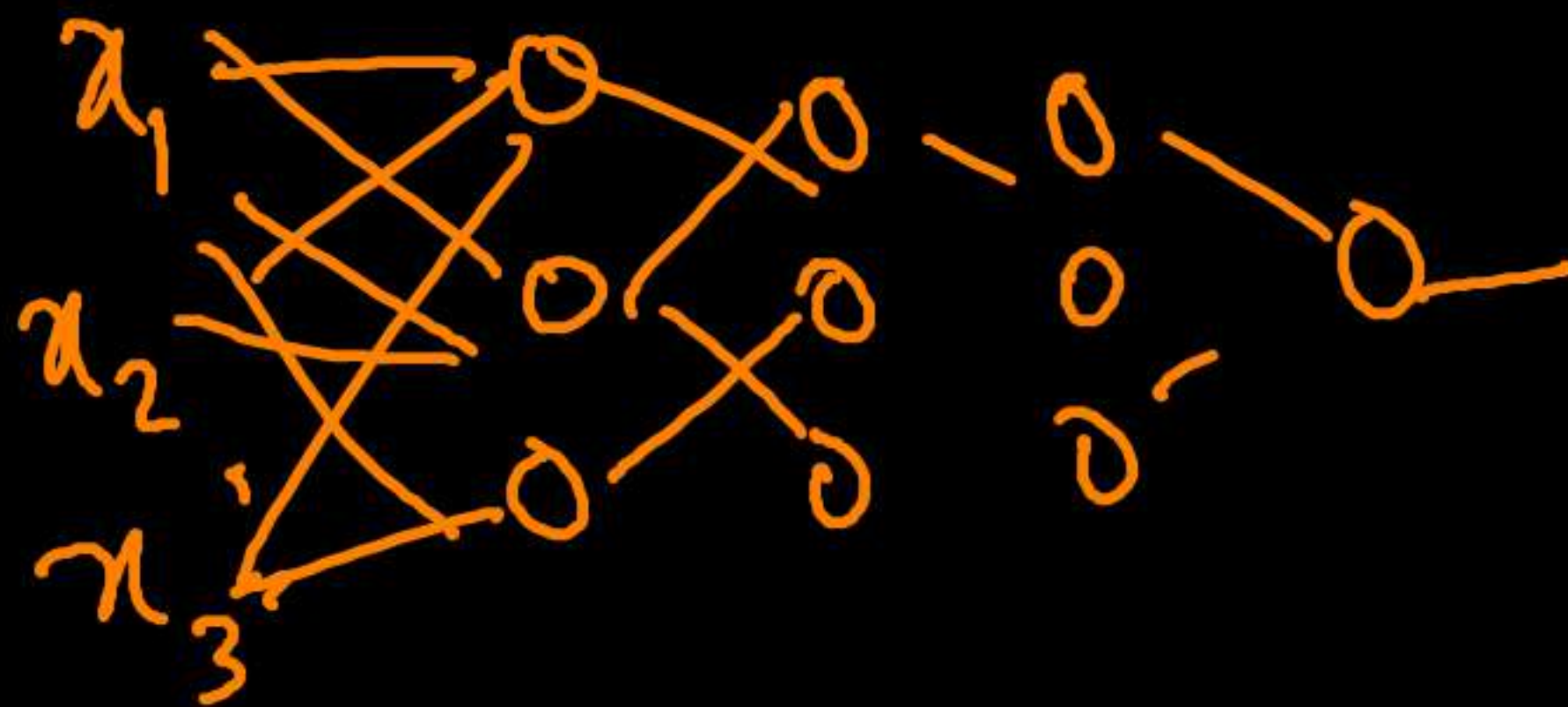
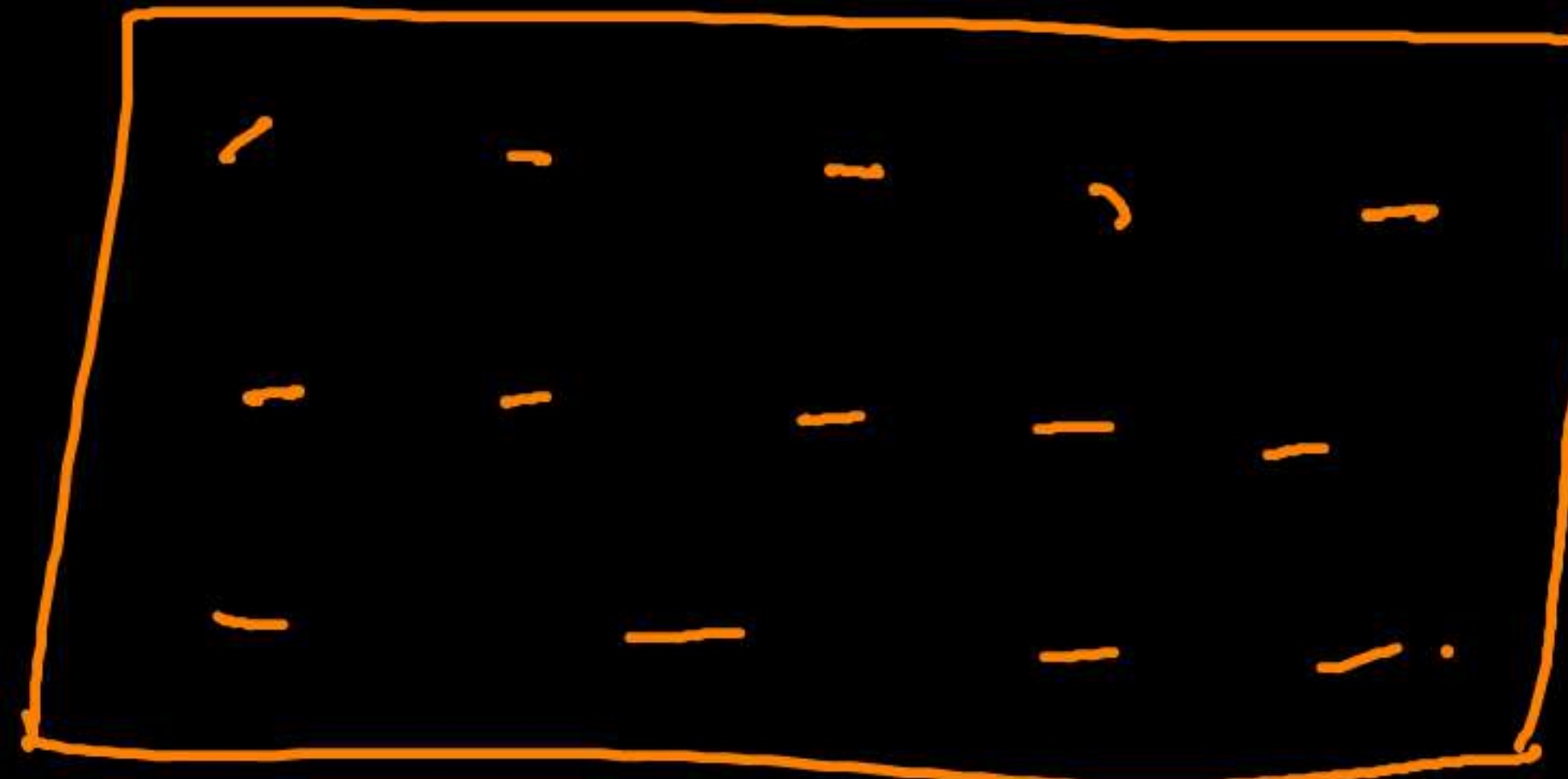
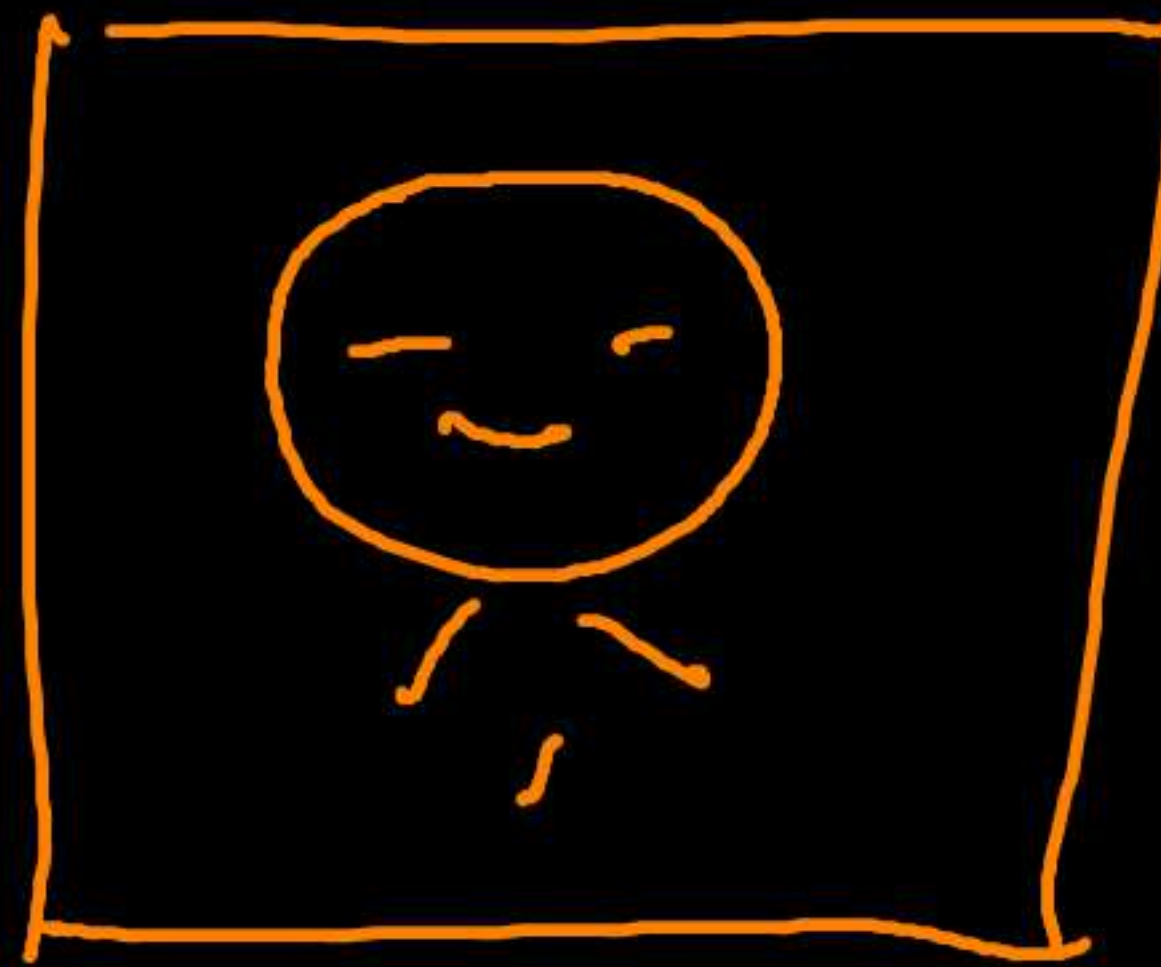
To: Hosts and panelists

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Feature Selection

ML - Manual work

DL - Automation approach



→ C/D/h/E

Algorithm

Time Series

ML - LR, Logistic, DT, RT,
Ada, XGB, GD, St-
KNN, SVM, NB, T
ea

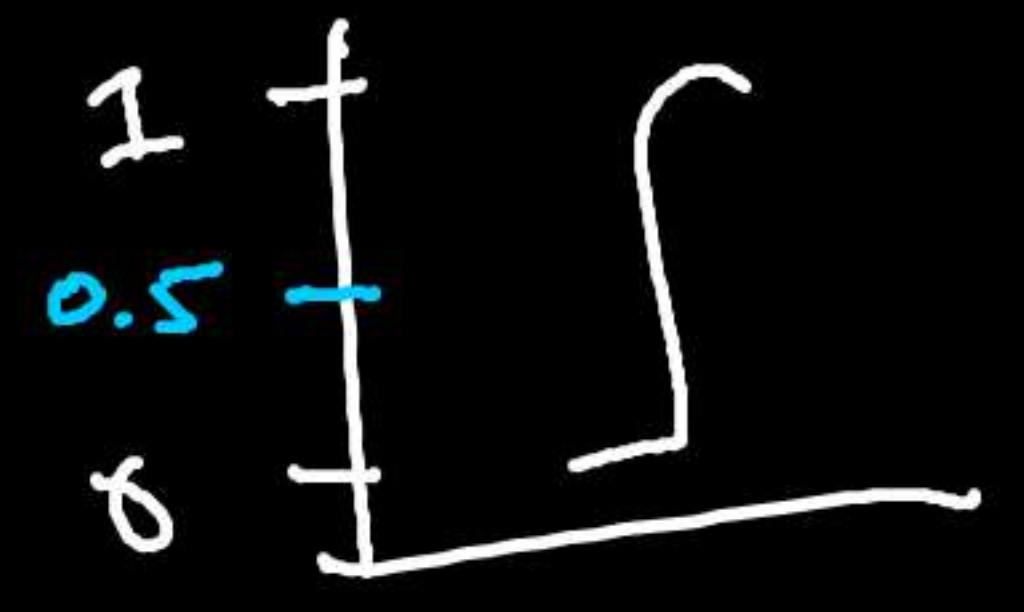
DL - MLP, CNN, RNN
LSTM

History of Neural Network & Deep Learning

- NN are an 'important ML modelling framework'
- first simplest NN model built was a "perceptron".
 - ↳ Built by Rosenblatt - 1957

→ With small changes a perceptron can become a
✓ Logistic Regression - Sigmoid curve

MLE



x_0	x_1	x_2	y
5	10	20	0
50	100	200	1
50	60	20	1
10	20	30	0

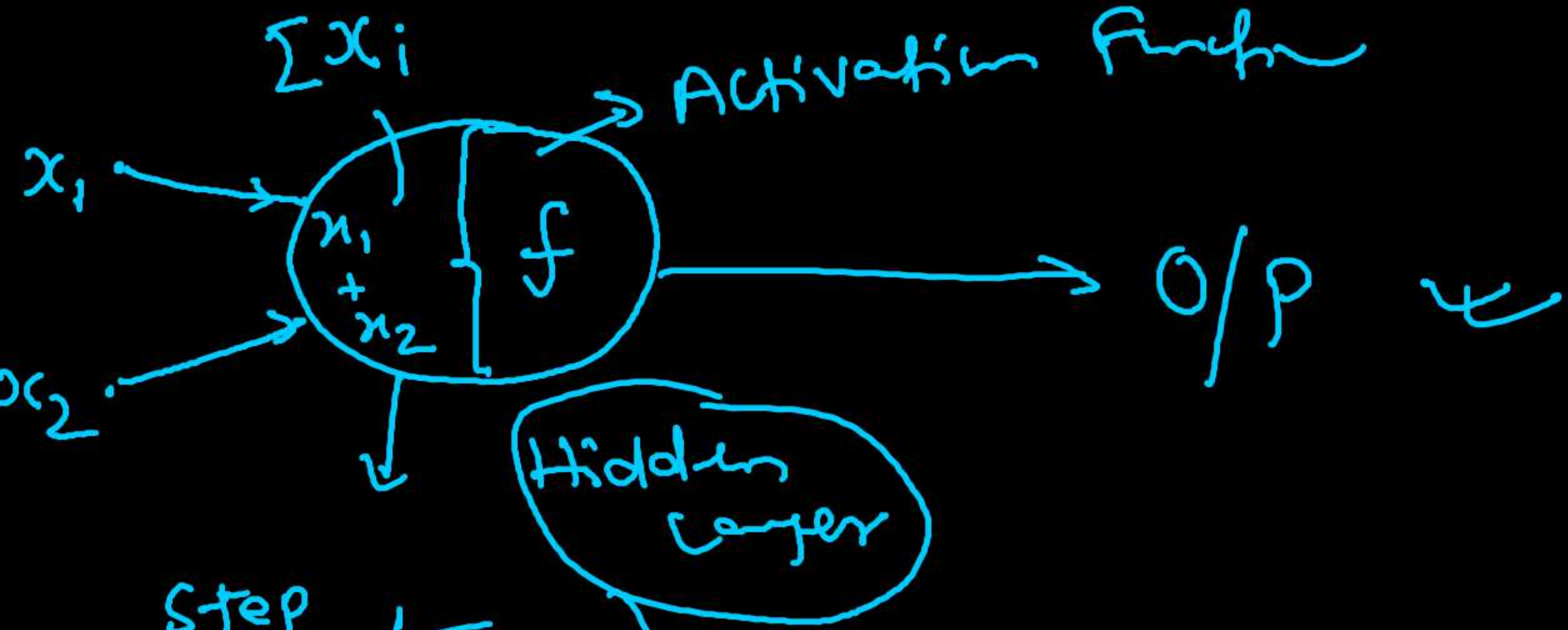
$-\infty$ to $+\infty$

$x_0 + x_1 + x_2 > 100, 1$
otherwise, 0

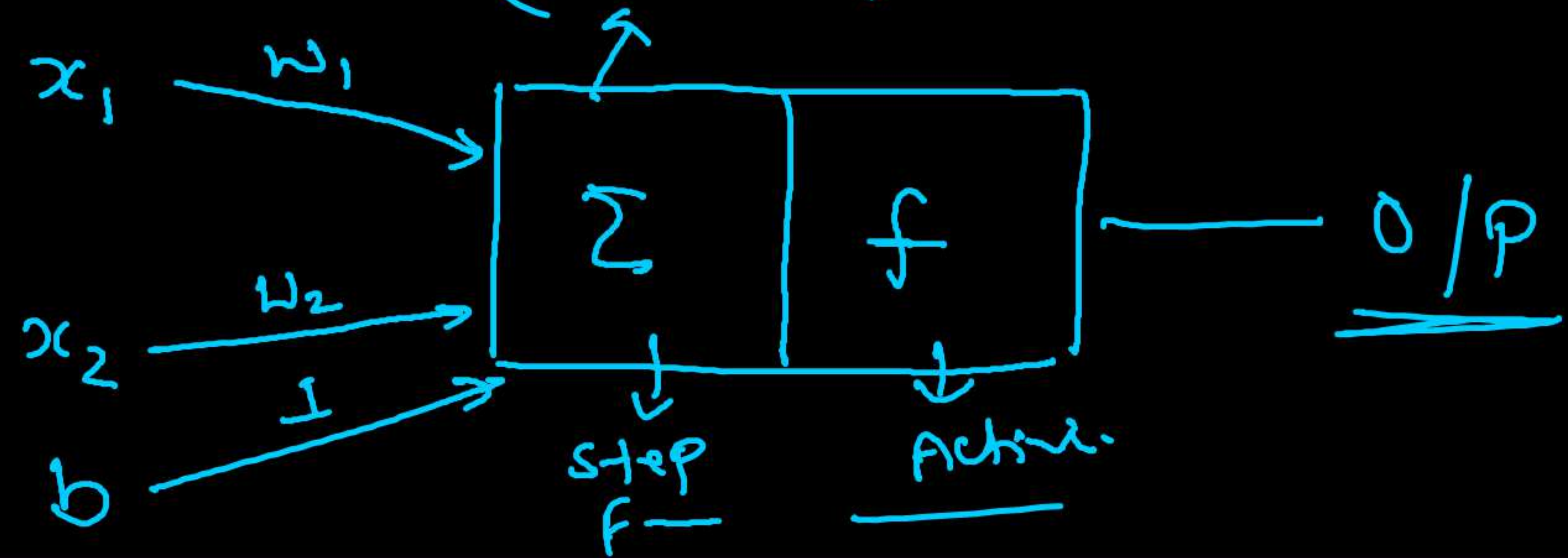
And gate
I/P data

x_1	x_2	$x_1 + x_2$	O/P
1	0	1	0
0	1	1	0
1	1	2	1
0	0	0	0

if $x_1 + x_2 < 2$, 0
otherwise 1



I/P
Step function (Σx_i)
function $(x_1 w_1 + x_2 w_2)$



$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots$$
$$Y = \beta + w_1 x_1 + w_2 x_2 + \dots$$

Alan Turing (father of modern computing)

→ curiosity raise these question

→ What is intelligence?

→ How should we build it artificially?

brilliant creation

→ There was a biologically inspired "loosely" inspired from biology

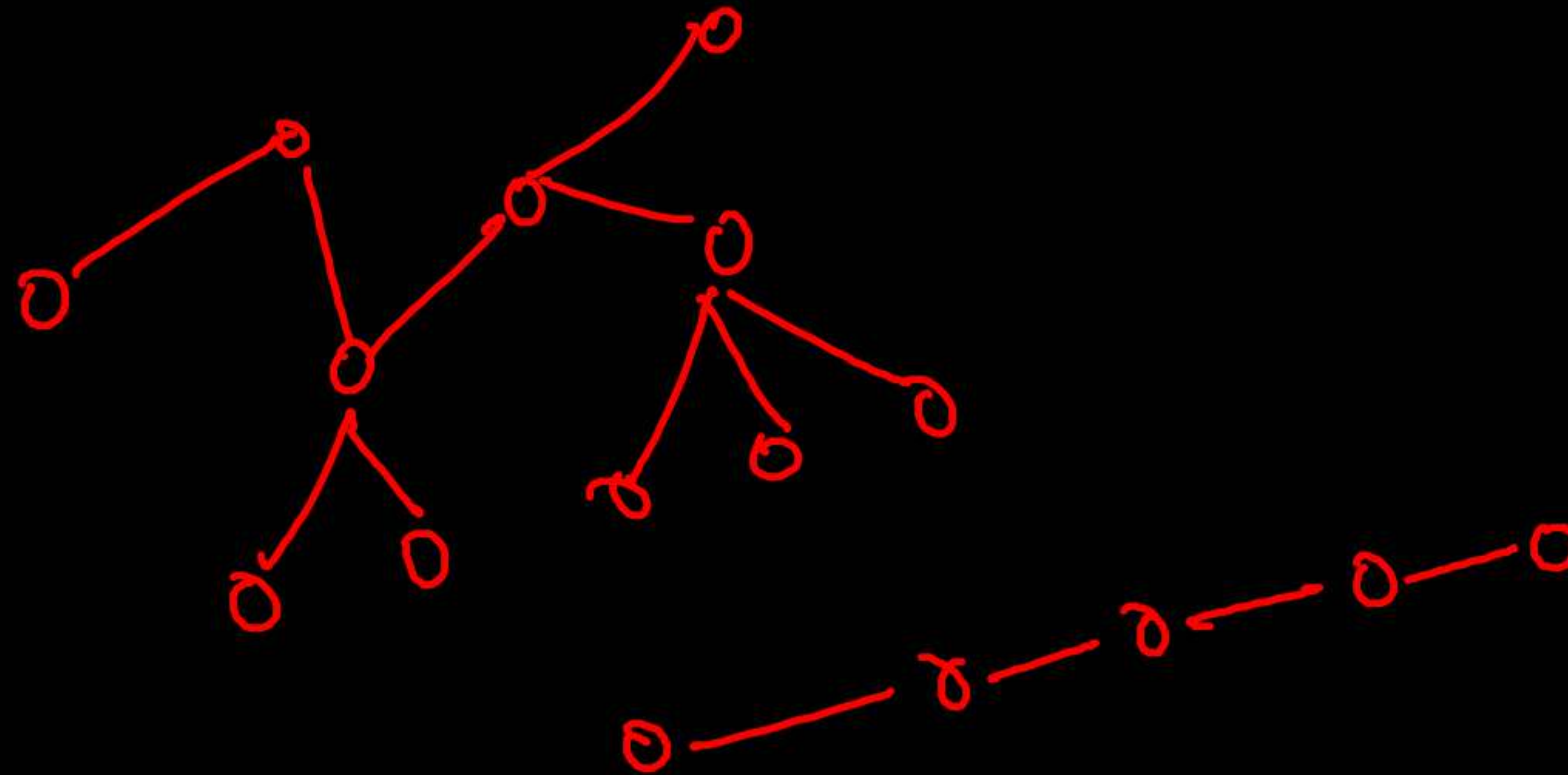
human, monkey, Elephant, ants

→ Due to work in Neuroscience, a vague understanding of the working of brain has been developed

Biological Neuron vs Artificial Neuron

perception → Single Neuron

5+ AI wsr



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Ch Usha Kumari to Hosts and panelists
CU ok

PRAMOD K. to Hosts and panelists
PK yes

Joel Ratnam to Hosts and panelists
JR can we have a 5 min break sir?
thank you sir
sure pls

Ch Usha Kumari to Hosts and panelists
CU yes

abhishek to Hosts and panelists
A what is weight?

Gunanidhi Mohanty to Hosts and panelists
GM save button is on right top corner fyi

Ch Usha Kumari to Hosts and panelists
CU f(W1X1) can be considered as single neuron?

abhishek to Hosts and panelists 2 new messages ↓

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Type message here...

1986 (Mathematicians — Hinton & others)

20 years

father of modern Deep Learning

Backpropagation ✓

SUM 2FGD
1990-2008

2012

ImageNet

Gradient descent

code - Perceptron model

AI winter year - 1990-

- insufficient computation power
- " data="data"
- " data="algorithm"

Activation — Sigmoid & tanh
optimizer — Gradient

- Perceptron is a linear model ✓
- Decision boundary / Decision surface
- OVR - one vs Rest
- AND Gate / OR Gate - Classification

$x_1 + x_2 > 2$, Green
 $x_1 + x_2 = 2$, Red
 $x_1 + x_2 < 2$, blue

→ XOR Gate - failed Perceptron - Single Neuron model

x_1	x_2	$x_1 + x_2$	O/P
1	0	1	
0	1	1	
1	1	2	
0	0	0	

↓
 Sum / RF / BP

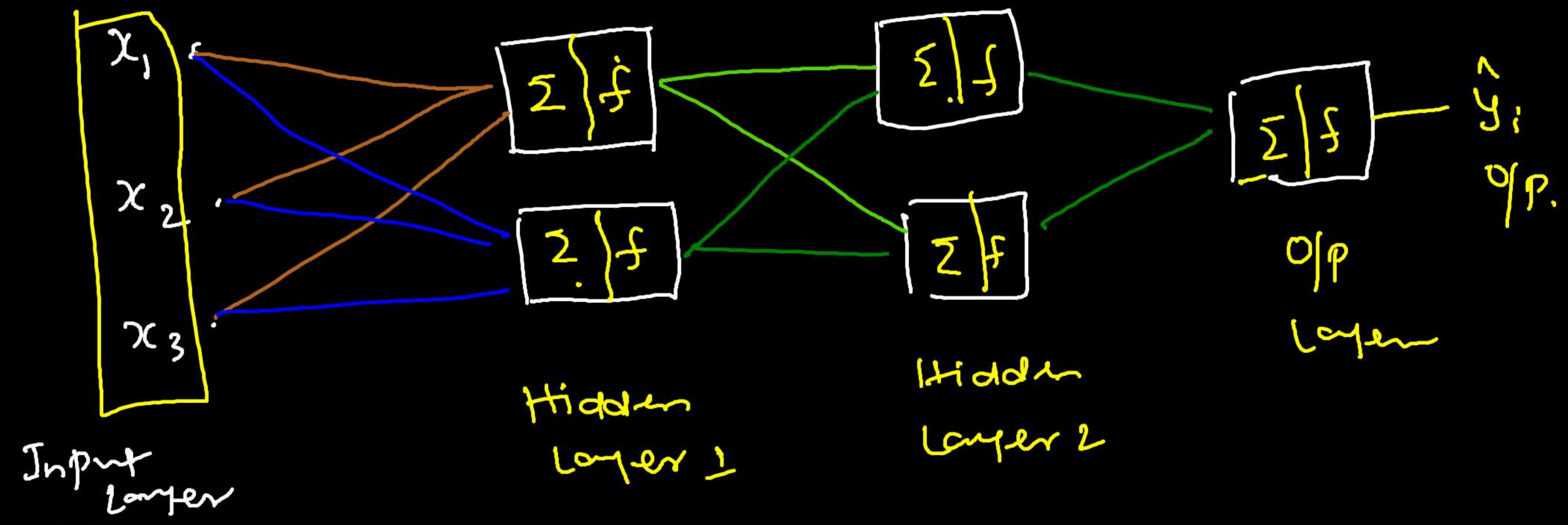
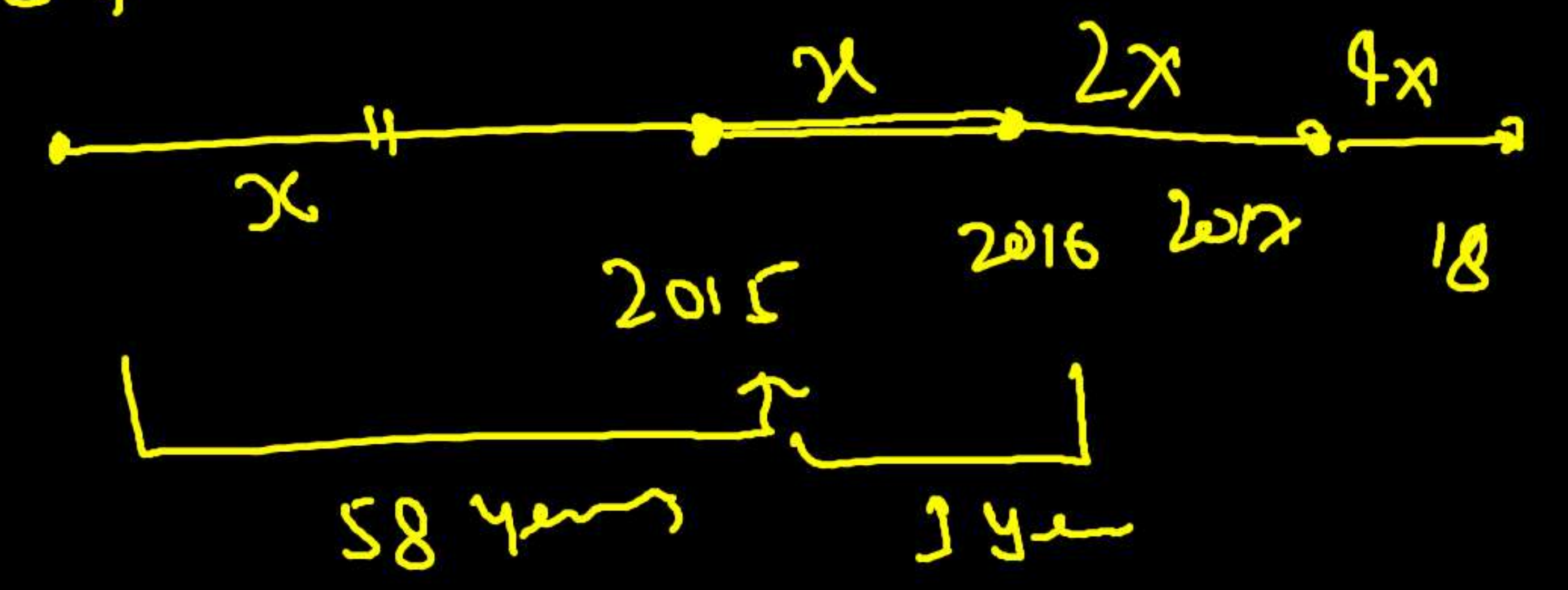
Geoffrey Hinton - Multilayer Perceptron ✓
 $x_1 + x_2 \geq 2$, 1 else 0
 Red Green

Why now?

- Hardware - GPU/TPU
- Dataset ✓
- Architecture
- Framework
- Community

Perceptron
Assembly

1957



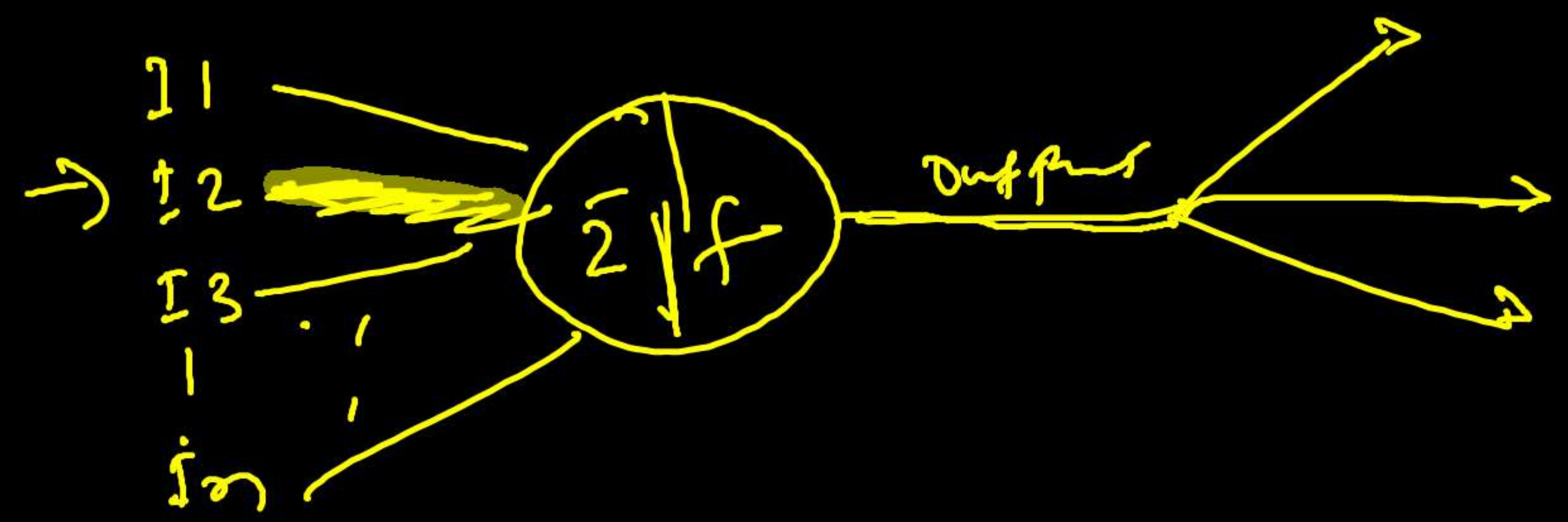
How Biological Neurons Work

Biological Neuron



- Sister
- ✓ Siblings
- ✓ Cibil
- ✓ Family member

Simplified view of Neuron.



DNN / MLP

- Perceptron
- MLP
- Backpropagation
- Memoization
- Chain Rule — Calculus
- Regularization
- Dropout
- Batch Normalization

- Normalization
- Weight Calculation
- Activation Function
- Optimization method
- Early Stopping
- Hyperparameters
- Each part = case study
- Reptile best time...

