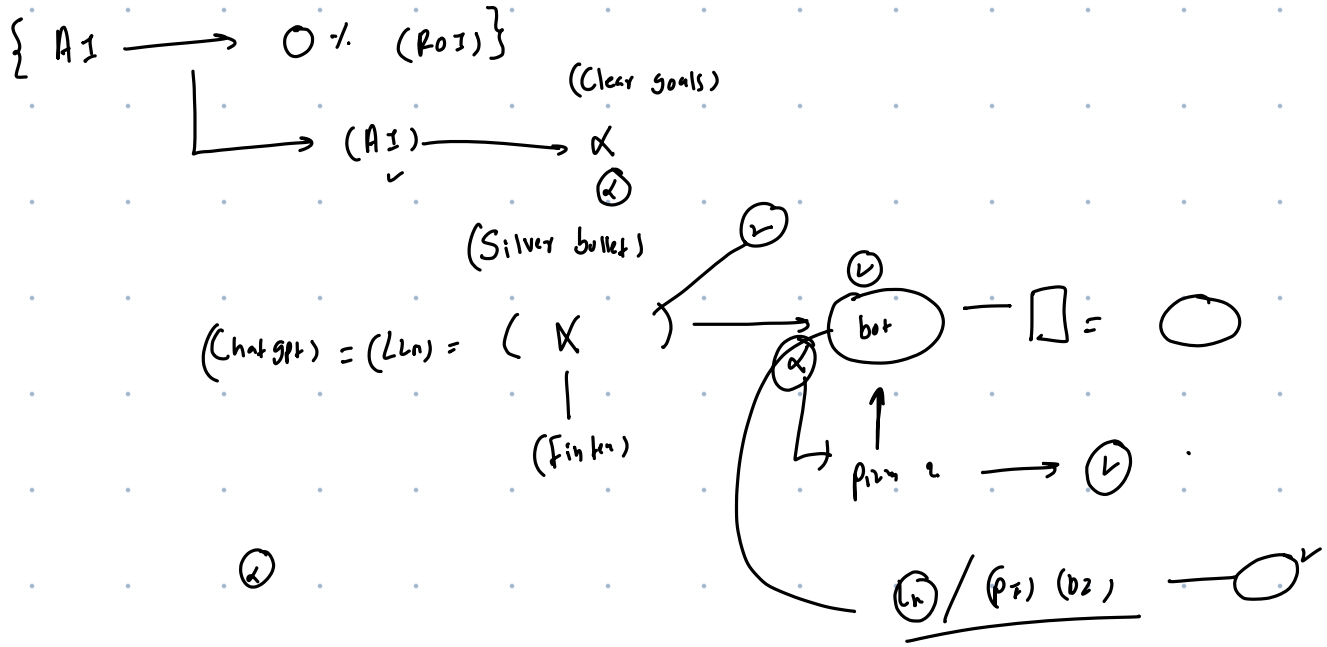
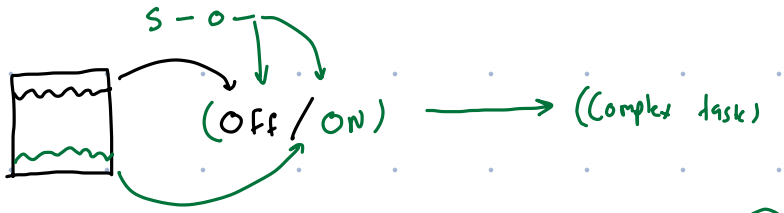
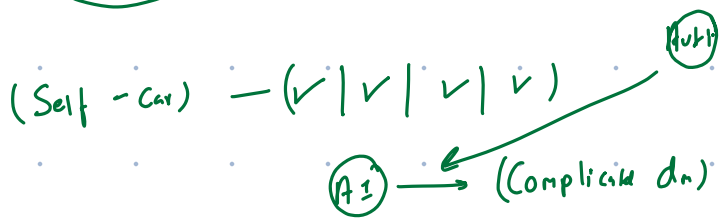
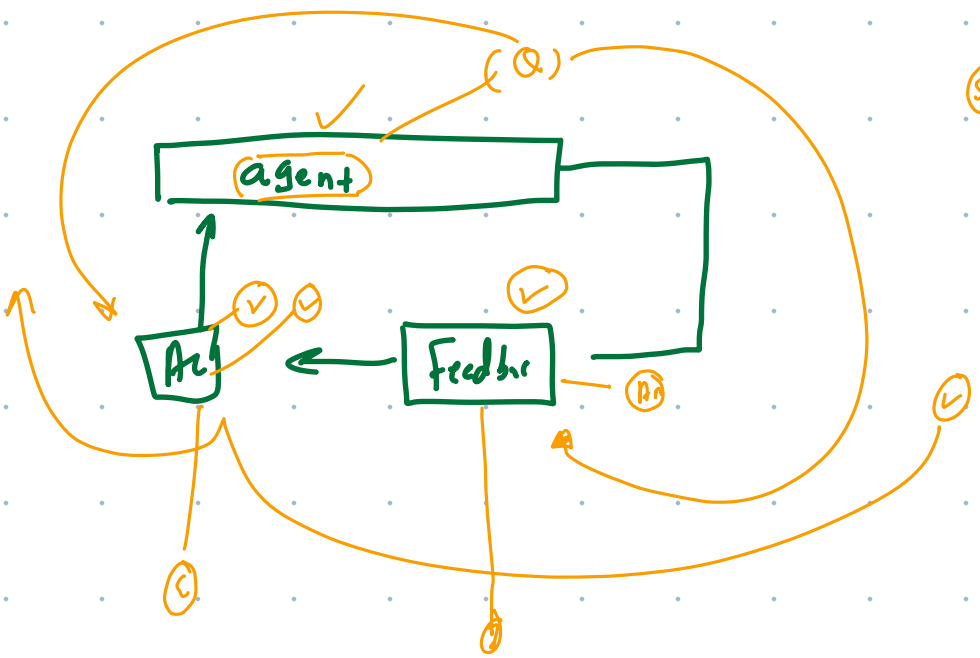
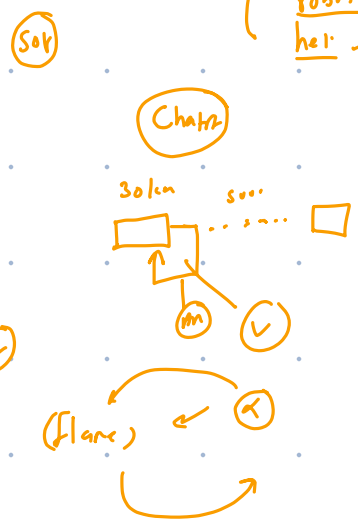

{ AI → 0 % (ROI) }
(Clear goals)
(AI)
(Silver bullet)
(Chatgpt) = (LLm) = (K)
(Fine tune)
bot
pizza
(L1) / (P1) (D2)


S - O
(OFf / ON)
(Complex task)

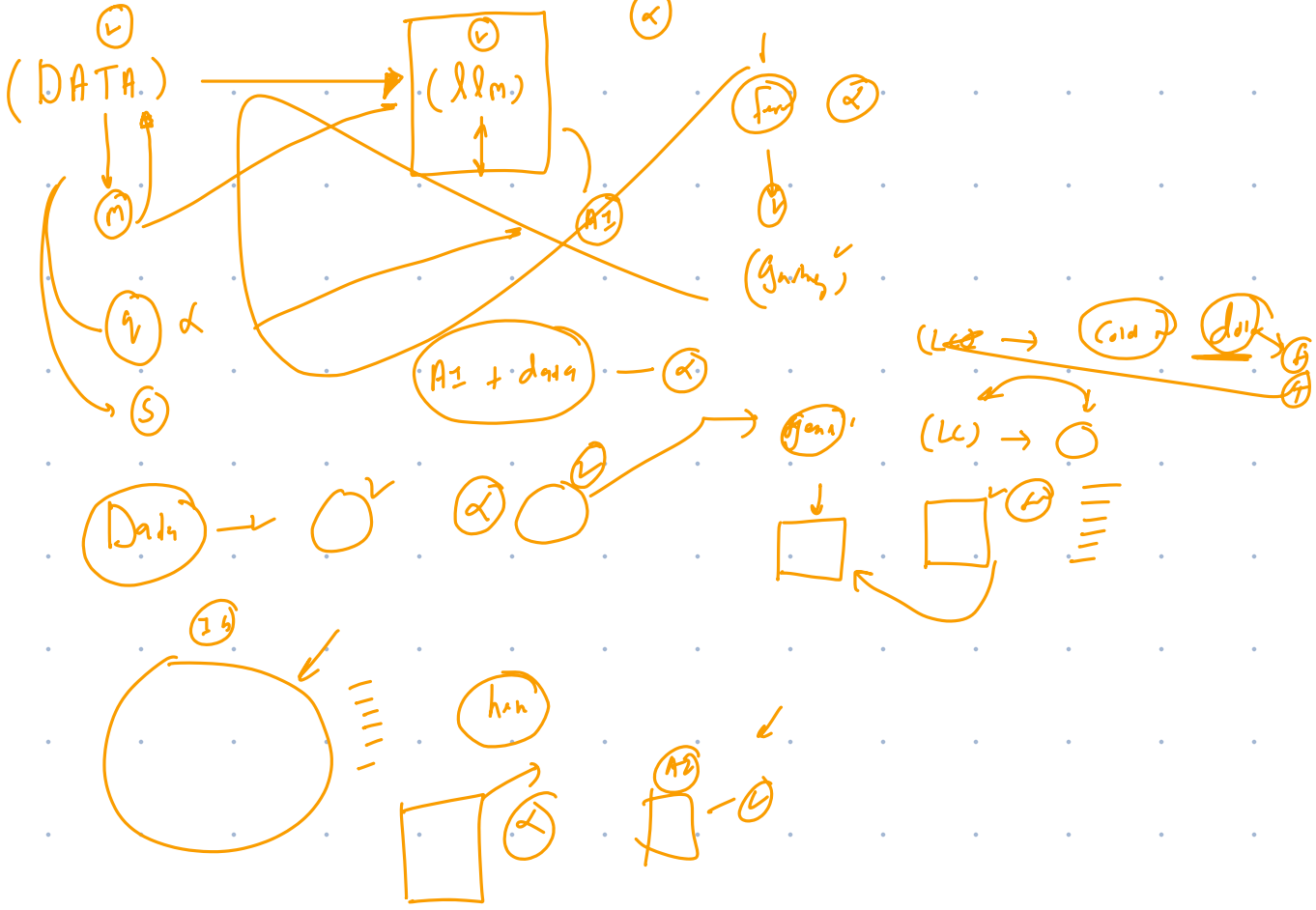

(Self - car)
(AI)
(Complicate dn)


agent
Act
Feedbac

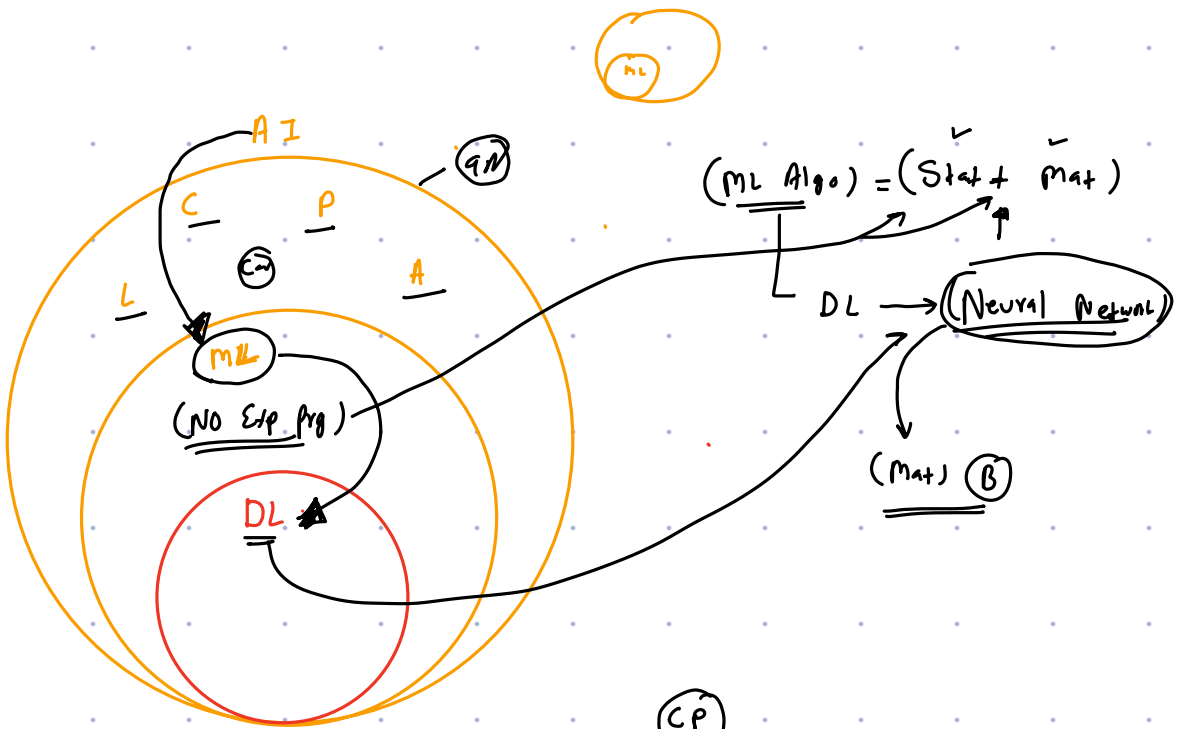

Car
phone
hose
robot
hel


Chatgp
30km
(Flame)

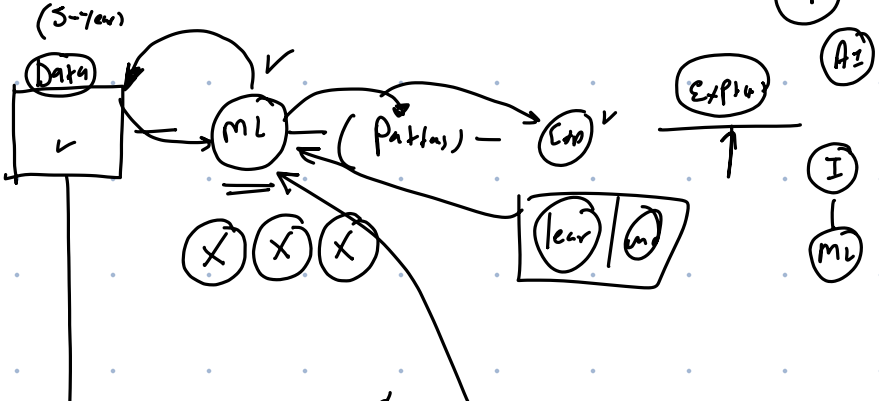

80 %
20 %

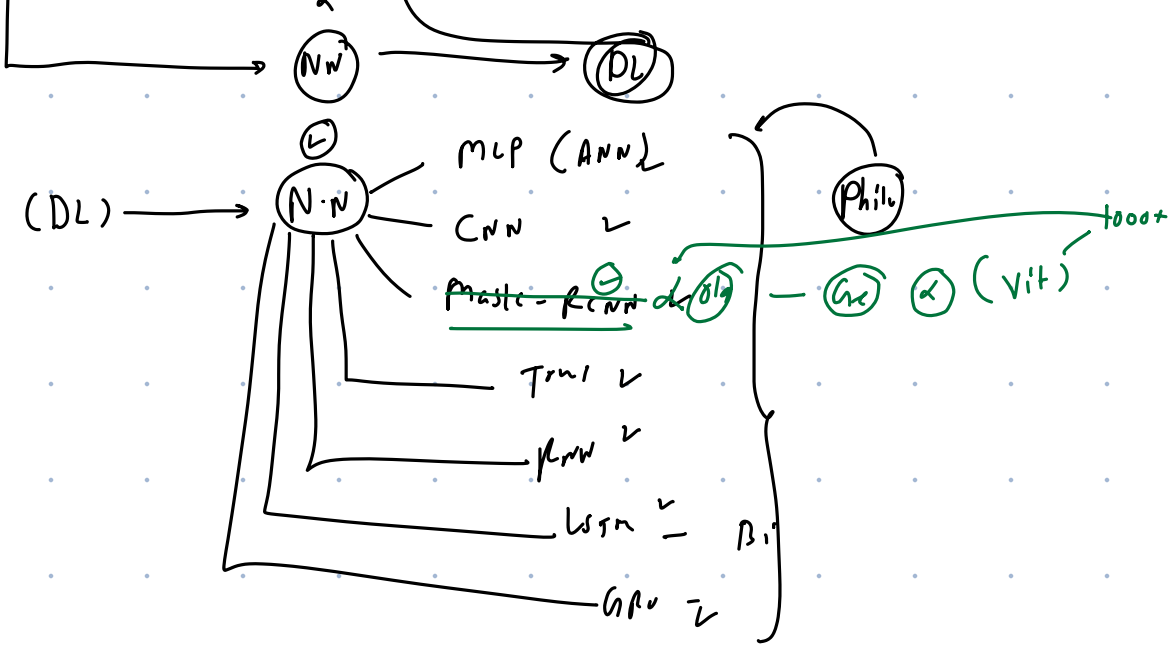

(DATA)
(llm)
AI
AI + data
Data
Cold
(LC)

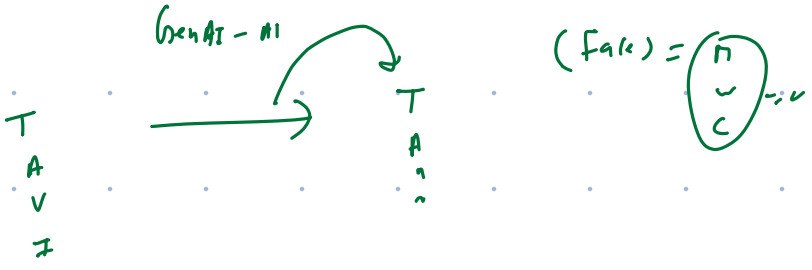
ML
DL

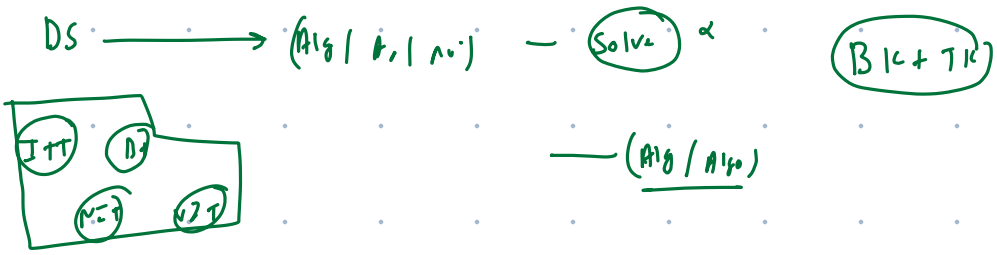

ML
AI
C
P
A
L
(ML Algo) = (Stat + Mat)
DL → (Neural Network)
(NO Exp Prg)
DL
(Mat) B

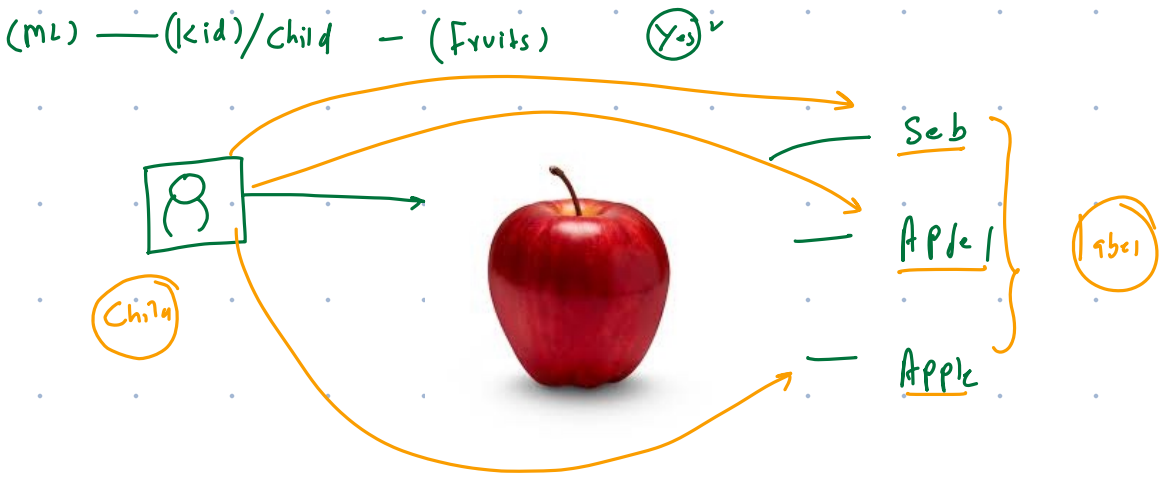
Y/N


(S-Learn)
Data
ML
(Pattern)
Exp
CP
AI
Explain
I
ML
X X X
learn


NN
DL
(DL)
N·N
MLP (ANN)
CNN
Mask-RCNN
Trnl
RNN
LSTM
GRU
Phi4
1000+
(Vit)


GenAI - AI
TAVI
(Fake) =


DS
(Alg / Algo)
Solve
Blc + Tlc
ITT
(Alg / Algo)


(ML) — (kid)/child — (Fruits)
Yes
Seb
Apple
Apple
Label
Child

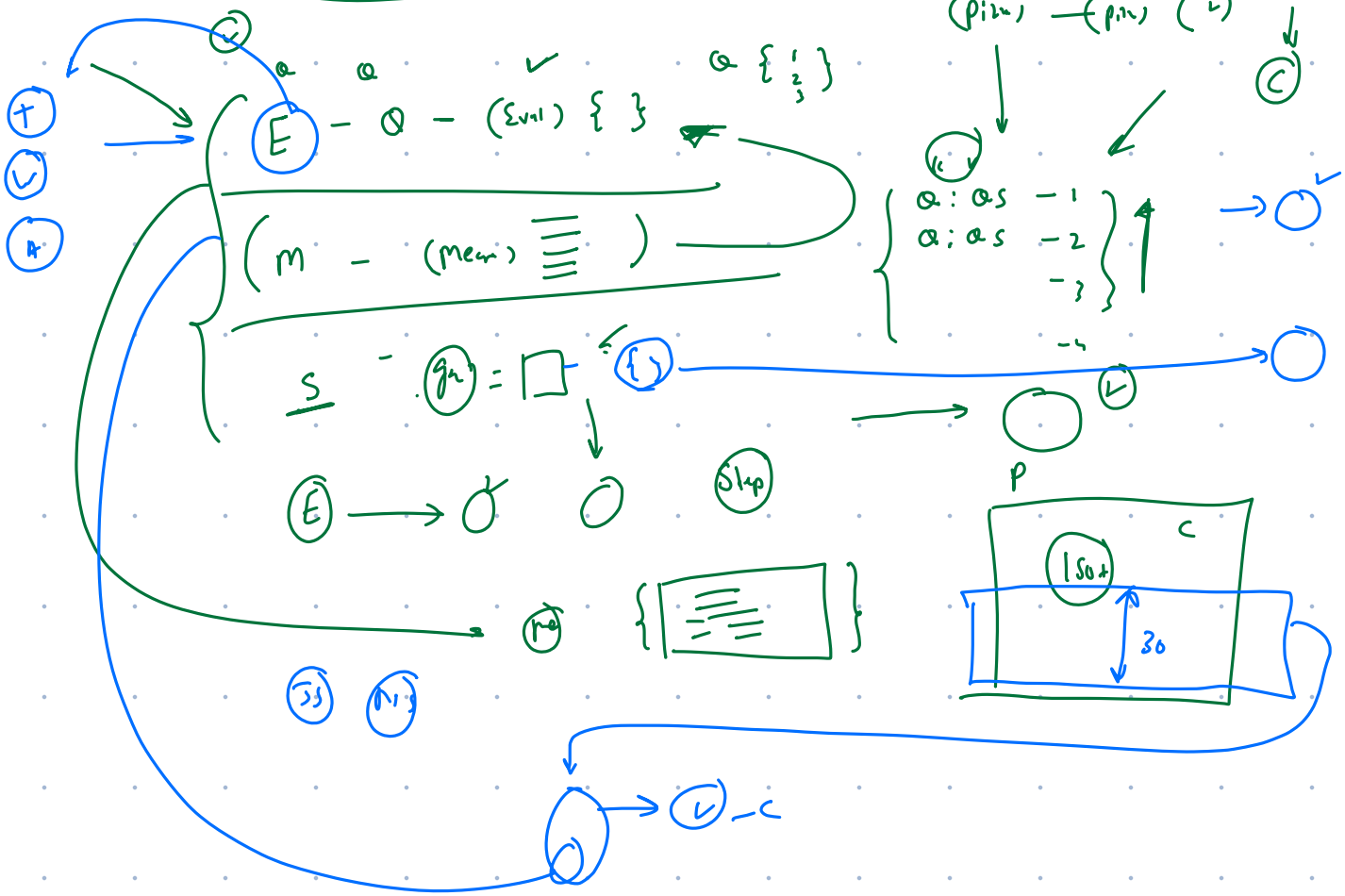

My
Cat
dog
G
d
V

(Data – label) → SL – (any label)

(Yes/No)

(maybe)

Age	Salary	Cibil	loan	
23	1,00,000	700	✓	Yes
41	98,000	300	✗	NO



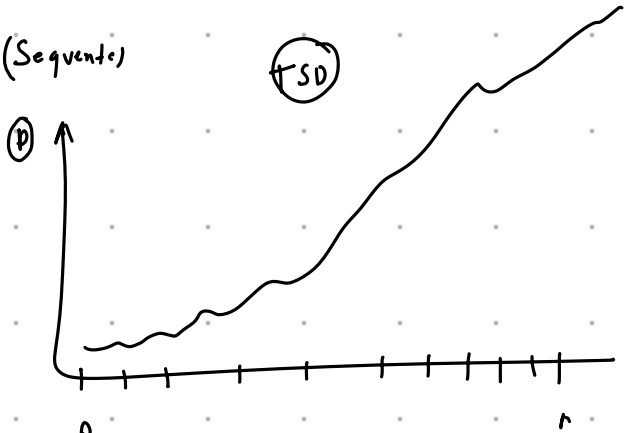
Arch = Better

ANN → CNN → RNN

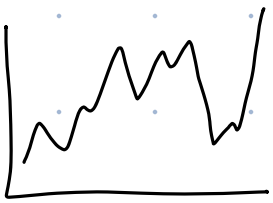
(System) → (Sequence)

Gold

1990 – 2015

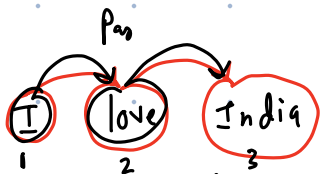


TSD



Browser

(Text) :



Imp

I

hak

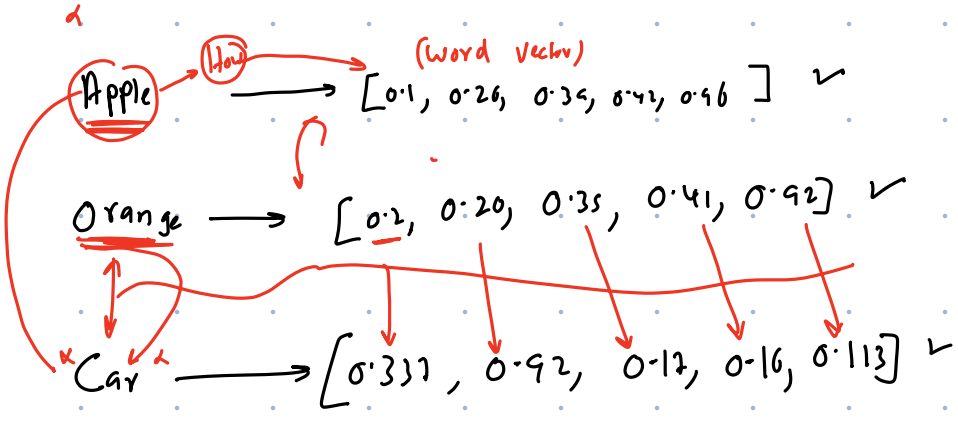
(word order) → (Man eat hot-dog)

(hot-dog eats man)

(RNN) : (Sequence)

How?

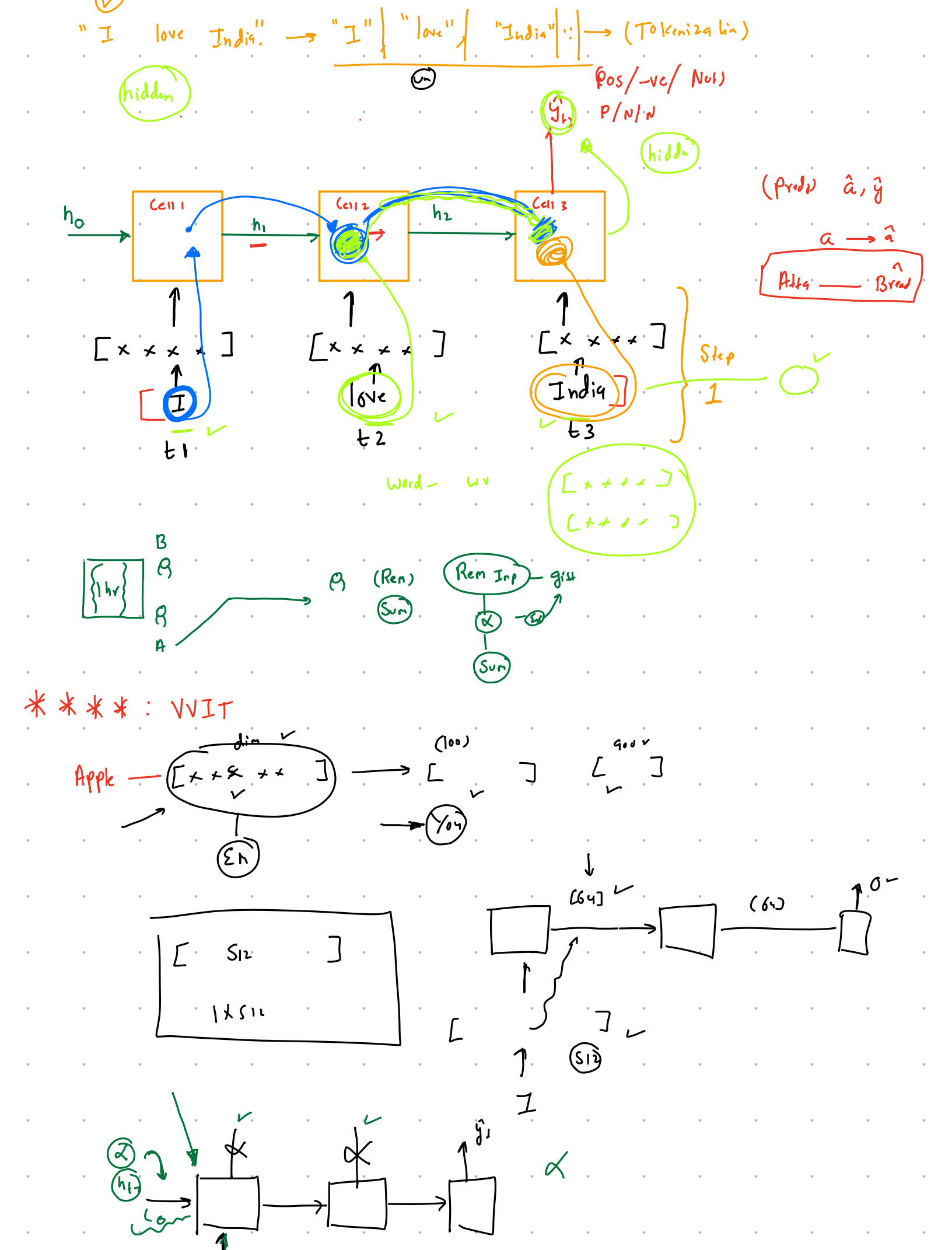
(word vectors) :

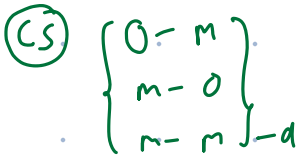


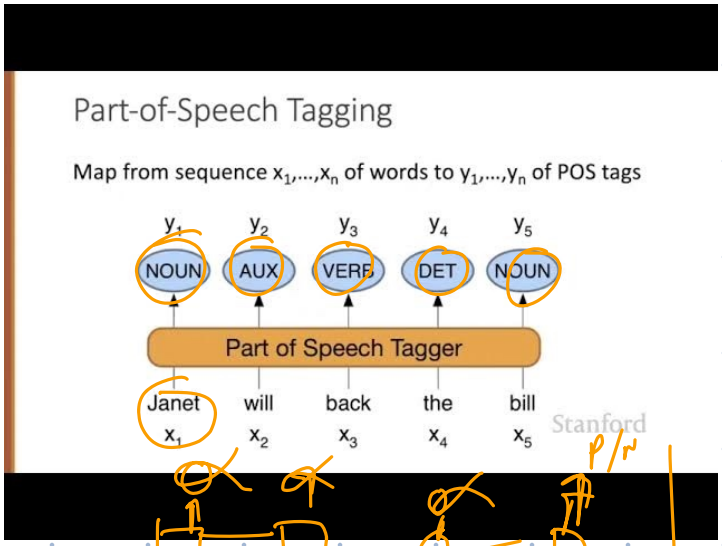
Amit bhai :

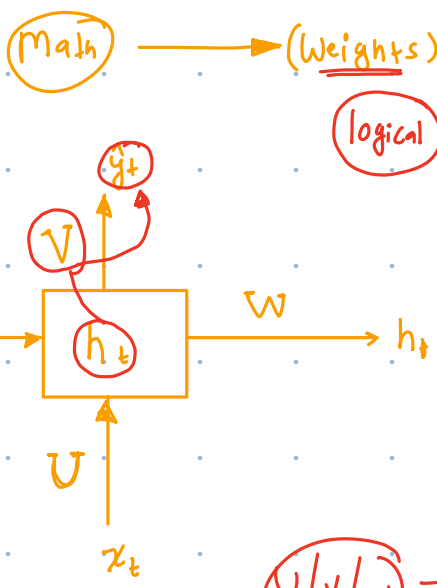
		1–10
Studious	:	9
Intelligent	:	8.5
Note	:	6
Hw	:	2.5
Ns	:	3

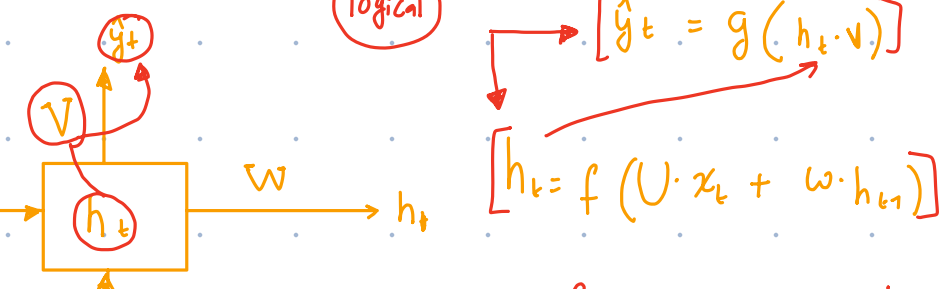
[9, 8.5, 6, 2.5, 3] — (word vector) (Embed)

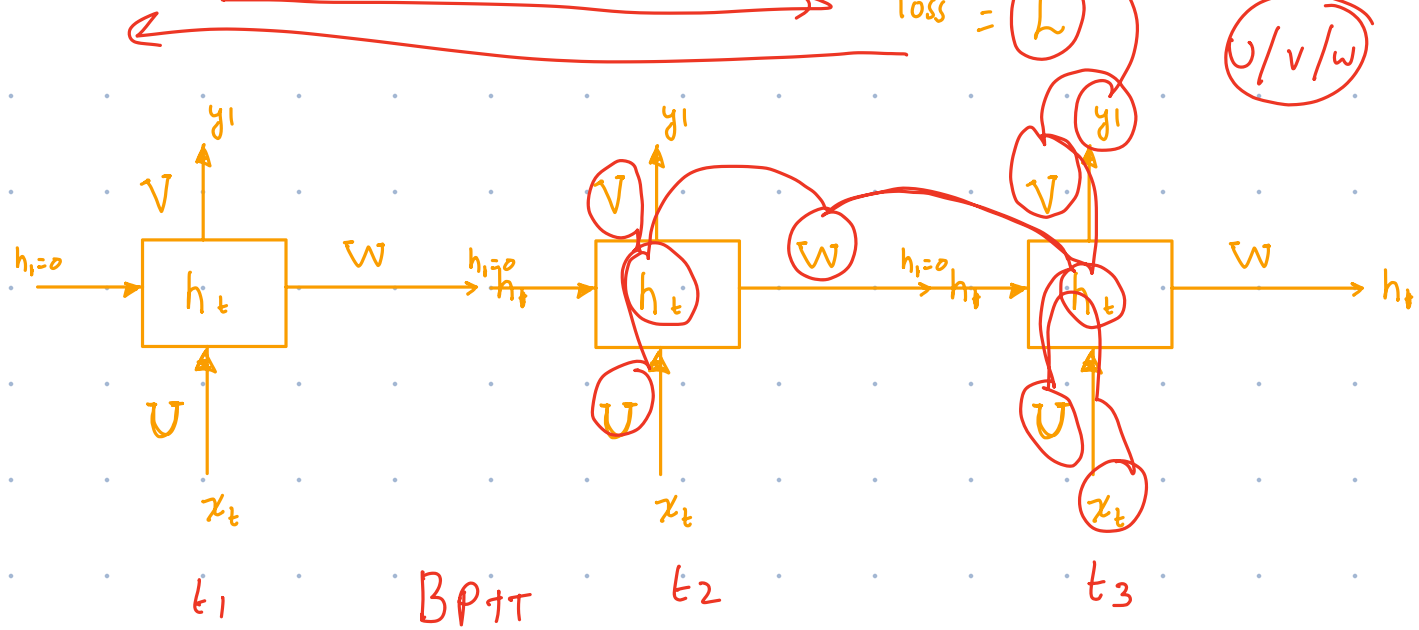

"I love India" → "I" | "love" | "India" | . | → (Tokenization)
hidden
(Pos/-ve/ Null)
P/N/N
hidden
(predict) â, ŷ
a → â
Adda — Bread
Cell 1
Cell 2
Cell 3
h0
h1
h2
Step 1
t1
t2
t3
Word - wv
Rem
(Rem)
Sum
Rem Inp
gist
Sum
**** : VVIT
dim
(100)
900
Apple
Σh
Y04
S12
1 x S12
[64]
(64)
S12
I
α

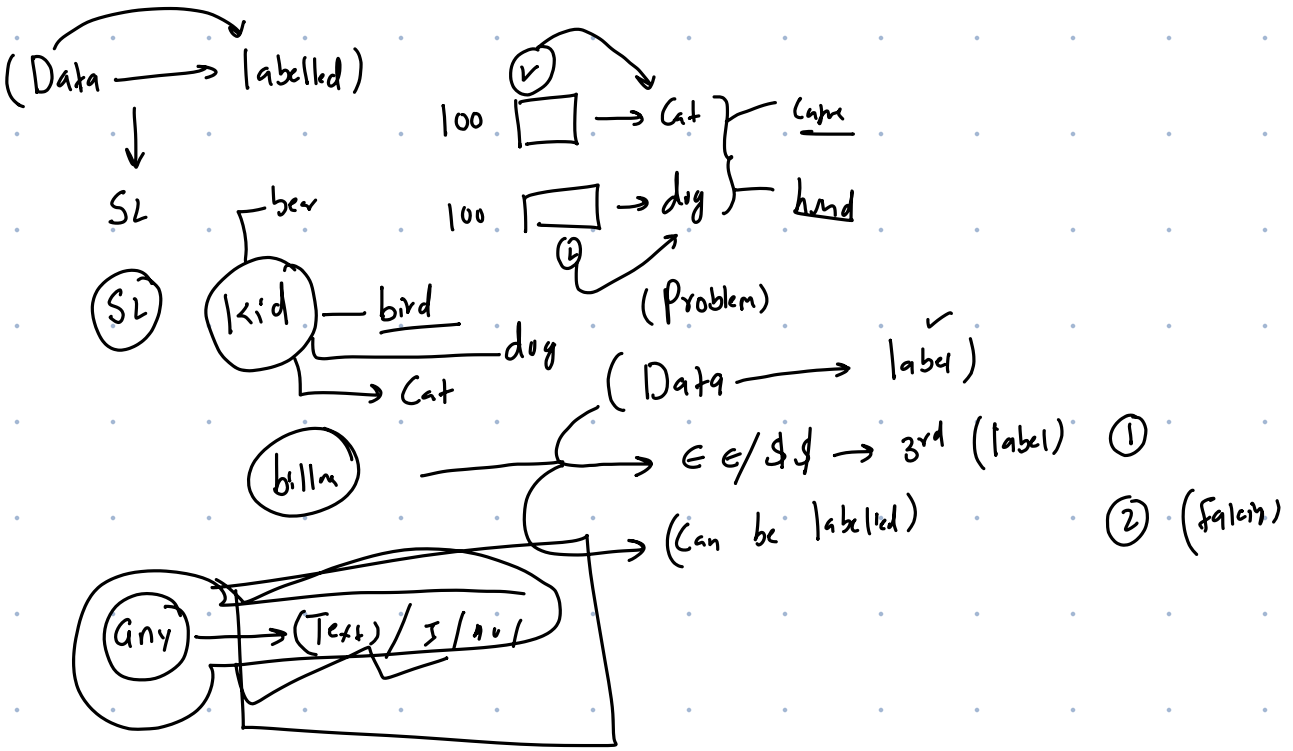



Part-of-Speech Tagging
Map from sequence $x_1,\ldots,x_n$ of words to $y_1,\ldots,y_n$ of POS tags
y_1 y_2 y_3 y_4 y_5
NOUN AUX VERB DET NOUN
Part of Speech Tagger
Janet will back the bill
x_1 x_2 x_3 x_4 x_5
Stanford







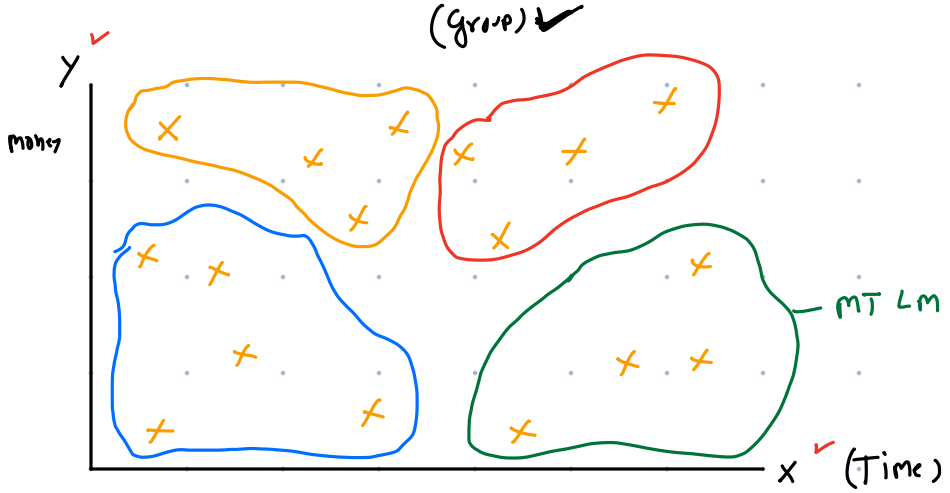


(Data - Not label) → UnSupervised learning → (Clustering)

(Mall)

(Group)

Time	money
x	y
x_1	y_1
x_2	y_2
⋮	⋮



(logical) (MTLM) } (label) — (data) (Solved) (2D) — 50

LTLM — How many group → (Algo) WCSS

{(USL) — 5 = ...} Ex

— (What label → data) (SS / EB) ≠ k

-2 -1 +1 +2

((SL / USL) ∝) → (P·A)

(SL / USL) → (RL) — GPT, Claude, Hanuman, Krin, ...

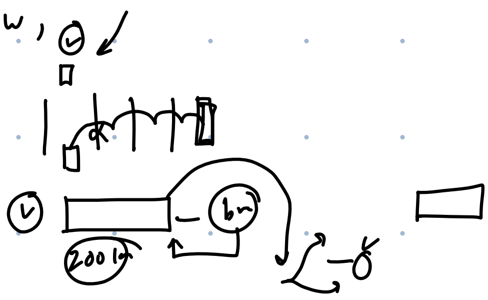
(OG)

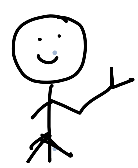
(Human like) Ex — (Self-driver) → (RL)

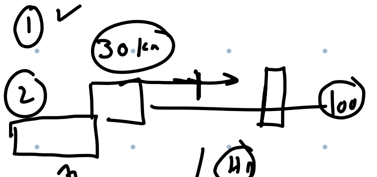
(Trial & error) — (makes mistake — Impr)

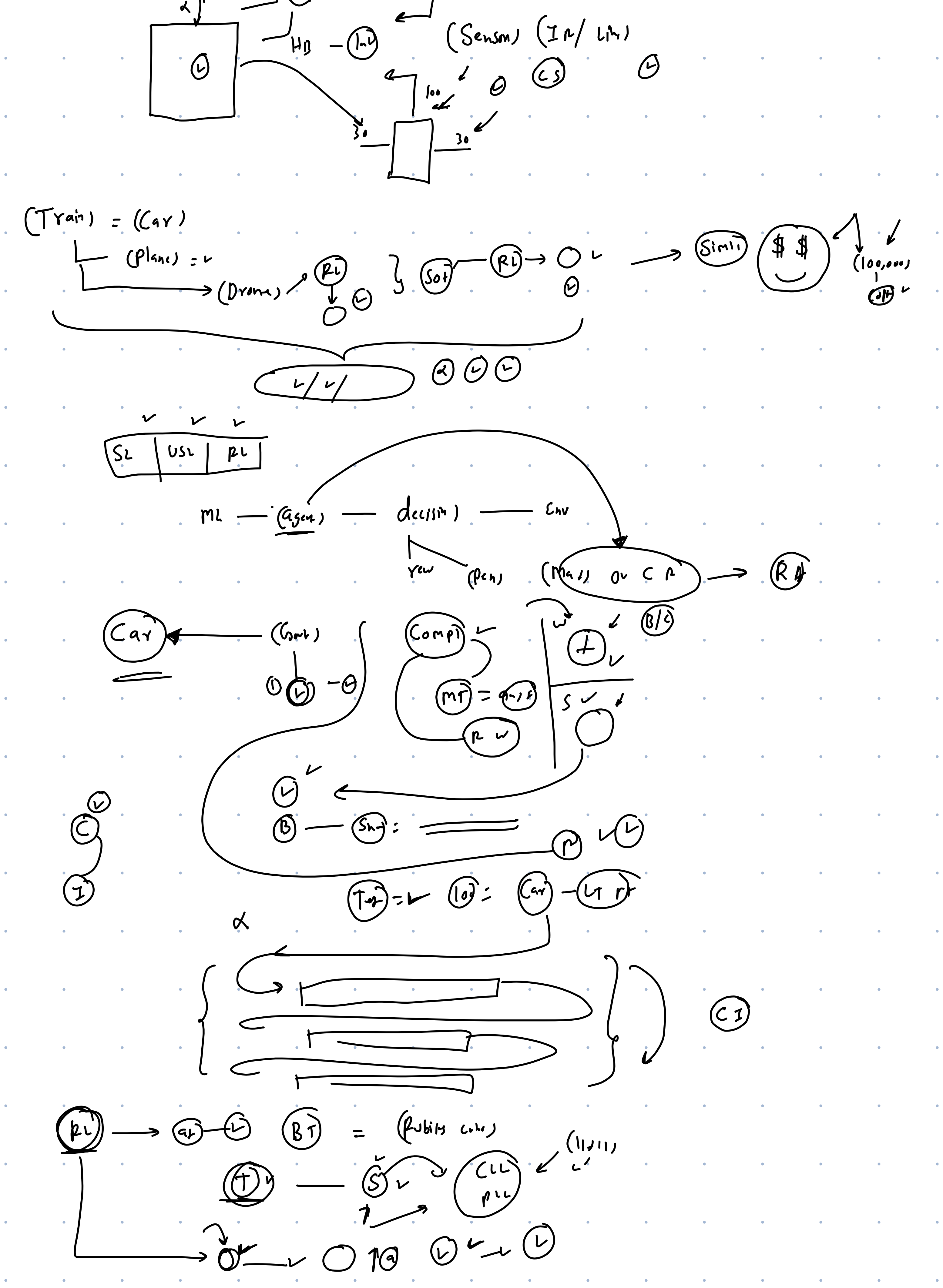
{(Self-driving car)} →

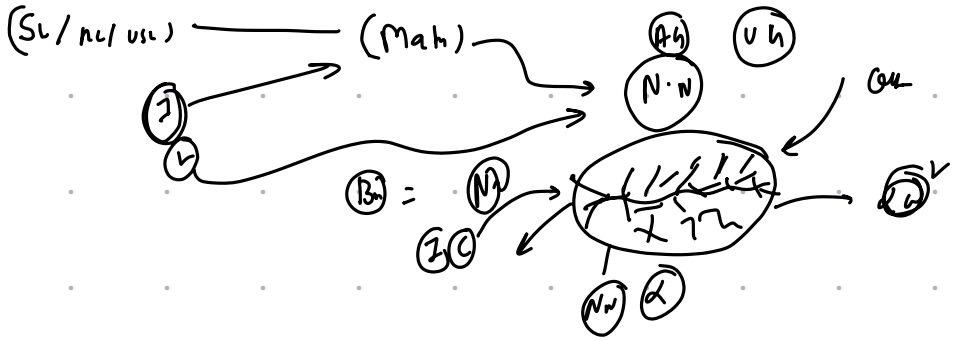
1. Agent : Car (decisions) (45–70)
2. Environment : {road, Pedes, rain/sun/w, Car, T.S, Eme, } (real life Cont)
3. State : { 60 km/h — 30 L — 12 bar }
4. Action : Acc / Brake / L / T / Ln / S / I — Brake — (Car) (Acc / decc) — L / R — def sh
5. Reward — good - Reward (5, 100) — bad - ∝ (100)

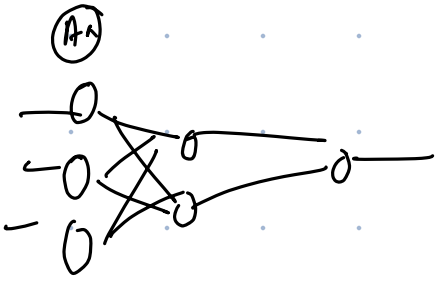




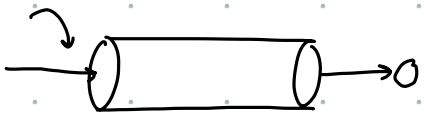


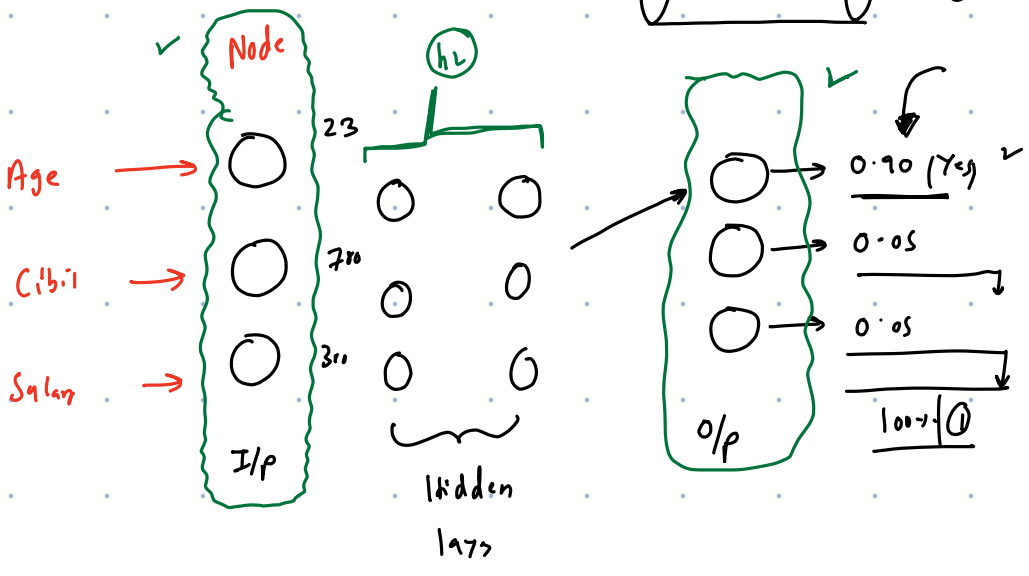

HB
100
30
30
(Train) = (Car)
(Plane)
(Drone)
RL
RL
$ $
(100,000)
SL
USL
RL
ML
(agent)
decision)
Env
rew
(pen)
or
RA
B/C
Car
Compt
MT
R W
B
CI
RL
BT
=
(Rubiks cube)

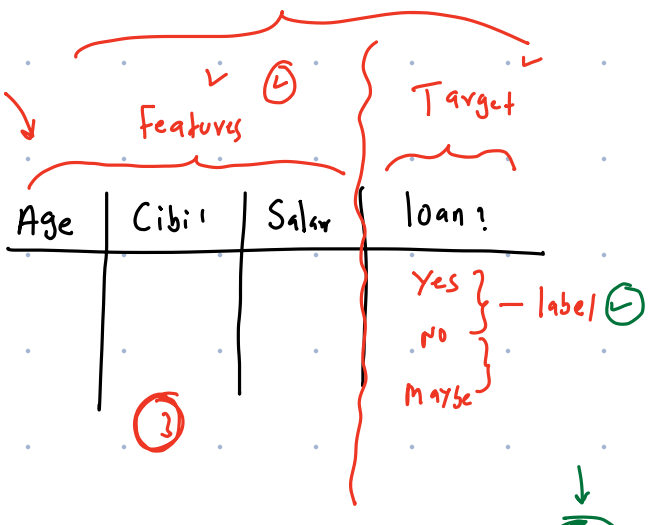


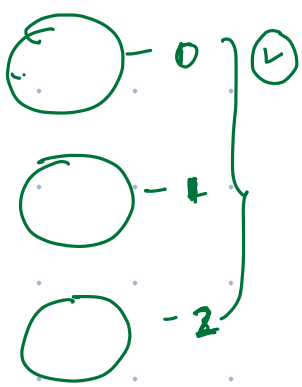


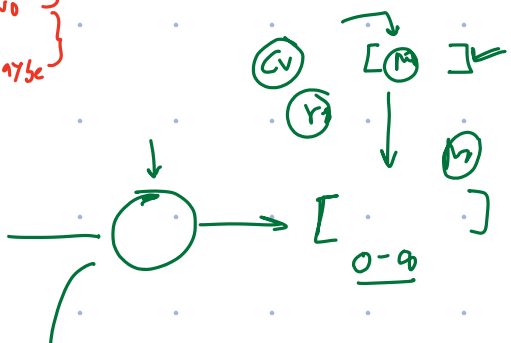
(Arch) — (I/p | Hid/ o/p)

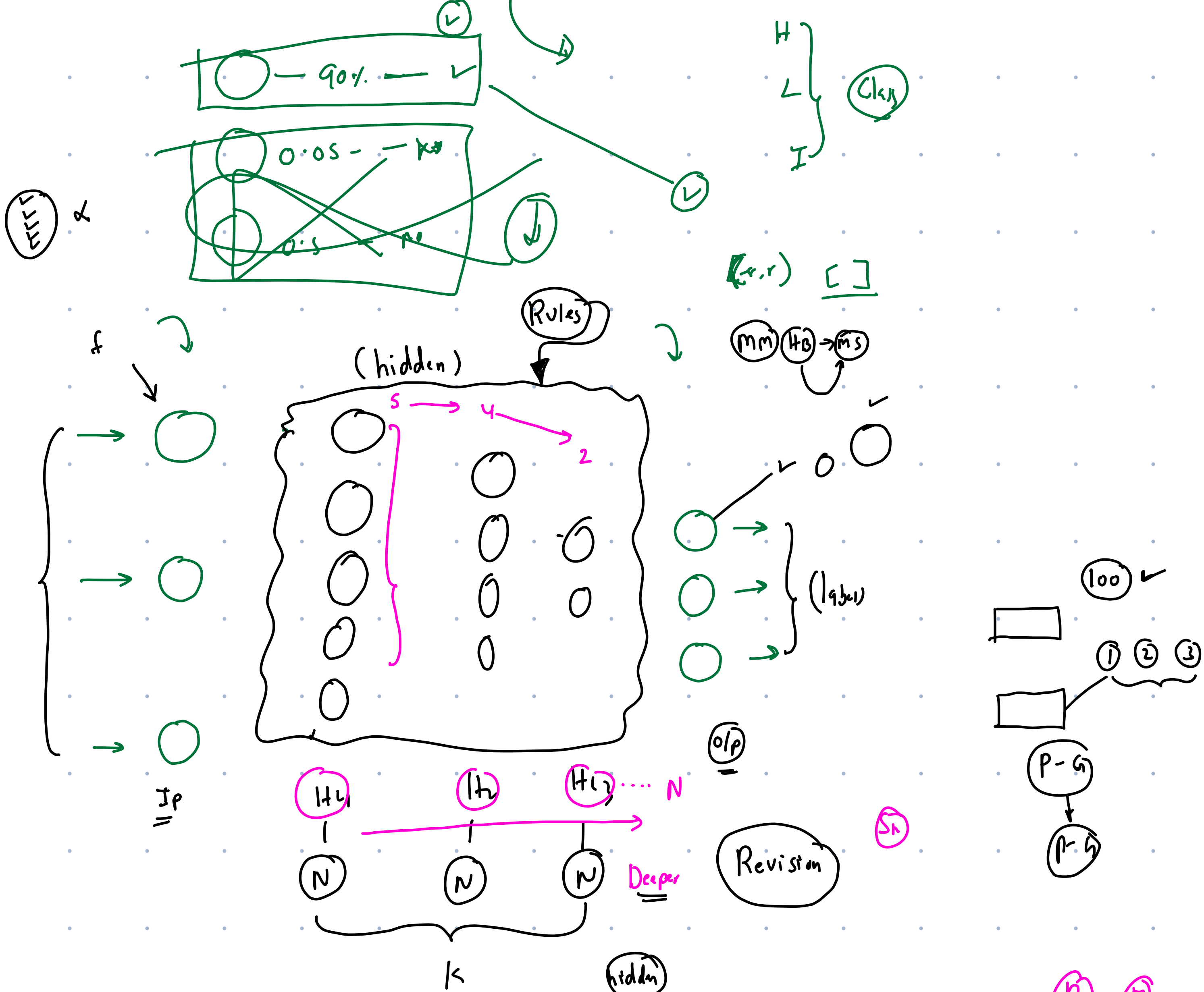












hidden

I/P → (Pixel) (. . . . . .)

HL1 → Basic → (Edges)

HL2 → Circle, ...

HL3 → eyes, m, nose

O/P → Cat

(Basic)

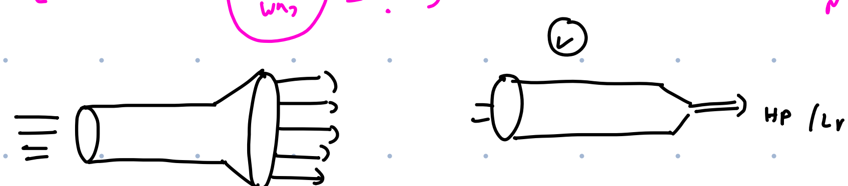
(Overdon) — (Time Compl) ↑ (Slow) (— — — —)

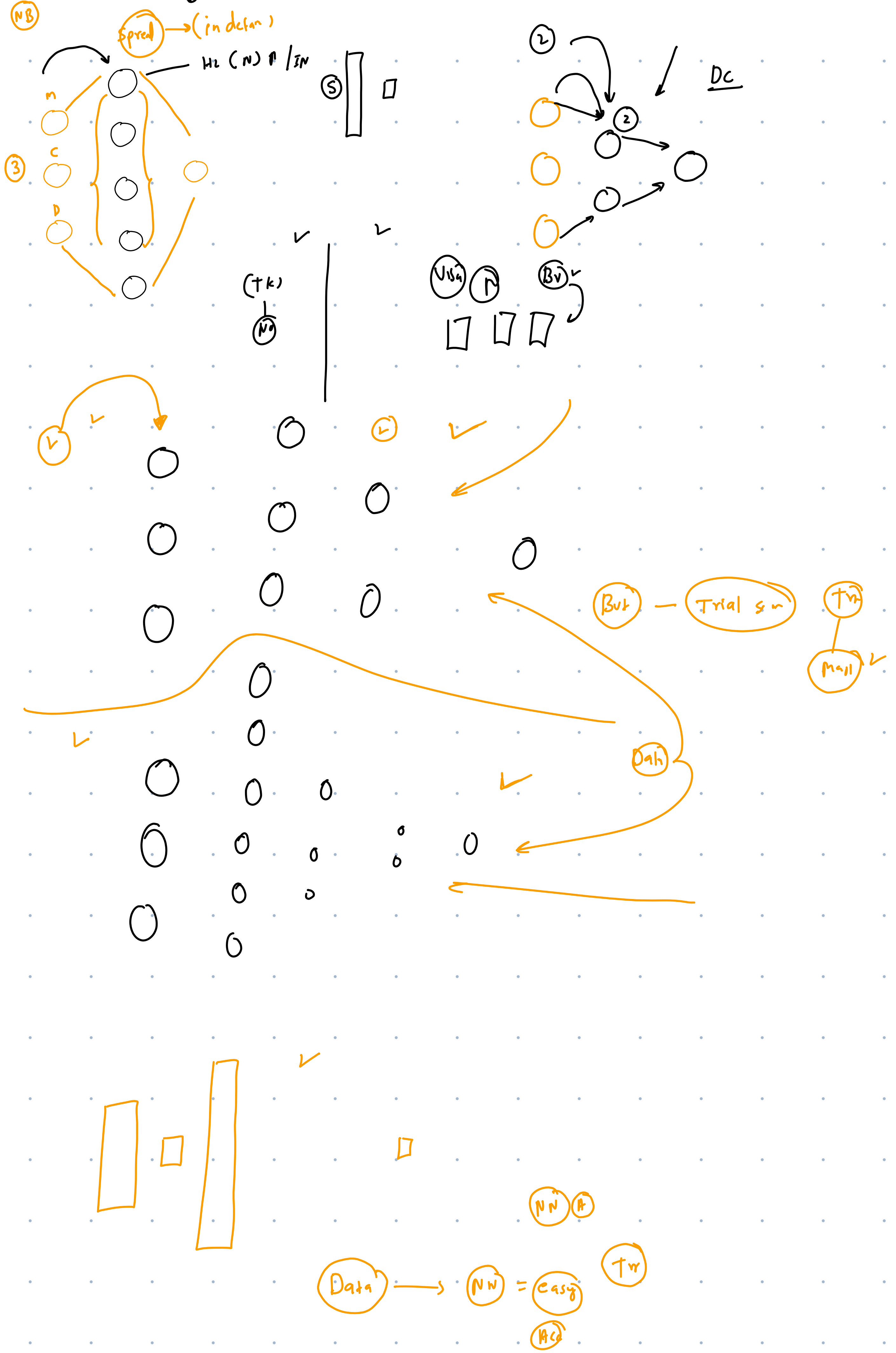
T ↑ Acc

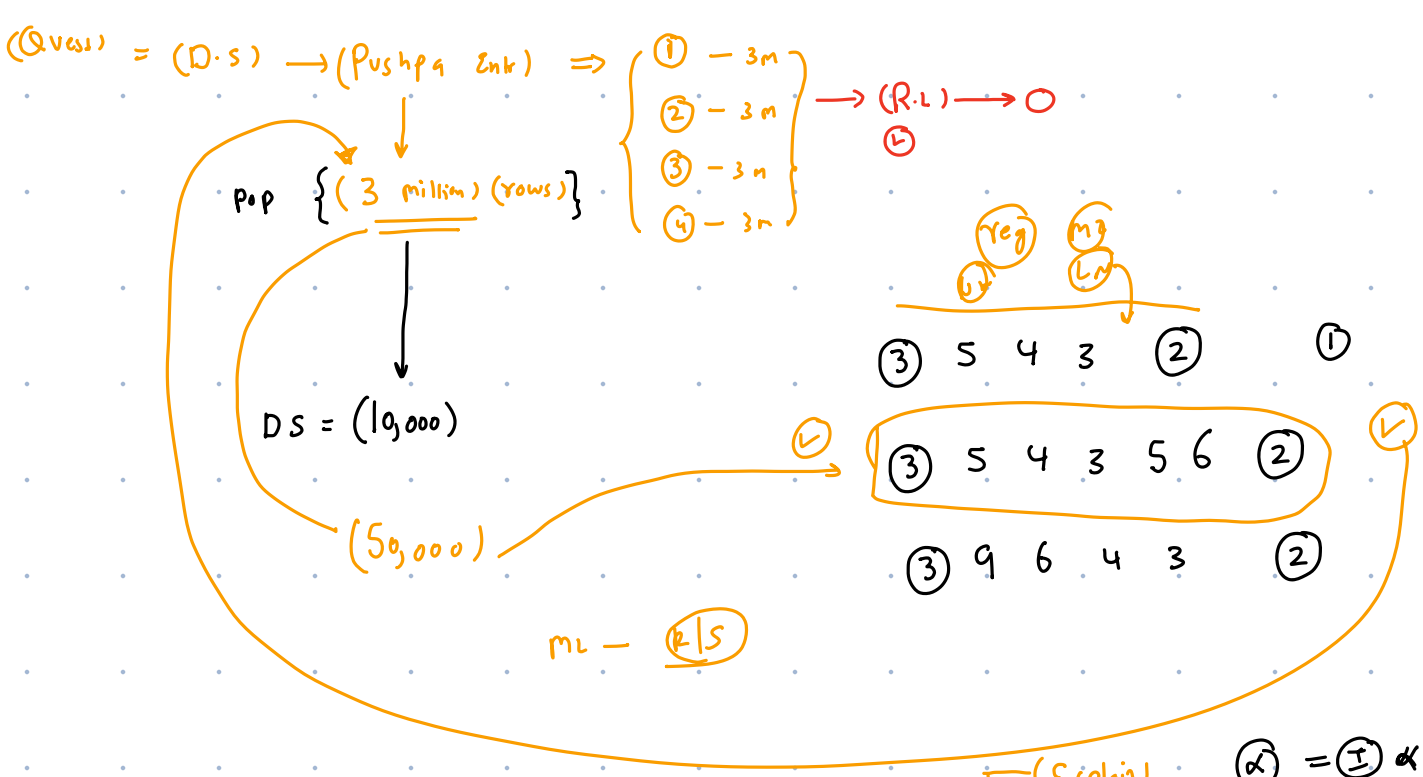
How H B or

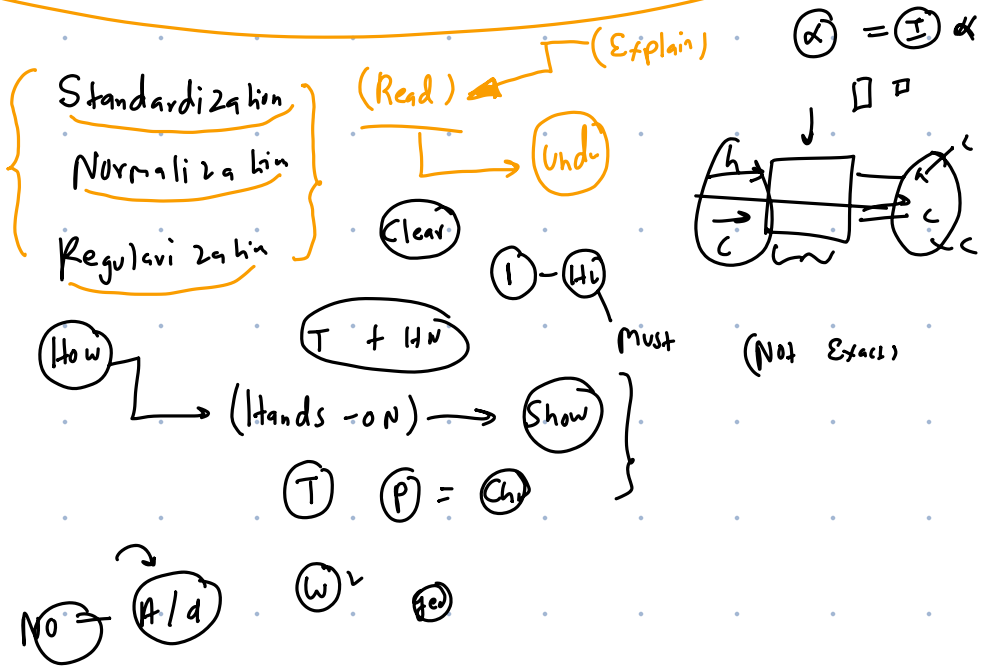
DS + Algs

{ T A + When / Why — ? }

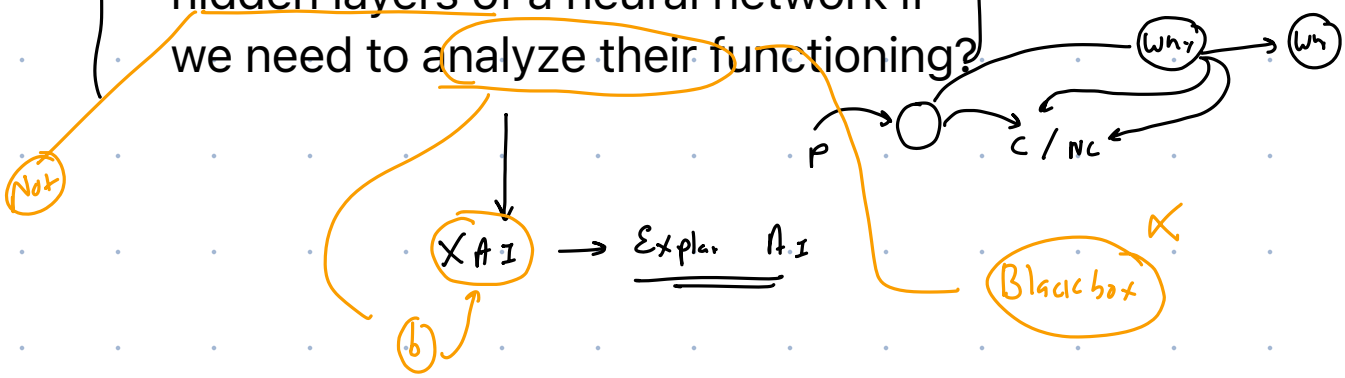



NB
Spread
DC
Trial
Data
NN
easy





Is it possible to observe or understand what occurs inside the hidden layers of a neural network if we need to analyze their functioning?



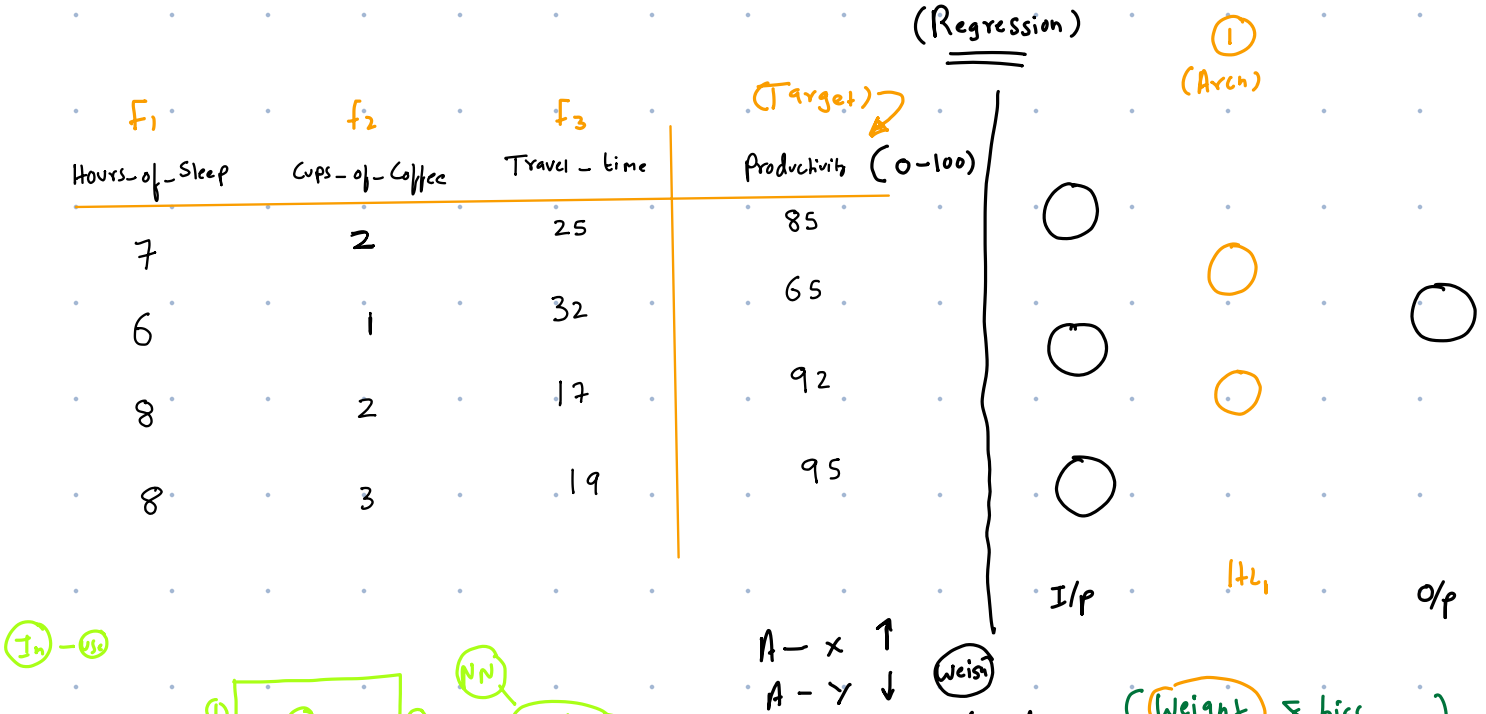
♥ Math Time ♥

Any NN ⟶ ① Forward propogation
② Backward propogation

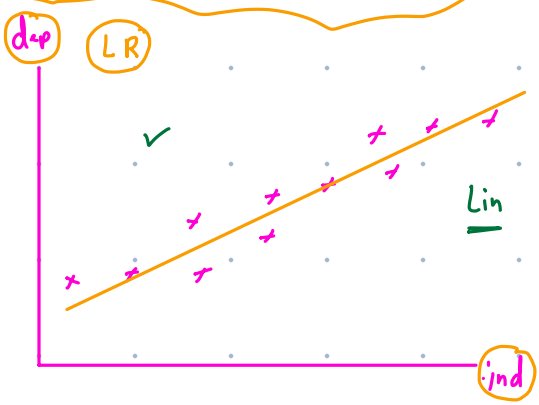
"Model Training" is a simple concept where the model (NN) learns a relationship btw (I/p – o/p - labels) → updating "weights and bias" such that overall error is as small as possible"

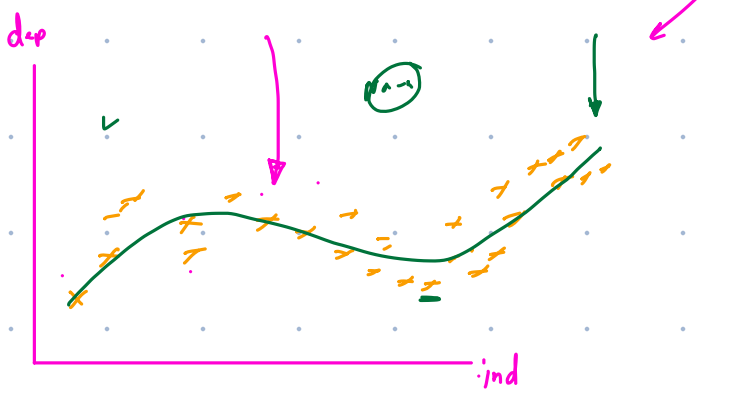
(Regression)

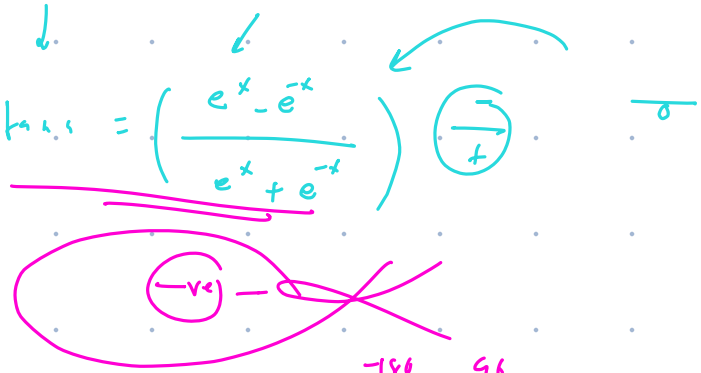
f_1	f_2	f_3	(Target)
Hours_of_Sleep	Cups_of_Coffee	Travel_time	Productivity (0-100)
7	2	25	85
6	1	32	65
8	2	17	92
8	3	19	95

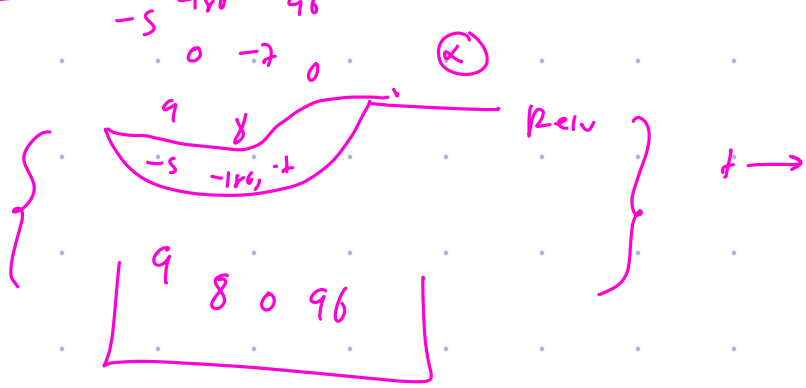


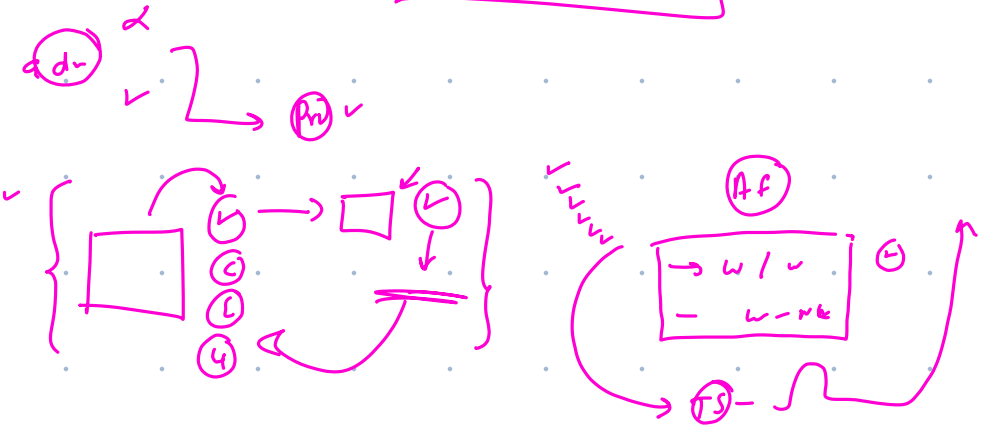
(Activation func) : Non-linearity in your model (Linear reg)







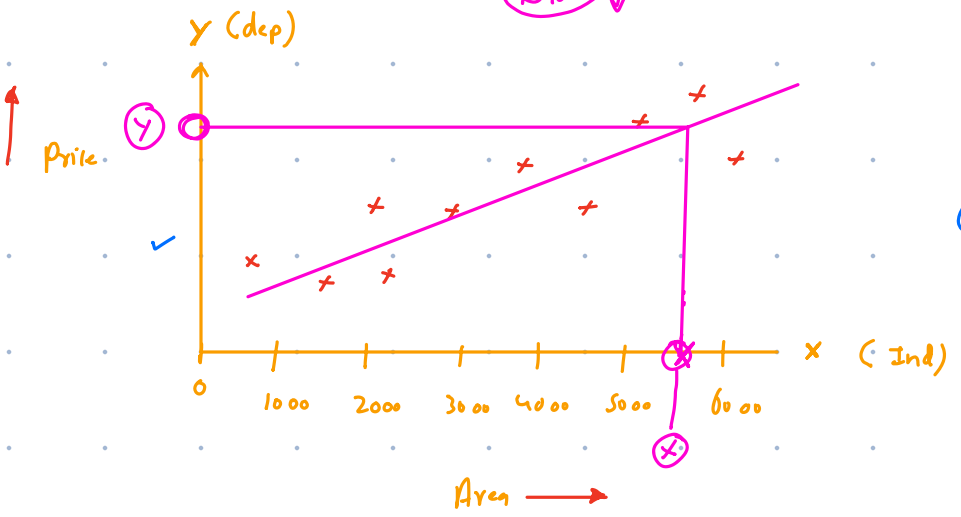




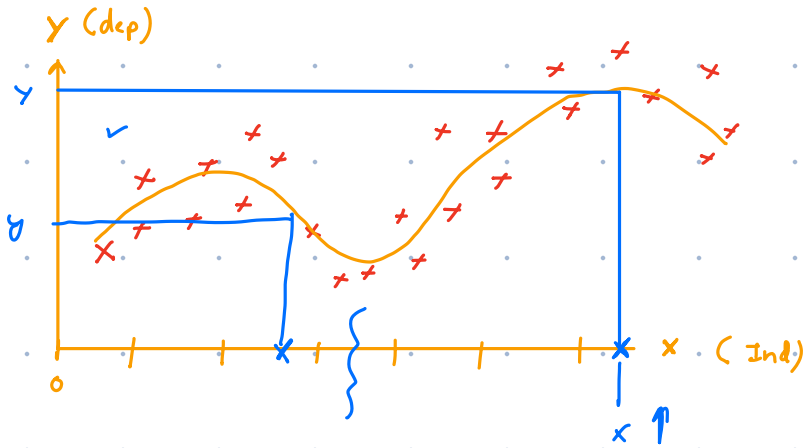
(ML) = (None) — Relationship

(Area — Pr.)

Basic



(y = mx + c)

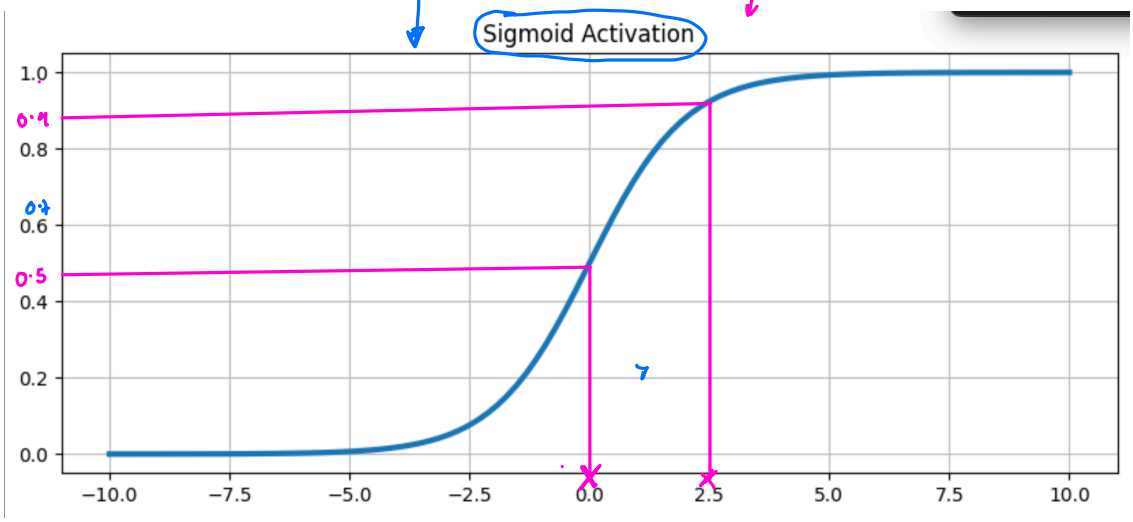


2 / 9

Non-

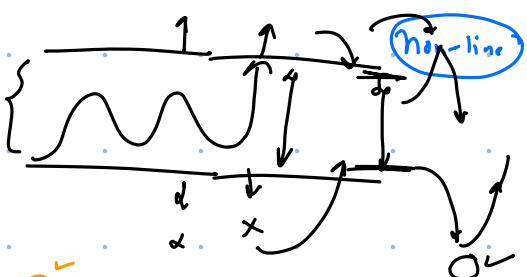
Non-L

(1) — (17) — (34)



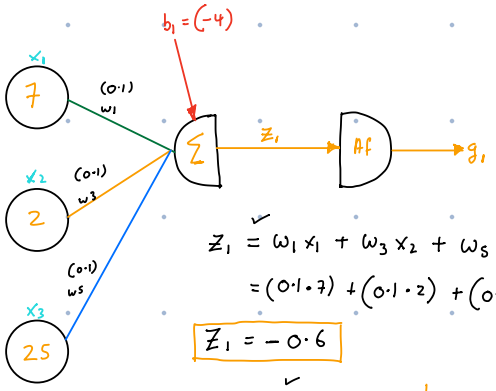
(0-1)

+∞ (x)



f_1	f_2	f_3	(Target)
Hours_of_Sleep	Cups_of_Coffee	Travel_time	Productivity (0-100)
7	2	25	85
6	1	32	65
8	2	17	92
8	3	19	95

(Random) = (W & b)



Yes → ds

$Z_1 = w_1 x_1 + w_3 x_2 + w_5 x_3 + b_1$

$= (0.1 \cdot 7) + (0.1 \cdot 2) + (0.1 \cdot 25) + (-4)$

$Z_1 = -0.6$

$g_1(x) = \frac{1}{1+e^{-x}} \Rightarrow \frac{1}{1+e^{-(-0.6)}} \Rightarrow 0.354$

Z_1 / Z_2
$g_1 g_2$

$-(z)$
e

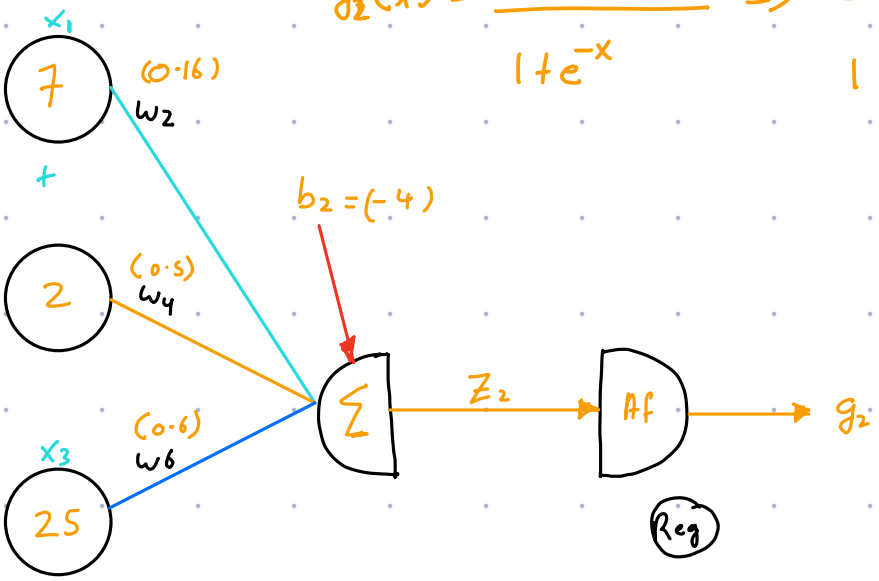
$Z_2 = w_2 x_1 + w_4 x_2 + w_6 x_3 + b_2$

$= (0.16 \times 7) + (0.5 \times 2) + (0.6 \times 25) + (-4)$

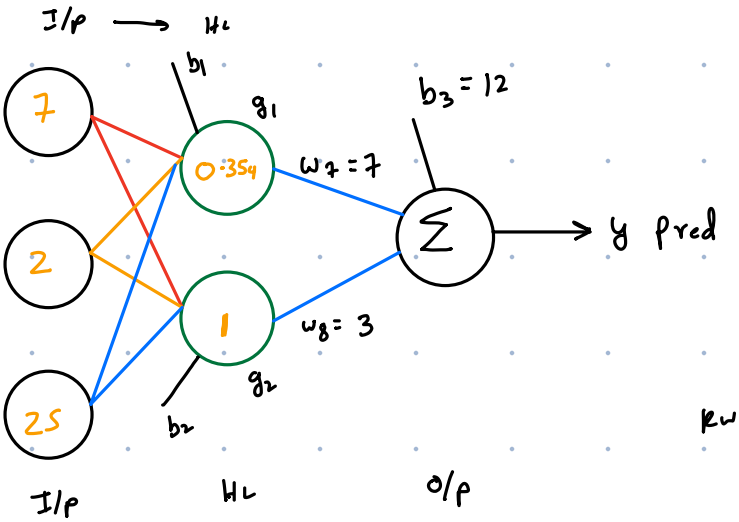
Random

$Z_2 = 13.12$

$g_2(x) = \frac{1}{1+e^{-x}} \Rightarrow \frac{1}{1+e^{-(13.12)}} \Rightarrow 1$



Reg



$y_{pred} = w_7 \times g_1 + w_8 \times g_2 + b_3$

$= 7(0.354) + 3(1) + 12$

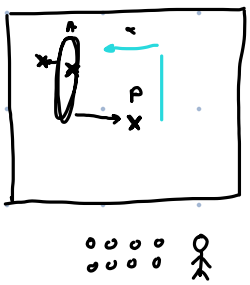
$y\_pred = 17.47$

RW — NN — RW → Asw

f_1 Hours_of_Sleep	f_2 Cups_of_Coffee	f_3 Travel_time	(Target) Productivity (0-100)
7	2	25	85
6	1	32	65
8	2	17	92
8	3	19	95

NN

17.478



① FP + BP

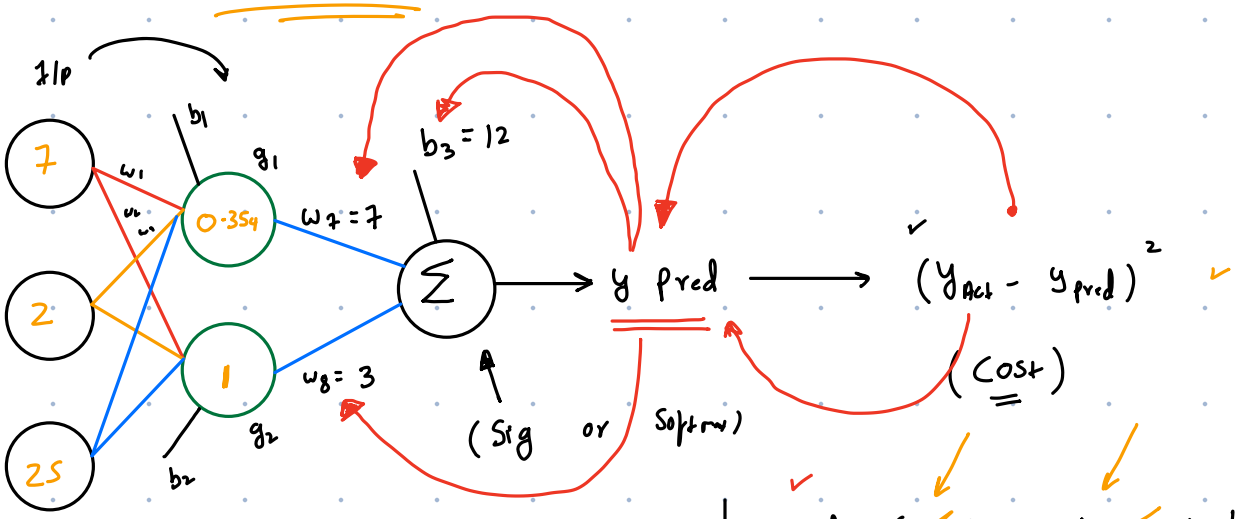
Error = (Actual - pred)

= (85 − 17.47)

= 67.522

"After f.p, we want to update our weights & biases until the error btw actual & predicted is as minimum as possible"

*) Backpropogation



(1)

1) $\frac{\partial Cost}{\partial w_7} = \frac{\partial Cost}{\partial y_{pred}} \times \frac{\partial y_{pred}}{\partial w_7}$

$= 2(y_{pred} - y_{act}) \times g_1$

$= 2(17.478 - 85) \times 0.354$

$\frac{\partial Cost}{\partial w_7} = -47.80$

(2)

$y_{pred} = w_7 g_1 + w_8 g_2 + b_3$

$= w_7 g_1 + 0 + 0$

$\frac{\partial y_{pred}}{\partial w_7} = (1) g_1 + 0 + 0$

$= g_1$

$\partial Cost = (y_{pred} - y_{act})^2$ (2)

$\frac{\partial Cost}{\partial y_{pred}} = 2(y_{pred} - y_{act})$.

2) $\frac{\partial Cost}{\partial w_8} = \frac{\partial Cost}{\partial y_{pred}} \times \frac{\partial y_{pred}}{\partial w_8}$

$= 2(y_{pred} - y_{act}) \times g_2$

$= 2(17.478 - 85) \times 1$

$\frac{\partial Cost}{\partial w_8} = -135.044$

$\frac{\partial Cost}{\partial b_3} = \frac{\partial Cost}{\partial y_{pred}} \times \frac{\partial y_{pred}}{\partial b_3}$

$= 2(y_p - y_a) \times 1$

$= -135.044$

$y_{pred} = w_7 g_1 + w_8 g_2 + b_3$

$w_7 g_1 + w_8 g_2 + b_3$

b_3

(85) (85)

$\propto$ (1) (2) (8)

$\eta = 0.1$

0.01

0.001

0.0001

Smaller

Calculate New weights & bias

$w_7^+ = w_7 - \eta\left(\frac{\partial Cost}{\partial w_7}\right) = 7 - 0.01(-47.80)$

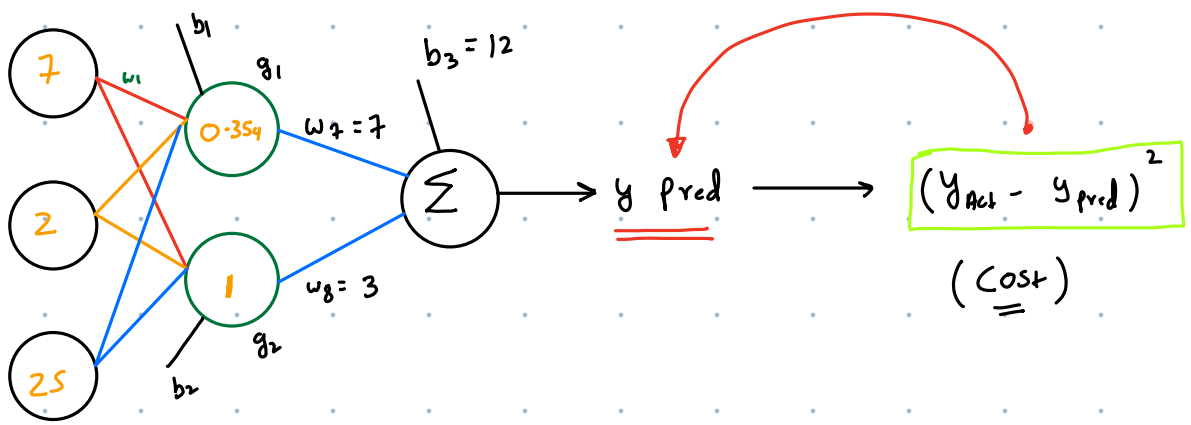
$= 7.478$

$w_8^+ = w_8 - \eta\left(\frac{\partial Cost}{\partial w_8}\right) = 3 - 0.01(-135.044)$

$= 4.35$

$b_3^+ = 13.35$

$\frac{\partial Cost}{\partial w_1}, \frac{\partial Cost}{\partial w_2} \ldots\ldots \frac{\partial Cost}{w_6} + \frac{\partial Cost}{\partial b_1} + \frac{b_{11}}{\partial n} \rightarrow \{w_1 \ldots w_6, b_1, b_2\}$



(Relu / leaky - Relu) → (AF)

(leaky Relu → Relu → Dying relu)

(Relu) → {(x) O} — (Non-dat)

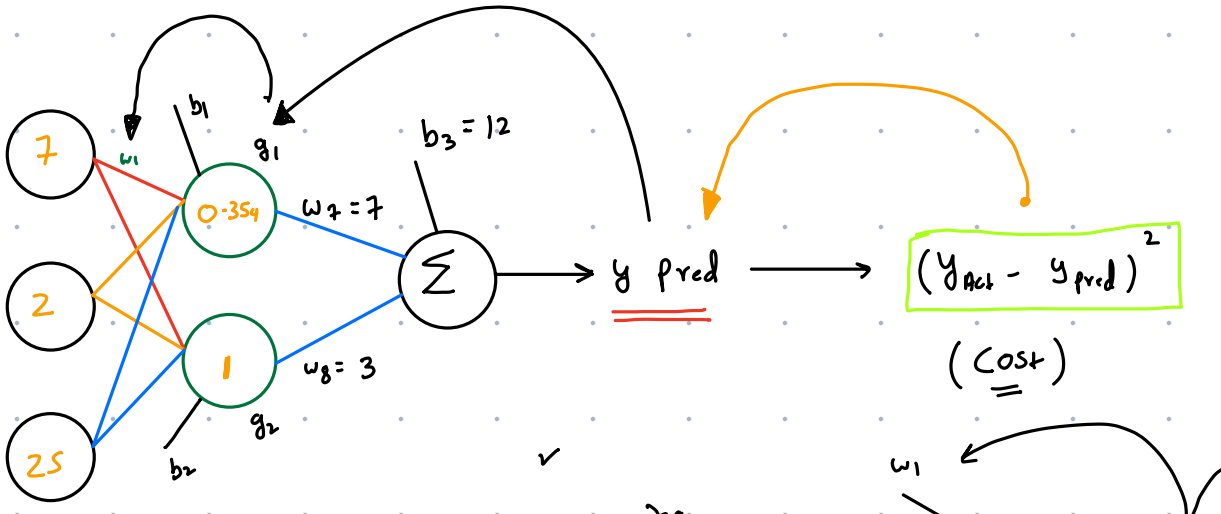
(N) = 0 → (Relu)

(Book)

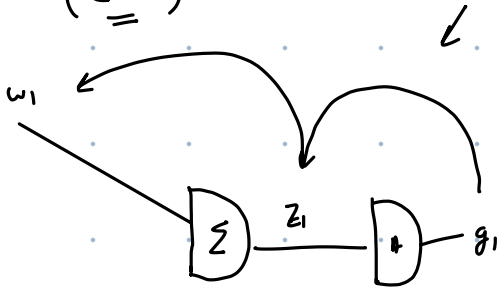
Time

GAN →

Revision



$$\frac{\partial Cost}{\partial w_1} = \frac{\partial Cost}{\partial y pred} \times \frac{\partial y pred}{\partial g_1} \times \frac{\partial g_1}{\partial w_1}$$



$$\left(\frac{\partial g_1}{\partial w_1} = \frac{\partial g_1}{\partial z_1} \times \frac{\partial z_1}{\partial w_1} \right)$$

Solve

$$= \frac{\partial Cost}{\partial y pred} \times \frac{\partial y pred}{\partial g_1} \times \frac{\partial g_1}{\partial z_1} \times \frac{\partial z_1}{\partial w_1}$$

$$= 2(y pred - y act) \times w7 \times g_1 \times (1 - g_1) \times x_1$$

$y_{pred} = (w_7 \times g_1) + (w_8 \times g_2) + b_3$ 0

g_1

w_7

$g_1 = \left(\frac{1}{1 + e^{-(z_1)}} \right)$ Sm

$Z_1 =$

$z_1 = w_1 x_1 + w_3 x_2 + w_5 x_3 + b_1$ 0 0 0

w_1

x_1

Numn

NW — Scratch

fp + Bp

T