* * Hare Krishna * *

Introduction To Machine learning:

Agenda:

⇒ Machine learning introduction

⇒ AI vs ML vs DL vs DS

⇒ Simple linear regression → mathematical intuition.

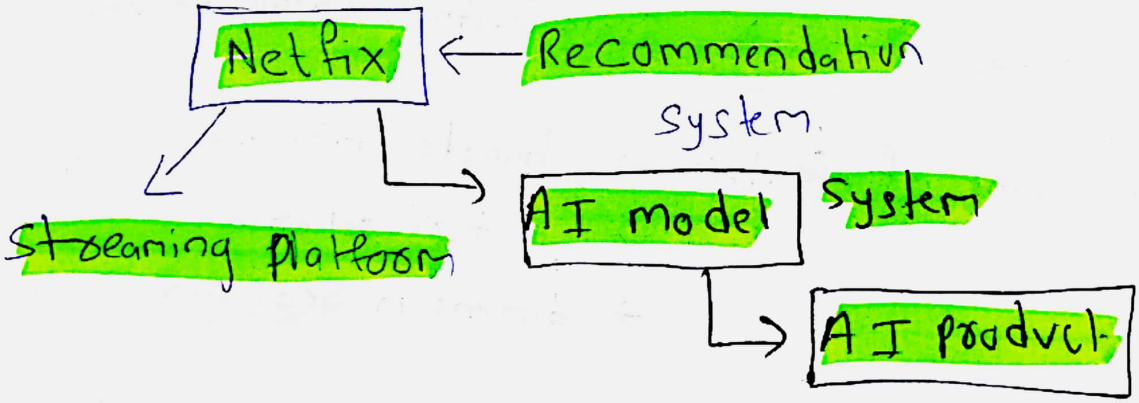
⇒ AI vs ML vs DL vs DS

AI ⇒ Arthificial intelligency

ML ⇒ Machine learning

DL ⇒ Deep learning

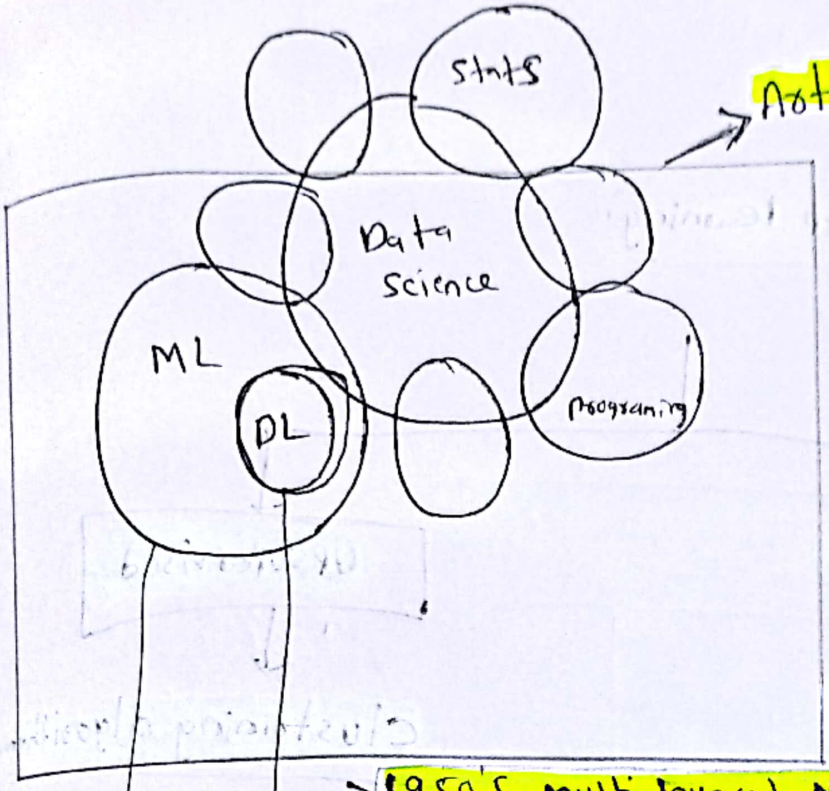
Ds ⇒ [illegible]



A.I

It is creating an application where it performs all its task without any human intervation.

Chat box → AI chatbox



→ Artificial intelligence

NLP ⇒ Natural language Processing

↓

is a technology or technic

↓

which falls in both ML & DL

Computer vision is also same.

DL:- Deep learning

1950's multi layered Neural Network.

ML → machine learning provide statistics tool to analyze, visualize, perform prediction and other task with the help of data

DL:- Deep learning.

→ in 1950's seacher's thought the can we make machine learn how human begin are able to learn. that is the intention behand deep learning.

↳ they started the concept called

↳ Percentron.

↓

now they call it

↳ Neural networks

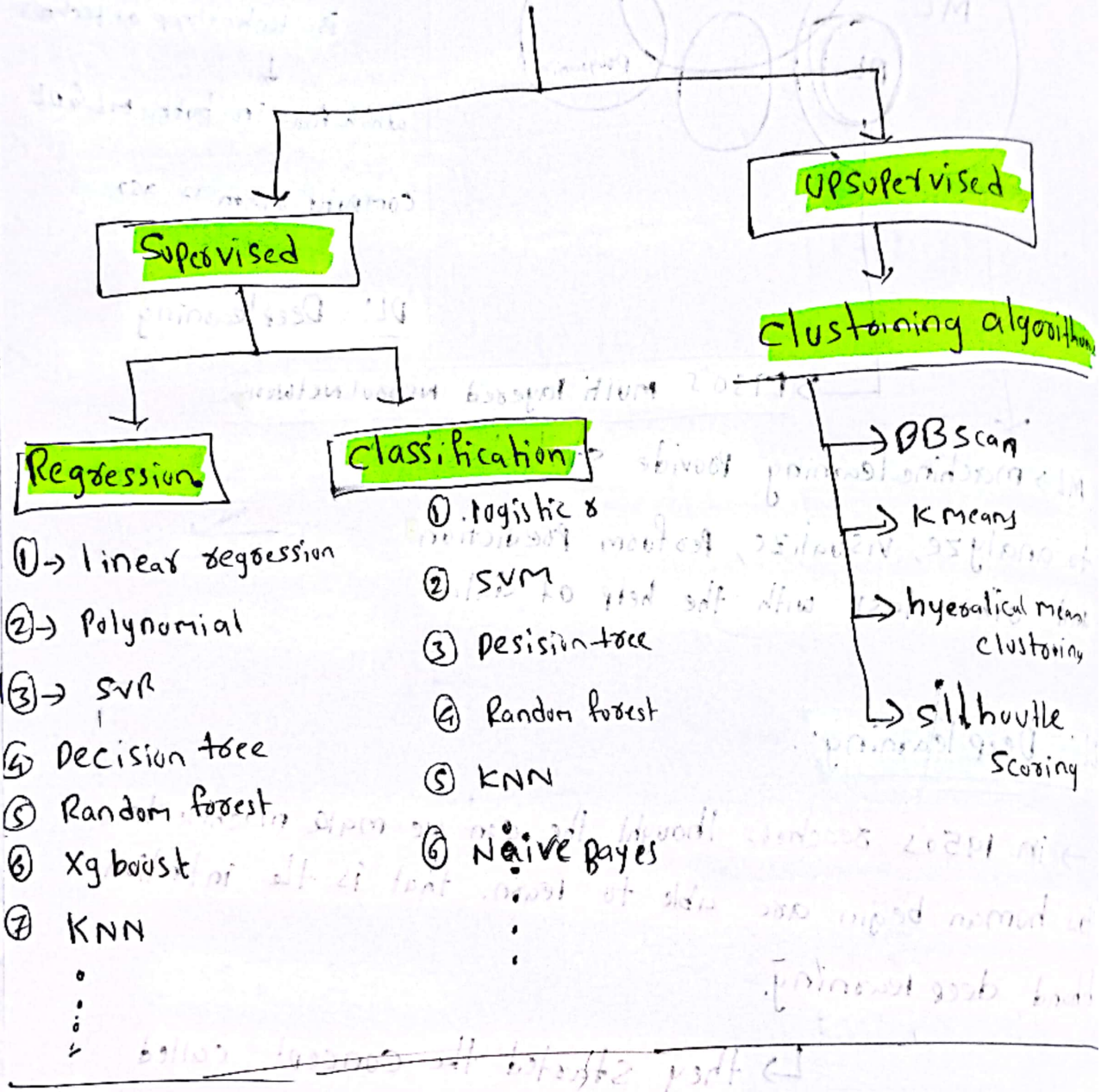
Simple defination:-

Deep learning was invented to mimic the human brain.

DL is the sub set of ML

ML and DL

Machine learning & deep learning:



Flight price predication → Regression

Algerian fire forset → classification

Air Quality index → Regression

Buy day of the person → classification

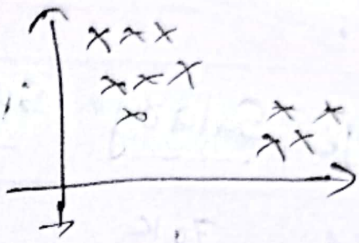
Rain tomorrow /NOT → classification

Supervised :-

↳ Dataset → o/p

Unsupervised :-

↳ Dataset → ~~o/p~~ → f_1, f_2, f_3, f_4



Supervised :-

degree	Exp	salary
B.E	7	50K
MS	2	70K
	—	65K
	—	86K
	—	82K

Regression

feature

⇒ Whenever you output value is continioves value the it becomes regression value

⇒ Whenever You output feature is catogorical value it becomes cassification value

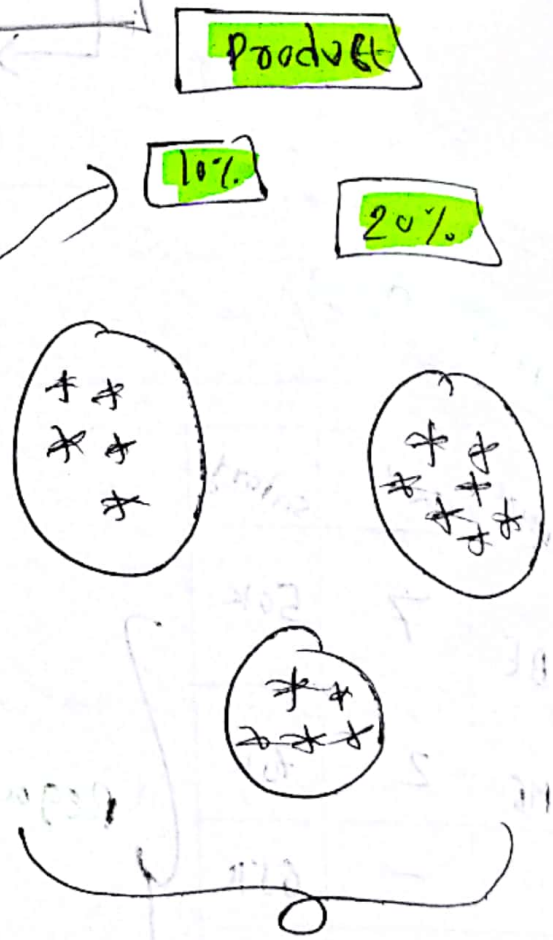
independent feature

No of play hrs	N.o of study hrs	Pass/fail → dependent feature
9	1	0
7	2	0
3	5	1

Classification Program

UN-supervised

Age	Salary	Spending-score (1-10)
24	70K	1
26	100K	9
27	200K	8
21	20K	9
25	120K	2
—	—	—
—	—	—
22	95K	4



customer segmantation.

Machine learning Algorithm:

Simple linear regression:

- 1 independent feature
- 1 dependent feature

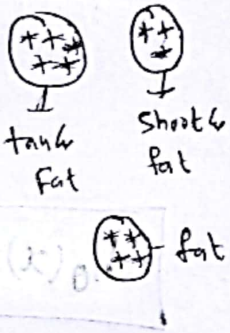
Ex: Dataset:

height weight

Aim:- To create a model

I/P → height

Predict → weight



Ex: Dataset:

No of room (X)	Price (Y)
↑	↑
↓	↓

Ex Data set:

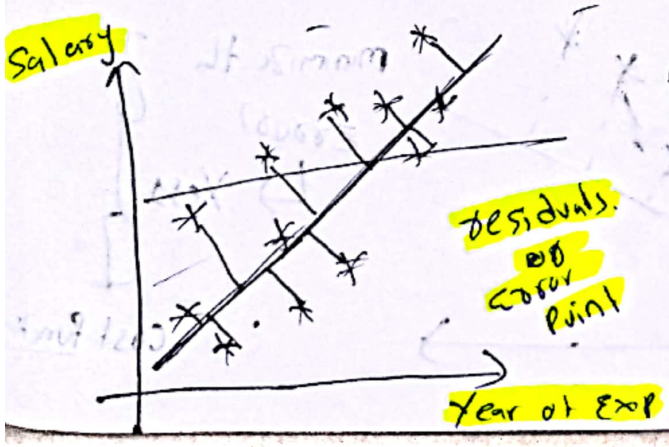
~~No of~~ Year of Exp	Salary

continuous

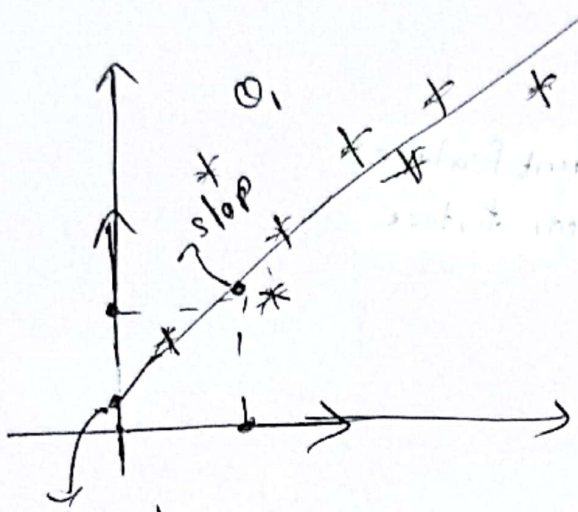
training data set

model → Year of exp & salary

Predict → Salary Based on I/P Year



the main Aim of Simple regression that find a best fit line in a such a way that the different b/w the real point & predicted point we perform summation we should get minimal.



The equation of straight line

$= y = mx + c$

$= y = \beta_0 + \beta_1 x$ } Same

$$h_\theta(x) = \theta_0 + \theta_1 x$$

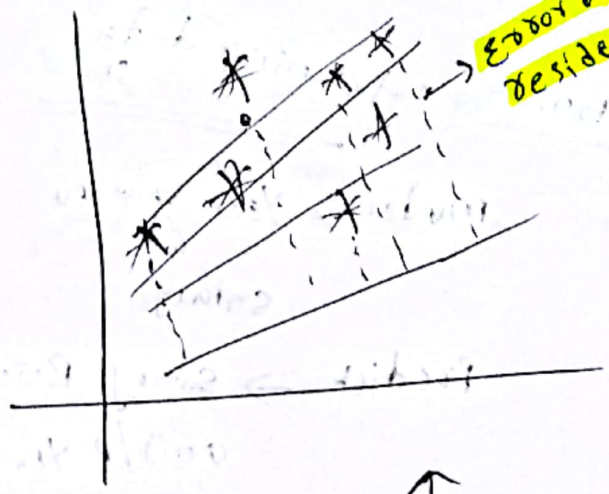
Exp	Salary:-
0	3.25 lakhs

θ_0 = intercept

θ_1 = slop

Unit movent in X-axis what is the movent in Y-axis.

if we chang value of best fit θ_0, θ_1 the line changes



θ_0, θ_1 → value

Traning of the model

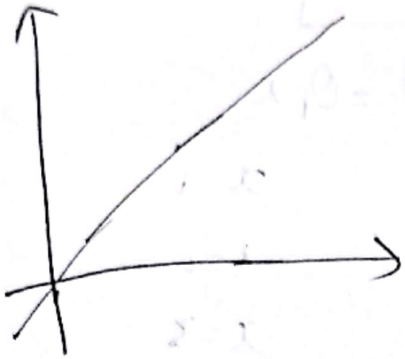
minimize the error?

↳ Yess

Cost fun

$\theta_0 = 0$

intercept = 0



cost function:

$$J(\theta_0, \theta_1) = \frac{1}{m} \sum_{i=1}^{m} \left(h_\theta(x)^{(i)} - y^{(i)} \right)^2$$

→ mean squared error

$h_\theta(x)^{(i)}$ → predicted data point

$y^{(i)}$ → actual data point

final aim:

minimize $J(\theta_0, \theta_1) = \frac{1}{m} \sum_{i=1}^{m} \left(h_\theta(x)^{(i)} - y^{(i)} \right)^2$

θ_0 → intercept

θ_1 → slope

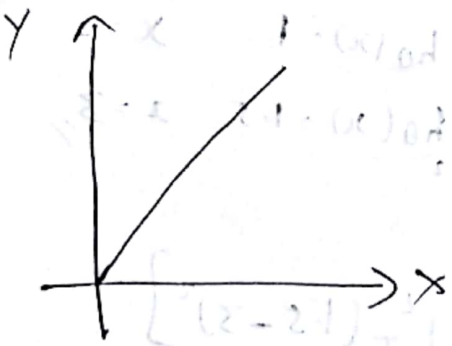
$\left(h_\theta(x)^{(i)} - y^{(i)} \right)^2$ → mean square error

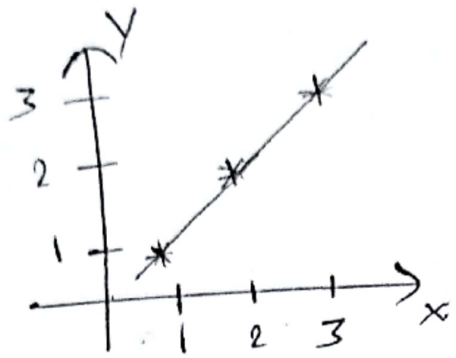
$h_\theta(x) = \theta_0 + \theta_1 x$

let us consider

$\theta_0 = 0$

$h_\theta(x) = \theta_1 x$





training

x	Y
1	1
2	2
3	3

$\theta_1 = 1$

$h_\theta(x) = \theta_1 x$

$h_\theta(x)$ $x = 1$

$h_\theta(x)$ $x = 2$

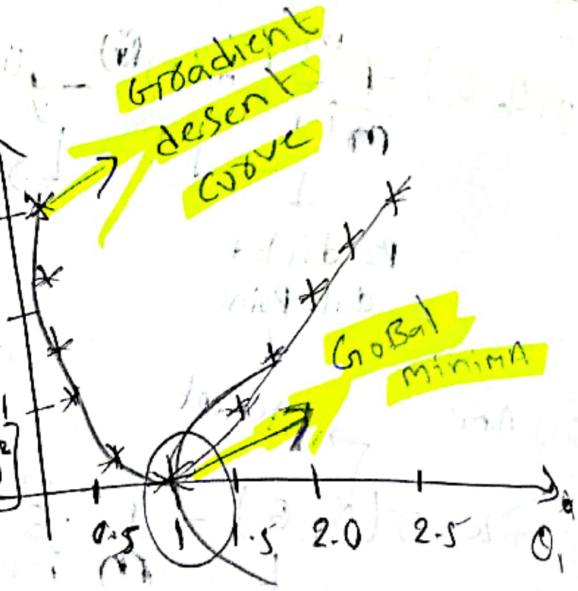
$h_\theta(x)$ $x = 3$

$$J(\theta_1) = \frac{1}{M}\sum_{i=1}^{m}\left(h_\theta(x)^i - y(i)\right)^2$$

$\rightarrow 1/3[(1-1)+(2-2)+(3-3)]^2$

$$= \frac{1}{3}\left[0+0+0\right]^2$$

$$= 0$$



$$J(\theta_1) = \frac{1}{m}\sum_{i=1}^{m}\left(h_\theta(x)^i - y^{(i)}\right)^2$$

$$= \frac{1}{3}\left[(1-1)^2+(2-2)^2+(3-3)^2\right]$$

$$= 0$$

$\theta_1 = 0.5$

$h_\theta(x) = 0.5$ $x = 1$

$h_\theta(x) = 1$ $x = 2$

$h_\theta(x) = 1.5$ $x = 3$

$$J(\theta_1) = \frac{1}{m}\sum_{i=1}^{m}\left(h_\theta(x)^i - y(i)\right)^2$$

$$= \frac{1}{3}\left[(0.5-1)^2+(1-2)^2+(1.5-3)^2\right]$$

$$= \frac{3.5}{3} = 1.16$$

Convergence algorithm

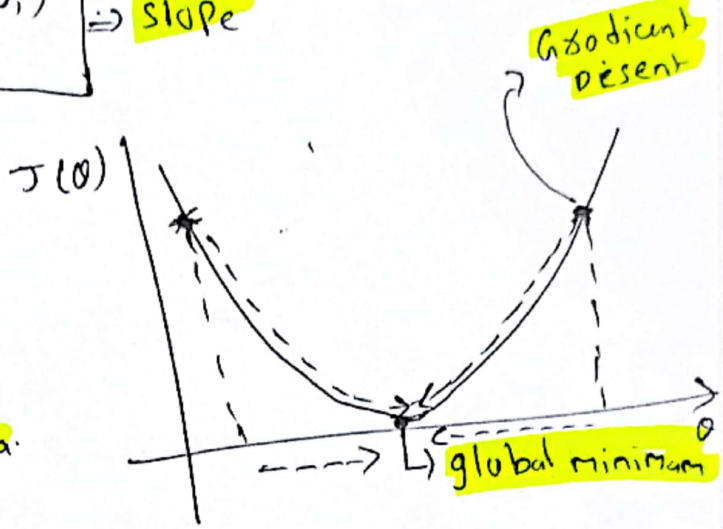
{Optimize the change of θ_i values

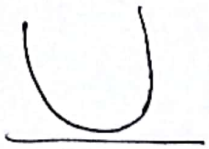
Repeat until convergence:

$$\theta_i = \theta_i - \alpha \left[\frac{\partial}{\partial \theta_i} J(\theta_i) \right] \Rightarrow \text{slope}$$

derivative

global minima.



MSE ⇒ 

↳ cost function

$\theta_i = \theta_i - \alpha$ (+ve slope)

MAE RMSE