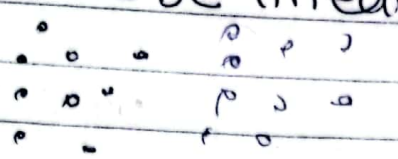


logistic Regression

Real

⇒ data should be linearly ^{or separable} classified

i.e. or almost  | you can draw line to separate.

⇒ don't use at non-linear data.

Perceptron Trick

disadvantage

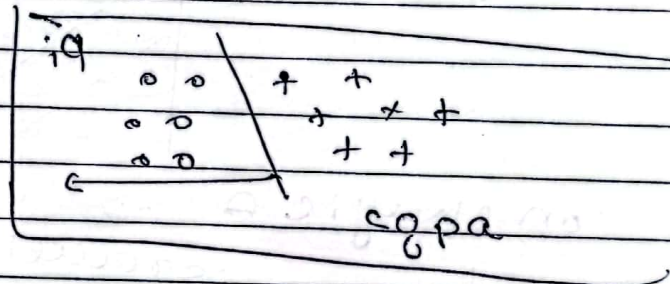
⇒ best possible solution won't come

eq of line is

$$Ax + By + c = 0$$

(~~not a line~~)

$$\text{not } y = mx + b$$



for extra column

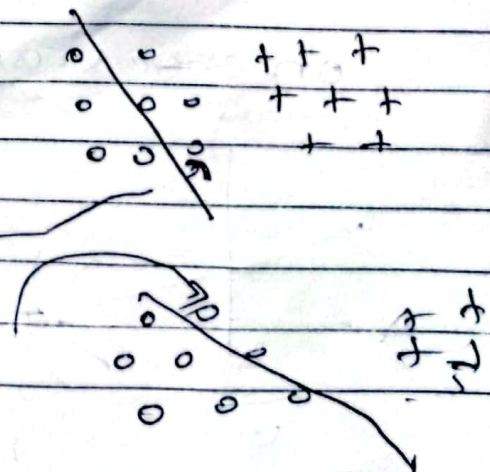
$$Ax_1 + Bx_2 + Cx_3 + d = 0$$

① start from random value of A, B, C
 $A = 1, B = 1, C = 0$

② loop (1000 or 10000)
 ask ^{random} if your place is
 right

our line is say no so

~~again ask~~

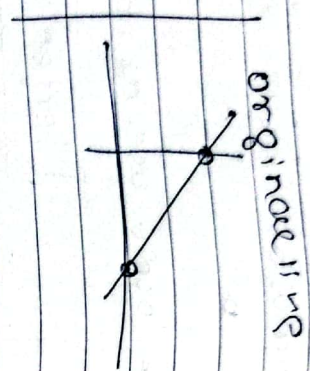


How to label

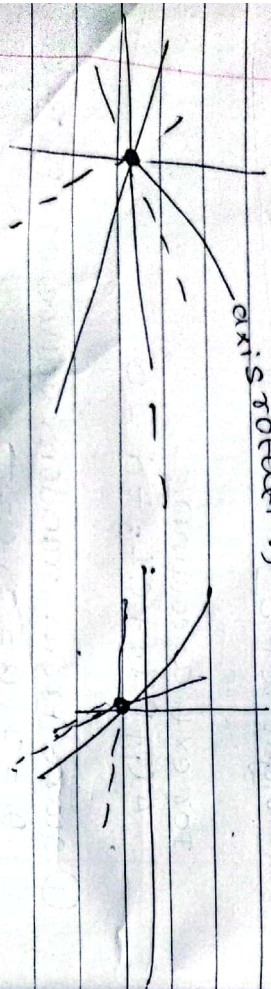
$ax + by + c > 0$ +ve region
 $ax + by + c < 0$ -ve region

Transform

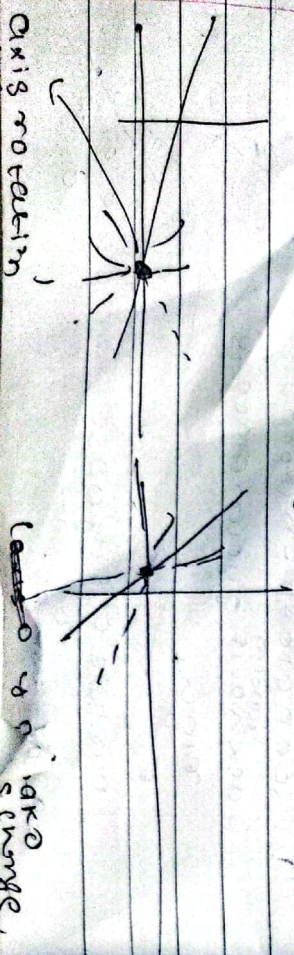
on changing c



on changing a



on ~~change~~ transforming b



Transformations

① Inside area marked enclosed

let line eq
 $2x + 3y + 5 = 0$
 let

$(x) \rightarrow$ coordinate be (4, 5)
 then
 add rest (4, 5, 1)

The write three coordinate of line

$2x + 3y + 5$

~~4, 5, 1~~
 2, 3, 5
 -4, 5, 1

$-2 -2 + 4$

\rightarrow then $-2x - 2y + 4 = 0$

to move negative region

① coordinate 1, 3

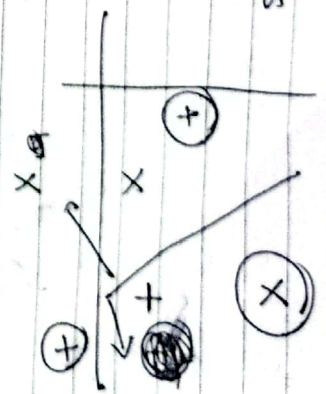
add, 1 \rightarrow 1, 3, 1

2 3 5
 + 1 3 1

$3x + 6y + 6 = 0$ eq of new line
 \downarrow

now line ~~eq~~ (x) will draw such

that $(+)$ will be in +ve region
 that $(-)$ will be in -ve region



$$ax + by + c = 0$$

$$w_0 + w_1 x_1 + w_2 x_2 = 0$$

$$w_0 = c, w_1 = a, w_2 = b$$

$$x_1 \quad x_2 \quad y$$

known

x_0	x_1	x_2	y
1	7.5	6.1	0.1
1	8.9	10.9	0.1
1	0.0	8.1	0

sort

$$w_0 x_0 + w_1 x_1 + w_2 x_2$$

$$w_0 x_0$$

$$w_0 x_2$$

$$\Rightarrow w_0$$

$$\sum_{i=0}^2 w_i x_i = 0$$

$i=0$

\Rightarrow zero data start from x_0

ieko, x_0 no use

For

$$p = 0$$

$$w_0 x_2 + w_1 x_7.5 + w_2 x_6.1 = 0$$

number

$$\text{If number} \begin{matrix} > 0 \rightarrow 1 \\ < 0 \rightarrow 0 \end{matrix}$$

This is our prediction

$$\sum_{i=0}^2 w_i x_i < 0$$

bold $X, w \rightarrow$ matrix

$$[w_0, w_1, w_2]$$

$$\begin{bmatrix} x_0 \\ x_1 \\ x_2 \end{bmatrix}$$

dot product

$$w_0 x_0 + w_1 x_1 + w_2 x_2$$

algo

Epoch = 1000, $\eta = 0.01$

For i in range (epochs):

randomly select a student

if $x_p \in N$ and $\sum w_i x_i \geq 0$:

$i=0$

$$w_{\text{new}} = w_{\text{old}} - \eta \sum_{i=0}^2 x_i$$

ie +ve

if $x_p \in P$ and $\sum_{i=0}^2 w_i x_i < 0$

$i=2$

$$w_{\text{new}} = w_{\text{old}} + \eta \sum_{i=0}^2 x_i$$

ie -ve

algo

$$x_p \in N \text{ and } \sum w_i x_i \geq 0$$

$$w_n = w_0 - \eta x_p$$

$$x_p \in P \text{ and } \sum w_i x_i < 0$$

$$w_n = w_0 + \eta x_i$$

for i in range(2):
 $w_0 = w_0 + \eta (y_i - \hat{y}_i) x_i^0$
 with out
 if else
 just update

$y_i \cdot \hat{y}_i$ $y_i - \hat{y}_i$

1	1	0
0	0	0
1	0	1
0	1	-1

for i = 0

$y_i - \hat{y}_i = 0$ so

$w_0 = w_0 + 0$

$w_0 = w_{old}$ (no change)

$y_i - \hat{y}_i = 0 - 1 = -1$

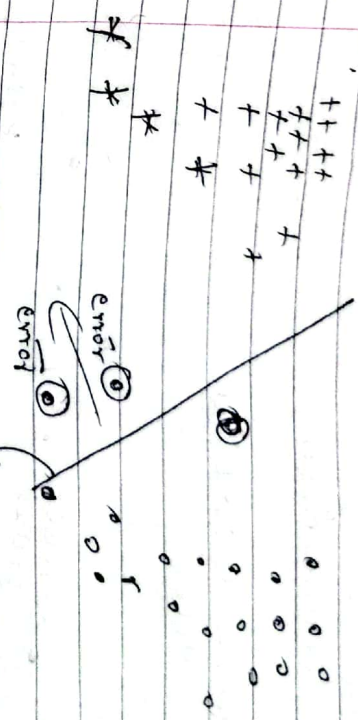
$w_0 = w_0 + \eta (-1) x_i^0$

$$= [w_0 - \eta x_i^0]$$

2 ~ + bias ~ m
 ~ random guess which
 is right

problem with

Perceptron



For unseen data it may generate error
 ~> core unseen

we have ourselves error in our
 algorithm,

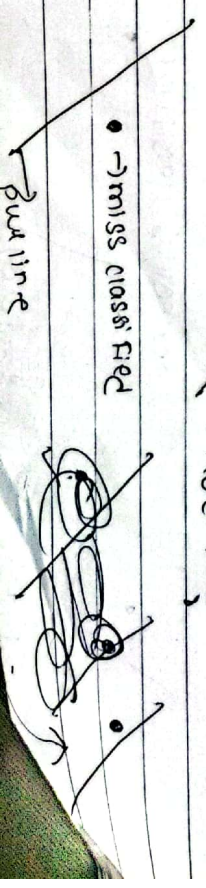
until now we
 ask ~ if we are right or not
 If yes the nothing

If no then miss classified datapoints
 pull the ~~data~~ line

i.e

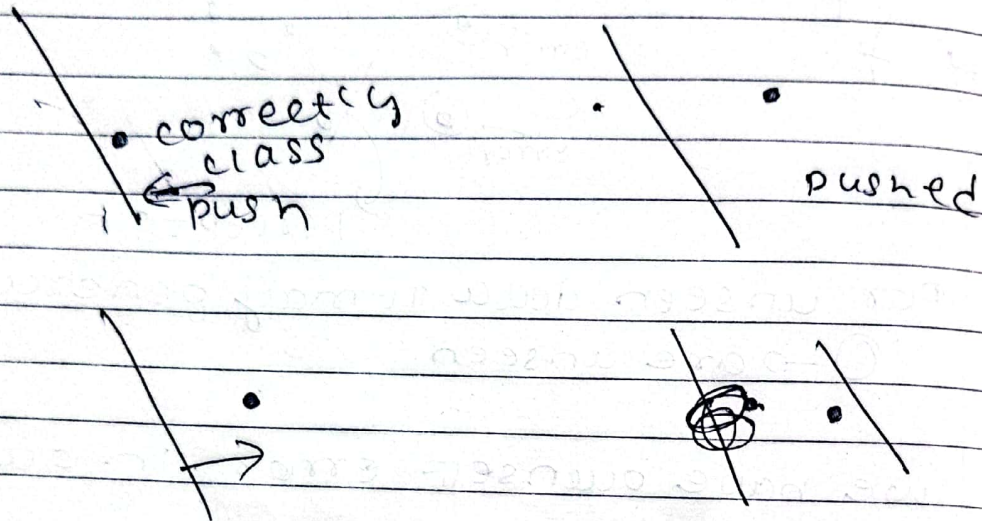
• - correctly
 classified
 "nothing"

• ~ miss classified



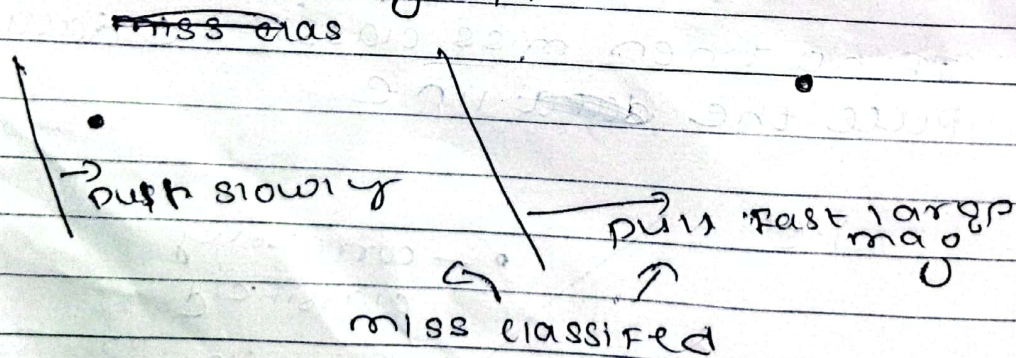
but now lets
→ correctly
→ line push

→ miss classified
pull



pull or push also depends on the
distance between point and line.

For correctly opp



miss classified

correctly classified

pull fast (big magnitude)

pull slowly small mag