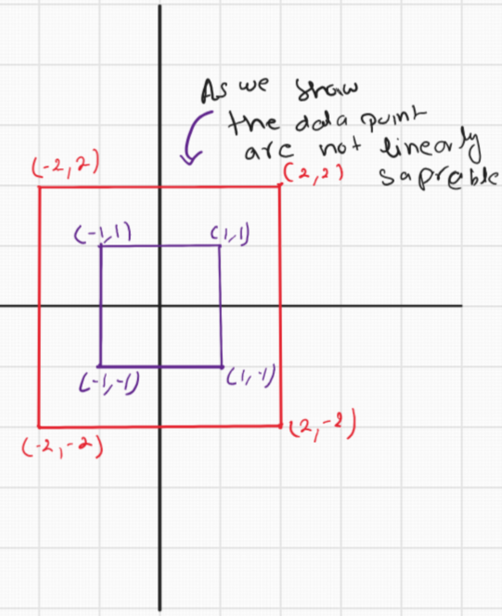
SVM ⇒

$$\begin{array}{ll}
 & \qquad\qquad\quad 10,6 \qquad\; 6,6 \qquad\; 6,10 \\
+ve & \{(2,2),\ (2,-2),\ (-2,-2),\ (-2,2)\} \\
-ve & \{(1,1),\ (1,-1),\ (-1,-1),\ (-1,1)\}
\end{array}$$

↳ Converting data point

$$\phi = \begin{cases} 4 - x_2 + |x_1 - x_2| \\ 4 - x_1 + |x_1 - x_2|, & \text{if } \sqrt{x_1^2 + x_2^2} > 2 \\ \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}, & \text{otherwise} \end{cases}$$



Non-Linear Data Points ⇒

Updating +ve data point

$$= \sqrt{2^2+2^2} = \sqrt{8} > 2 \begin{bmatrix} 4-2+|2-2| = 2 \\ 4-2+|2-2| = 2 \end{bmatrix}$$

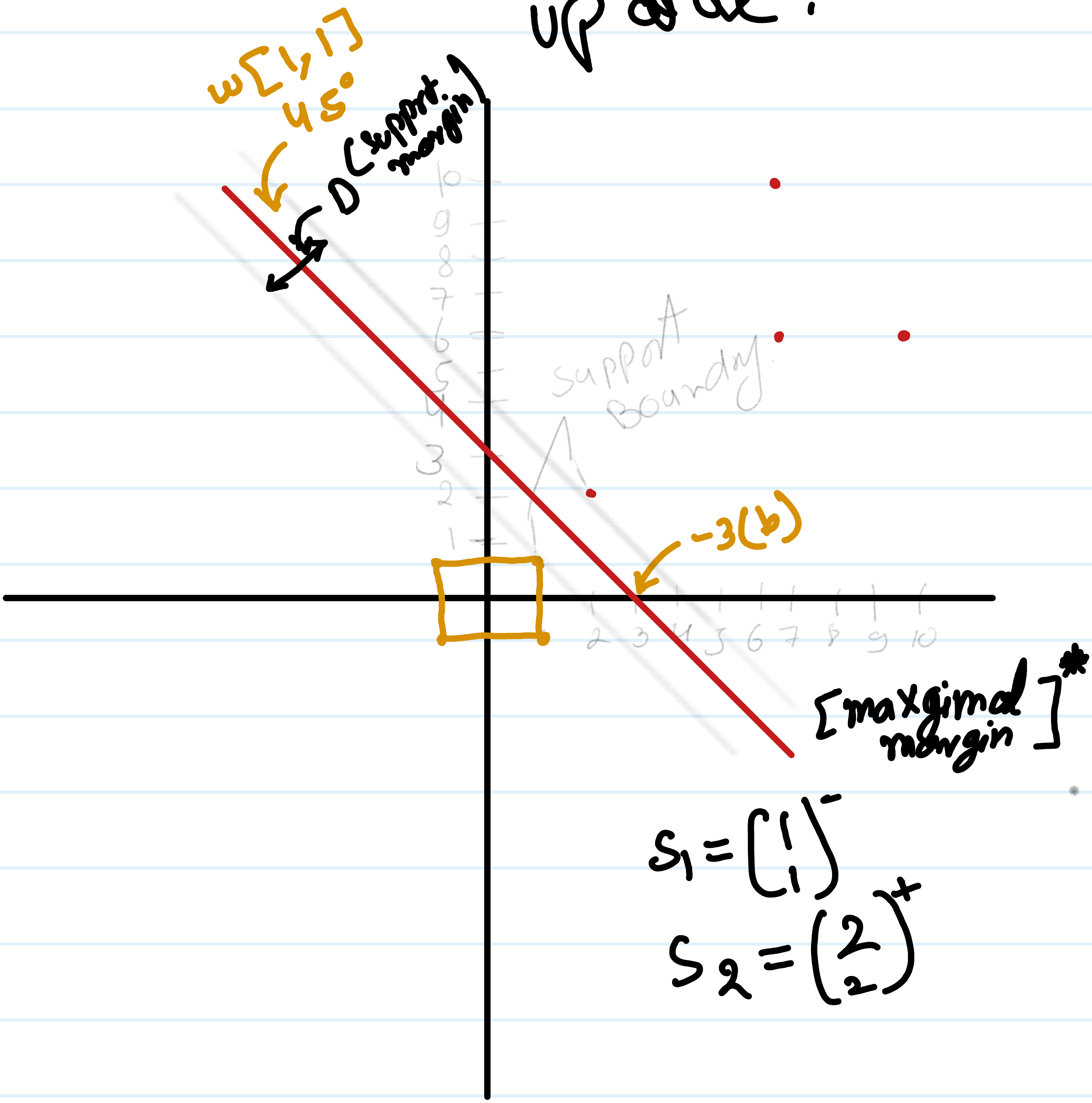
$$= \sqrt{2^2-(-2)^2} = \sqrt{8} > 2 \begin{bmatrix} 4+2+|2+2| = 10 \\ 4-2|2+2| = 6 \end{bmatrix}$$

$$= \sqrt{8} > 2 \begin{bmatrix} 4+2+|-2+2| = 6 \\ 4+2+|-2+2| = 6 \end{bmatrix}$$

$$= \begin{bmatrix} 4-2+|-2-2| = 6 \\ 4+2+|-2-2| = 10 \end{bmatrix}$$

Updating the weight ⇒

$\sqrt{1^2+1^2} = \sqrt{2} \cancel{\times} 2$ So for the Point no weight are need to be update.



$s_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}^-$

$s_2 = \begin{pmatrix} 2 \\ 2 \end{pmatrix}^+$

$$\hat{S}_1 = \begin{pmatrix}1\\1\\1\end{pmatrix}, \quad \hat{S}_2 = \begin{pmatrix}2\\2\\1\end{pmatrix}$$

Make eq^n.

$$\alpha_1 \hat{S}_1 \hat{S}_1 + \alpha_2 \hat{S}_1 \hat{S}_2 = -1$$
$$\alpha_1 \hat{S}_2 \hat{S}_1 + \alpha_2 \hat{S}_2 \hat{S}_2 = 1$$

$$\alpha_1 \begin{pmatrix}1\\1\\1\end{pmatrix}\begin{pmatrix}1\\1\\1\end{pmatrix} + \alpha_2 \begin{pmatrix}1\\1\\1\end{pmatrix}\begin{pmatrix}2\\2\\1\end{pmatrix} = -1$$

$$\alpha_2 \begin{pmatrix}2\\2\\1\end{pmatrix}\begin{pmatrix}1\\1\\1\end{pmatrix} + \alpha_2 \begin{pmatrix}2\\2\\1\end{pmatrix}\begin{pmatrix}2\\2\\1\end{pmatrix} = 1$$

$$\left.\begin{array}{l} 3\alpha_1 + 5\alpha_2 = -1 \\ 5\alpha_1 + 9\alpha_2 = 1 \end{array}\right| \begin{array}{l} \alpha_1 = -7 \\ \alpha_2 = 4 \end{array}$$

$$\alpha_1 \hat{S}_1 + \alpha_2 \hat{S}_2 = \hat{w}$$

$$\hat{w} = -7\begin{bmatrix}1\\1\\1\end{bmatrix} + 4\begin{bmatrix}2\\2\\1\end{bmatrix}$$

$$= \begin{bmatrix}-7\\-7\\-7\end{bmatrix} + \begin{bmatrix}8\\8\\4\end{bmatrix} = \begin{bmatrix}1\\1\\-3\end{bmatrix}$$

$w = \begin{bmatrix}1\\1\end{bmatrix}$, $b = -3$

☆ 1,1 — 45°

1,0 — = y

0,1 — = x

b (position)

— V [I]

$y = wx + b$

$$\boxed{y = \begin{bmatrix}1\\1\end{bmatrix} x - 3}$$

Regression $\Rightarrow$ $y = mx + c$

$$\bar{x} = \frac{1}{n}\sum x_i \quad , \quad \bar{y} = \frac{1}{n}\sum y_i$$

$$var(x) = \frac{1}{n-1}\sum (x_i - \bar{x}_i)^2$$

$$Cov(x, y) = \frac{1}{n-1}\sum\left[(x_i - \bar{x}_i)\cdot(y_i - \bar{y}_i)\right]$$

$$m = \frac{Cov(x,y)}{Var(x)} \quad , \quad c = \bar{y} - m\bar{x}$$

Q $\Rightarrow$

x	y
43	99
21	65
25	79
42	75
57	87
59	81

$$\bar{x} = \frac{1}{n}\sum x_i \quad , \quad \bar{y} = \frac{1}{n}\sum y_i$$

$$\bar{x} = 41.16 \quad , \quad \bar{y} = 81$$

$$Var(x) = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x}_i)^2$$

$$= 248.16$$

$$Cov(x, y) = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x}_i)(y_i - \bar{y}_i)$$

$= 6.62 + 64.51 + 6.46 - 1.008$
$+ 19.008 + 0$
$= 95.6$ Ans.

$$m = \frac{Cov(x,y)}{Var(x)} = \frac{95.6}{248.16} = 0.385$$

$$c = \bar{y} - m\bar{x} = 81 - 0.385 * 41.16$$
$$= 65.15$$

$$\boxed{y = 0.385x + 65.15}$$

Apriori Algorithm ⇒

T.Id	Items
T_1	1, 2, 5
T_2	2, 4
T_3	2, 3
T_4	1, 2, 4
T_5	1, 3
T_6	2, 3
T_7	1, 3
T_8	1, 2, 3, 5
T_9	1, 2, 3

Support

$$\text{Support} = 22\% = \frac{22 \times 9}{100} = \frac{198}{100} = 1.98 \approx 2$$

Confidence = 70% ← Confidence

Step -1 ⇒

Apriori algorithm ⇒ Generate

$c_1 \rightarrow f_1 \rightarrow c_2 \rightarrow f_2 \rightarrow c_3 \rightarrow f_3$

Table c_1 = f_1 all have min scount.

Item	Support Count
1	6
2	7
3	5
4	2
5	2

Table C_2

Item	SC	f_2
1,2	4	4
1,3	4	4
1,4	1 ✗	
1,5	2	2
2,3	4	4
2,4	2	2
2,5	2	2
3,4	0 ✗	
3,5	1 ✗	
4,5	0 ✗	

Table C_3

Item	SC	f_3
1,2,3	2	2
1,2,4	1 ✗	
1,2,5	2	2
1,3,5	1 ✗	

$l_1 = \{1, 2, 3\}$

$l_2 = \{1, 2, 5\}$

$S_1 = \{\{1\}, \{2\}, \{3\}, \{1,2\}, \{2,3\}, \{1, 3\}, \{1, 2, 3\}\}$

$S_2 = \{\{1\}, \{2\}, \{5\}, \{1,2\}, \{1,5\}, \{2,5\}, \{1,2,5\}\}$

Strong Association $\Rightarrow$ $l/s \geq$ S.C.

$\{1\} \rightarrow \{2, 3\} \Rightarrow 2/6 = 0.33$

$\{2\} \rightarrow \{1, 3\} = 2/7 = 0.28$

$\{3\} \rightarrow \{1, 2\} = 2/5 = 0.40$

$\{1,2\} \rightarrow \{3\} = 2/4 = 0.50$

$\{1,3\} \rightarrow \{2\} = 2/4 = 0.50$

$\{2,3\} \rightarrow \{1\} = 2/4 = 0.50$

$\{1,2,3\} \rightarrow \{\emptyset\} = 2/2 = 1$

$\{5\} \rightarrow \{1,2\} = 2/2 = 1$

$\{1,5\} \rightarrow \{2\} = 2/2 = 1$

$\{2,5\} \rightarrow \{1\} = 2/2 = 1$

Strong Association

Fp Tree ⇒

TId	Items
1	f, a, c, d, g, i, m, p
2	a, b, c, f, l, m, o
3	b, f, h, J, o
4	b, c, k, s, p
5	a, f, c, e, l, p, m, n

minimum Support ⇒ 3%
= 3

Step-1 ⇒ find C_1, L_1 ⇒

a	3
b	3
c	4
d	~~1~~
e	~~1~~
f	4
g	~~1~~
h	~~1~~
i	~~1~~
j	~~1~~
k	~~1~~
l	~~2~~
m	3
n	~~1~~
o	~~2~~
p	3
s	~~1~~

← Step 2

Create orderd Set ⇒

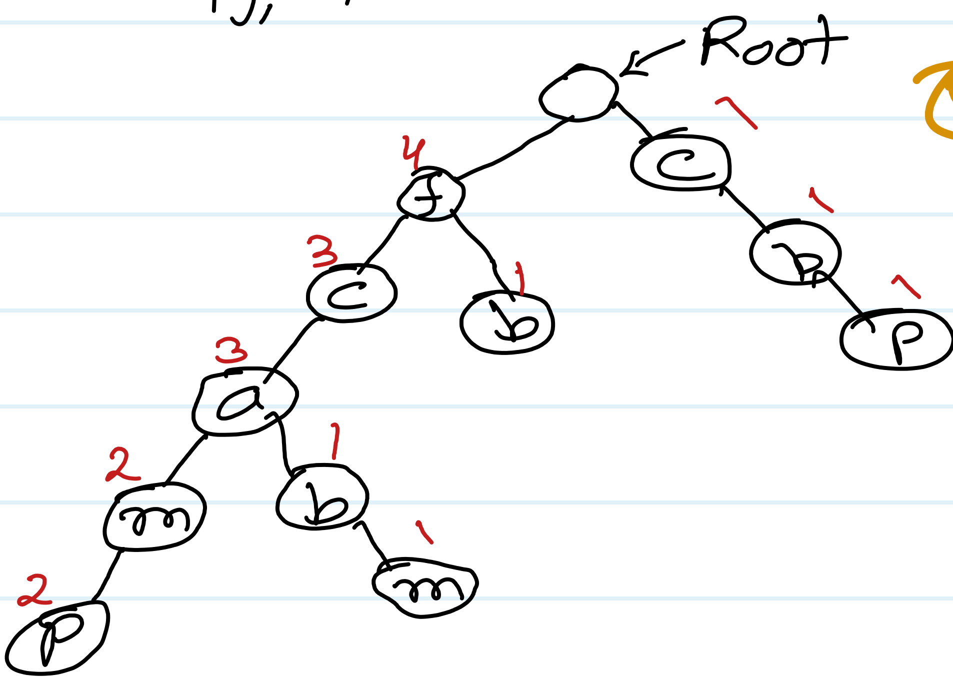
= {(c:4), (f:4), (a:3), (b:3), (m:3), (P:3)}

Generate another table ⇒

3

TId	Ordered Item
1	f, c, a, b, m, p
2	f, c, a, b, m
3	f, b
4	c, b, p
5	f, c, a, m p,

4



5

f – 4
c – 3
a – 3
m – 2
p – 2

I	CP	TP	FP
p	{f, c, a, m : 2}, {c, b : 1}	{c : 3}	<c, p : 3>
m	{f, c, a : 2}, {f, c, a, b : 1}	{f : 3, c : 3, a 3}	<f, c, a, m : 3>
a			
c			
f			

* K-mean Clustring [Clustring Algo] ⇒

Data #	x	y
1	1.90	0.97
2	1.76	0.84
3	2.32	1.63
4	2.31	2.09
5	1.14	2.11
K_1 6	5.02	3.02
7	5.74	3.84
8	2.25	3.47
9	4.71	3.60
10	3.17	4.96

4.10 2

8.57

Suppose you are given initial assignment cluster center as {cluster1: #1}, {cluster2: #10} – the first data point is used as the first cluster center and the 10-th as the second cluster center. Please simulate the k-means (k=2) algorithm for ONE iteration. What are the

$C_1 = 1,1 \mid C_2 = 10, 10 \mid$ Distarse $= \sqrt{(x-\bar{x})^2 + (y-\bar{y})^2}$

$d_{11} = \sqrt{(x-\bar{x})^2 + (y-\bar{y})^2} = \sqrt{(1.90-1) + (0.97-1)} = 0.090$

$d_{21} = \sqrt{(1.90-10) + (0.97-10)} = 12.130$

Update $C_1 \Rightarrow \left(\frac{1+1.90}{2}, \frac{1+0.97}{2}\right) = 1.45, 0.985$