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21L-5294

BCS-8A

Question 1

laptop - 5

mouse - 7

charger - 4

USB - 6

HDMI - 3

Bag - 3

SSD - 6

ordered Items

1 { mouse, USB, laptop, charger, HDMI }

2 { Mouse, USB, SSD, laptop, Bag }

3 { mouse, USB, SSD, charger, Bag }

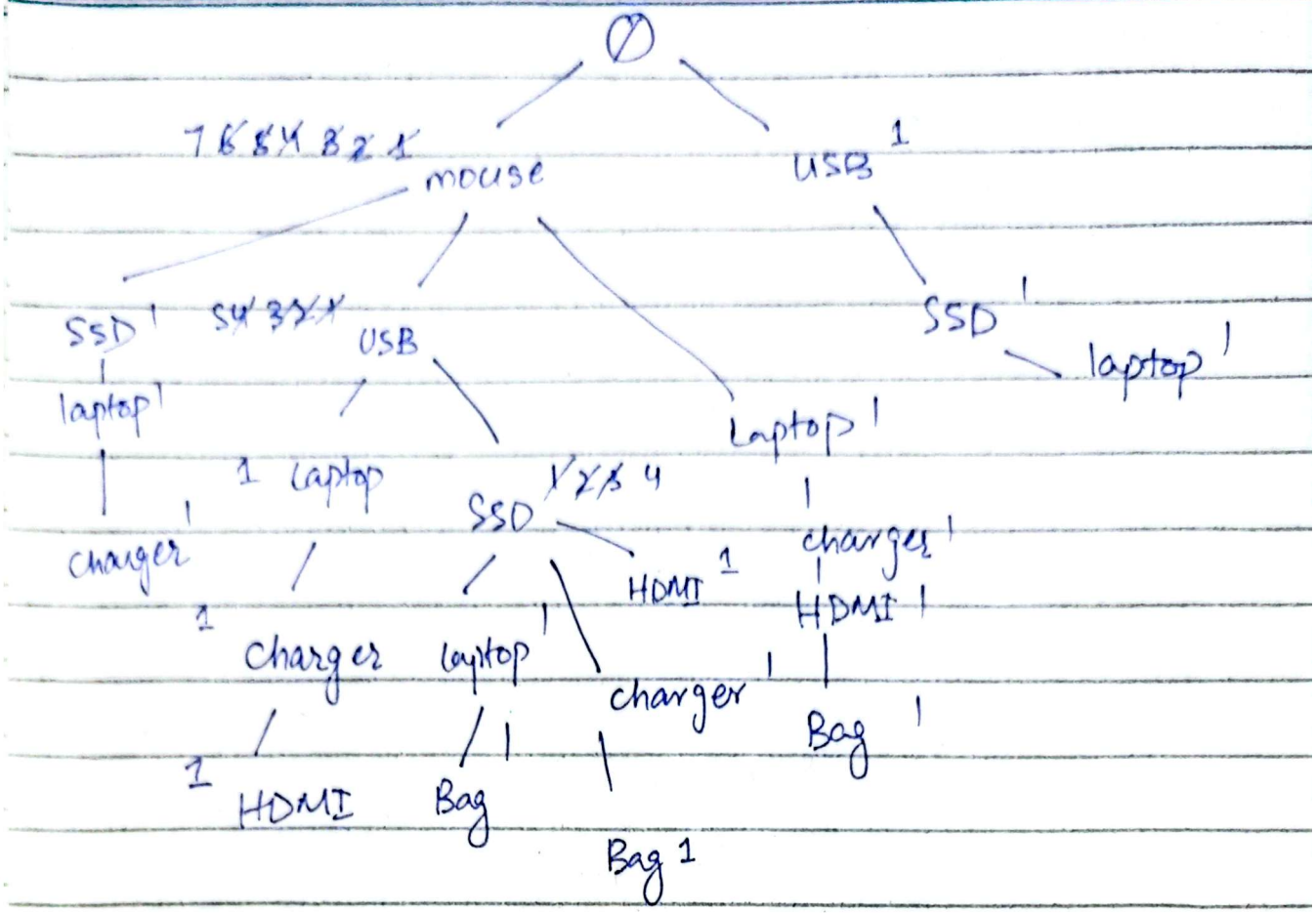
4 { Mouse, USB, SSD }

5 { Mouse, laptop, charger, HDMI, Bag }

6 { USB, SSD, Laptop }

7 { mouse, SSD, laptop, charger }

8 { mouse, USB, SSD, HDMI }



item	CPB
{Bag:3}	{mouse, usb, usb, laptop:1}, {mouse, usb, ssd, charger:1}, {mouse laptop charger HDMI:1}
{HDMI:3}	{mouse, usb, laptop, charger:1} {mouse, laptop charger:1}, {mouse, usb, ssd, 1}
{Charger:4}	{mouse, usb, laptop 1}, {mouse, usb, ssd 1} {mouse, laptop 1} {mouse ssd, laptop 1}
{laptop:5}	{mouse, usb:1}, {mouse, usb ssd:1} {mouse:2} {usb:ssd:1} {mouse, ssd 1}
{SSD:6}	{mouse, usb:4}, {mouse 1} / {usb:1}
{USB:6}	{mouse:5}

item	C FPT
{Bag:3}	{mouse:3}
{HDMI:3}	{mouse:3}
{Charger:4}	{mouse:4}
{laptop:5}	{mouse:4} {usb:1}
{ssd:6}, {usb:6}	{mouse:5} {usb:1} {mouse:5}

itemset	Frequent Pattern Generated
{Bag : 3}	{mouse, Bag : 3}
{HDMI : 3}	{mouse, HDMI : 3}
{Charger : 4}	{mouse, charger : 4}
{laptop : 5}	{mouse, laptop : 3} {usb, laptop, 3}
{ssd : 5}	{mouse, ssd : 5}, {usb, ssd : 5}
{USB : 6}	{mouse, usb : 5}
{usb : 6}	

Generating Association rule

1) mouse → Bag = 3/7

B → mous = 3/3 1

2) mouse → HDMI = 3/7

HDMI → mouse = 3/3 = 1

3) mouse → charger = 4/7

Charger → mouse = 4/4

4) mouse → laptop = 4/7

laptop → mouse = 4/4 1

usb → laptop : 3/6

laptop → usb = 3/3

5) mouse → ssd 5/7

Ssd → mouse = 5/5

usb → ssd = 5/6

ssd → usb = 5/5

6) moube → usb = 5/7

usb → mouse = 5/5 = 1

Question 2

1. Regression algorithm would work best
2. Whether or not a company going bankrupt is a classification problem
3. TP = 45 FP = 18
   FN = 12 TN = 25

$$\text{Accuracy} = \frac{TP+TN}{TP+TN+FP+FN} = \frac{45+25}{45+25+18+12} = 0.7$$

$$\text{Precision} = \frac{TP}{TP+FN} = \frac{45}{45+12} = 0.714$$

$$\text{Recall} = \frac{TP}{TP+FP} = \frac{45}{45+18} = 0.789$$

$$F1 = \frac{2PR}{P+R} = \frac{2 \times 0.714 \times 0.789}{0.714 \times 0.789} = 0.75$$

4a

0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 2 2 2 2
0 0 0 0 0 0 0 0 0 1 1 2 2 1 1 0 2 2 2 0 1

pred \ true	0	1	2
0	8	2	2
1	1	2	1
2	1	1	2

Class 0:-

$$P = \frac{8}{8+2+2} = 0.667$$

$$R = \frac{8}{8+1+1} = 0.8$$

$$F1 = \frac{2(0.67)(0.8)}{0.67+0.8} = 0.729$$

class 1 :- $P = \frac{2}{2+1+1} = 0.5$

$R = \frac{2}{2+2+1} = 0.4$

$F1 = 0.44$

Class 2 = $P = \frac{2}{2+1+1} = 0.5$

$R = \frac{2}{2+1+1} = 0.4$

$F = 0.44$

Question 3
(Perceptron training)

a) $z = (1)(0.7) + (0)(0.6) + (1)(0.5 + (0)(0.3) + (1)(0.4)$

$= 1.6$

$\geq 1.5 = 1$

b) $y - \hat{y} = 0 - 1 = -1$

$w_1 = 0.7 + (0.2 \times -1 \times 1) = 0.5$

$w_2 = 0.6 - 1 (0.2 \times -1 \times 0) = 0.6$

$w_3 = 0.5 + (0.2 \times -1 \times 1) = 0.3$

$w_4 = 0.3 + (0.2 \times -1 \times 0 = 0.3$

$w_5 = 0.4 + (0.2 \times -1 \times 0) = 0.2$

c) next predicted label.

$= (1)(0.5) + 0 + (1)(0.3) + 0 + (1)(0.2)$

$= 1$

$< 1.5 \quad = 0$

Question 4

	1	2	3	4	5	6	7	8	9	10
S11, up	0	0	0	0	0	0	0	0.23	0.69	0.69
S11, down	0	0	0	0	0	0	0	0	0	0
S12, down	0	0	0	0	4.63	4.63	4.63	4.63	4.63	8.39
S12, left	0	0	0	0	0	0	0	0	0	0
S12 right	0	0	0	0	0	0	0	0	0	0
S13: down	0	10	10	10	10	19	27.1	27.1	27.1	27.1
S13: left	0	0	0	0	0	0	0	0	0	0
S21 up	0	0	0	0	0	0	0	0	0	0
S21 right	0	0	0.9	2.52	2.52	2.52	2.52	5.36	8.51	8.51
S22 up	0	0	0	0	0.22	0.22	0.22	0.22	0.22	0.22
S22 left	0	0	0	0	0	0	0	0	0	0.0
S22 right	10	10	19	27.1	34.39	34.39	34.39	40.95	46.86	52.12
S23 up	0	0	0	0	0	0	0	0	0	0
S23 left	0	0	0	0	0	0	0	0	0	0

	Estimated	V^*	π^*
S11		0.69	down
S12		8.39	down
S13		27.10	down
S21		8.51	right
S22		52.17	right

Policy.

S11 → S21 → S22 → S23