Assignment – 3

Q-1 find the frequent item sets and generate the association rules using the Apriori algorithm:

TID	ITEMSETS
T1	A, B
T2	B, D
T3	B, C
T4	A, B, D
T5	A, C
T6	B, C
T7	A, C
T8	A, B, C, E
T9	A, B, C

Given: Minimum Support= 2, Minimum Confidence= 50%

Answer:

Items	Support
A	6
B	7
C	6
D	2
E	1

Items selected => (A,B,C,D)

Items	Support
A,B	4
A,C	4
A,D	1
B,C	4
B,D	2
C,D	0

Items selected => (AB,AC,BC,BD)

Items	Support
A,B,C	1
A,B,D	2
A,B,C,D	0
B,C,D	0

Items selected => (A,B,D)

Rules	Support	Confidence
(A^B) → C	2	50%
(A^C) → B	2	50%
(B^C) → A	2	50%
A → (B^C)	2	33%
B → (A^C)	2	28%
C → (A^B)	2	33%

Association rules:

(A^B) → C

(A^C) → B

(B^C) → A

Q-2 Support threshold=50%, Confidence= 60%

TABLE-1

Transaction	List of items
T1	I1,I2,I3
T2	I2,I3,I4
T3	I4,I5
T4	I1,I2,I4
T5	I1,I2,I3,I5
T6	I1,I2,I3,I4

Find the frequent itemsets and generate the association rules using the Apriori algorithm:

Answer:

Items	Support
I1	66%
I2	83%
I3	66%
I4	66%
I5	33%

Items selected => (I1,I2,I3,I4)

Items	Support
I1,I2	66%
I1,I3	50%
I1,I4	33%
I2,I3	66%
I2,I4	50%
I3,I4	66%

Items selected => (I1I2, I1I3, I2I3, I2I4)

Items	Support
I1,I2,I3	50%
I1,I2,I4	33%
I1,I2,I3,I4	16%
I2,I3,I4	33%

Items selected => (I1,I2,I3)

Rules	Support	Confidence
(I1^I2) → I3	50%	75%
(I1^I3) → I2	50%	100%
(I2^I3) → I1	50%	75%
I1 → (I2^I3)	50%	75%
I2 → (I1^I3)	50%	60%
I3 → (I1^I2)	50%	75%

Association rules:
(I1^I2) → I3

(I1^I3) → I2

(I2^I3) → I1

I1 → (I2^I3)

I2 → (I1^I3)

I3 → (I1^I2)

Using FP Growth algorithm:

Items	Support
I1	4
I2	5
I3	4
I4	4
I5	2

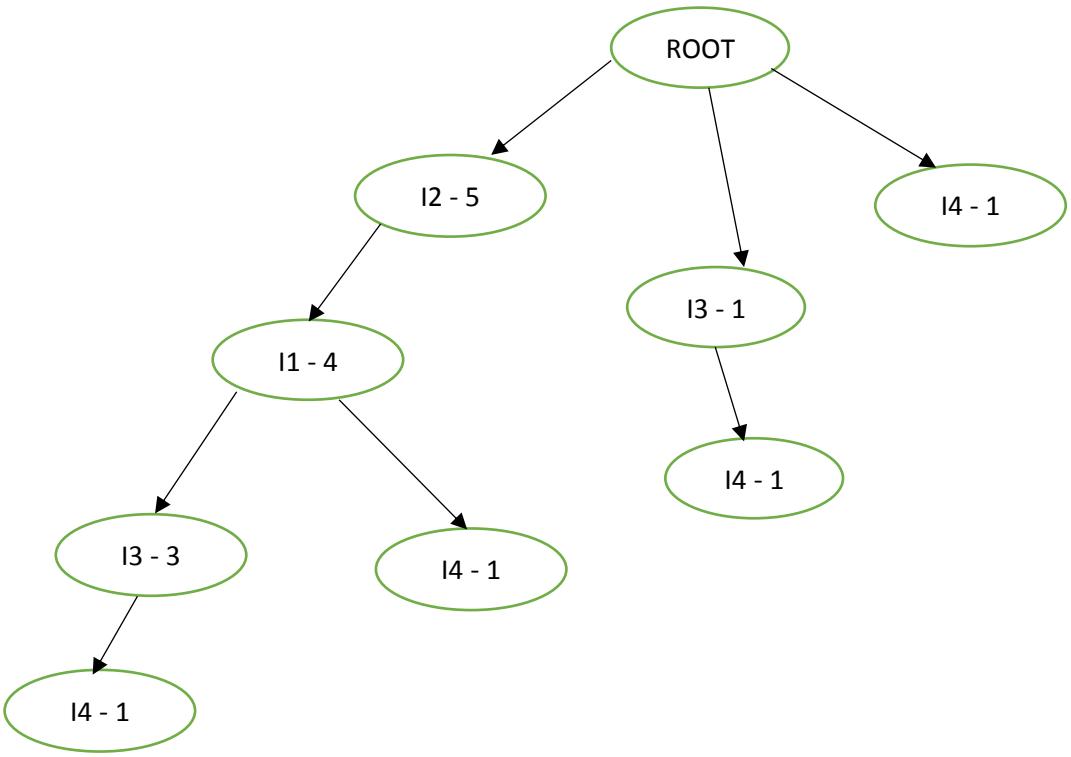
Thus we remove the $I5^{th}$ transaction and arrange the items in descending order based on their support count.

Items	Support
I2	5
I1	4
I3	4
I4	4

Now, we re-arrange the transactions based on the priority.

Transaction	List of items
T1	I2,I1,I3
T2	I2,I3,I4
T3	I4
T4	I2,I1,I4
T5	I2,I1,I3,I5
T6	I2,I1,I3,I4

The FP Growth tree of frequent item set is:



Q-3 Find the frequent itemsets **and generate** association rules **on this. Assume that minimum support threshold (s = 33.33%) and minimum confident threshold (c = 60%)**

Transaction ID	Items
T1	Hot Dogs, Buns, Ketchup
T2	Hot Dogs, Buns
T3	Hot Dogs, Coke, Chips
T4	Chips, Coke
T5	Chips, Ketchup
T6	Hot Dogs, Coke, Chips

Answer:

Hot Dogs = HD

Buns = B

Ketchup = K

Chips = CH

Coke = CO

Items	**Support**
HD	66%
B	33.33%
K	33.33%
CH	50%
CO	66%

Items selected => (HD,B,K,CH,CO)

Items	**Support**
HD,B	33.33%
HD,K	16%
HD,CH	33.33%
HD,CO	33.33%
B,K	16%
B,CH	0
B,CO	0
K,CH	0
K,CO	16%
CH,CO	50%

Items selected => (HD B, HD CO, HD CH, CO CH)

Items	**Support**
HD,B,CO	0
HD,B,CH	0
HD,B,CO,CH	0
HD,CO,CH	33.33%

Items selected => (HD, CO, CH)

Rules	Support	Confidence
(HD^CO) → CH	33.33%	100%
(HD^CH) → CO	33.33%	100%
(CO^CH) → HD	33.33%	66.66%
HD → (CO^CH)	33.33%	50%
CO → (HD^CH)	33.33%	66.66%
CH → (HD^CO)	33.33%	50%

Association rules:

(HD^CO) → CH

(HD^CH) → CO

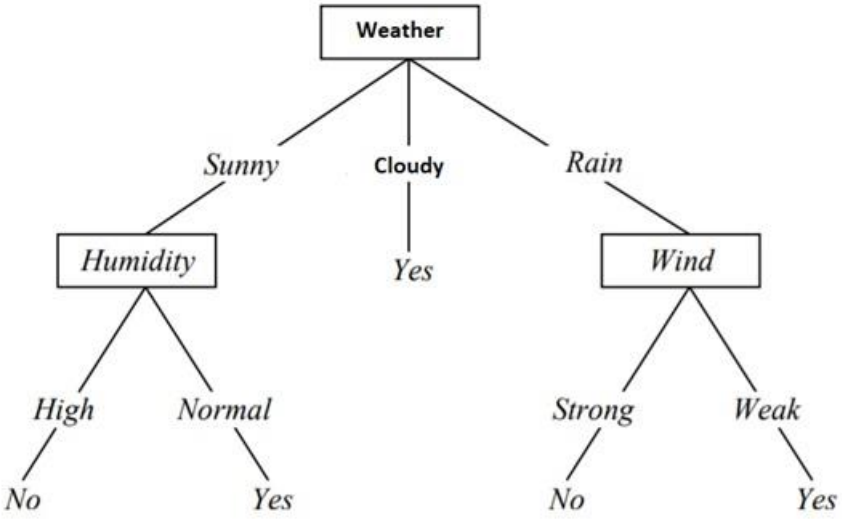
(CO^CH) → HD

CO → (HD^CH)

Q4. Draw decision tree.

Day	Weather	Temperature	Humidity	Wind	Play?
1	Sunny	Hot	High	Weak	No
2	Cloudy	Hot	High	Weak	Yes
3	Sunny	Mild	Normal	Strong	Yes
4	Cloudy	Mild	High	Strong	Yes
5	Rainy	Mild	High	Strong	No
6	Rainy	Cool	Normal	Strong	No
7	Rainy	Mild	High	Weak	Yes
8	Sunny	Hot	High	Strong	No
9	Cloudy	Hot	Normal	Weak	Yes
10	Rainy	Mild	High	Strong	No

Answer:



Q5. Construct decision tree.

Age	Education	Income	Marital Status	Purchase?
36-55	master's	high	single	will buy
18-35	high school	low	single	won't buy
36-55	master's	low	single	will buy
18-35	bachelor's	high	single	won't buy
< 18	high school	low	single	will buy
18-35	bachelor's	high	married	won't buy
36-55	bachelor's	low	married	won't buy
> 55	bachelor's	high	single	will buy
36-55	master's	low	married	won't buy
> 55	master's	low	married	will buy
36-55	master's	high	single	will buy
> 55	master's	high	single	will buy
< 18	high school	high	single	won't buy
36-55	master's	low	single	will buy
36-55	high school	low	single	will buy
< 18	high school	low	married	will buy
18-35	bachelor's	high	married	won't buy
> 55	high school	high	married	will buy
> 55	bachelor's	low	single	will buy
36-55	high school	high	married	won't buy

Answer: