



# Vidyavardhini's College of Engineering and Technology

## Department of Artificial Intelligence & Data Science

AY: 2024-25

Class:	TE	Semester:	V
Course Code:		Course Name:	DWM

Name of Student:	Sainath Khot
Roll No. :	20
Assignment No.:	5
Title of Assignment:	
Date of Submission:	
Date of Correction:	

### Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	
Demonstrated Knowledge	3	
Legibility	2	
Total	10	

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge	3	2	1
Legibility	2	1	0

### Checked by

Name of Faculty :

Signature :

Date :

## Q. 4)

Q. A Database has four transactions. Let min sup = 60%  
min-con = 80%. Apply Apriori algorithm to find  
the frequent items and the strong association rules.

Transaction	Date	List of items
T100	10/15/99	{K, A, D, B}
T200	10/15/99	{D, A, C, E, B}
T300	10/19/99	{C, A, B, E}
T400	10/22/99	{B, A, D}

Soln Support threshold = 60%

$$\therefore \text{min sup} = 0.6 \times \text{no. of transaction}$$

$$= 0.6 \times 4 = 2.4$$

$$\therefore \text{min sup} = 2.4$$

① Count of each Itemset (C<sub>i</sub>) by scanning the database

Itemset	Count
{A}	4
{B}	4
{C}	2
{D}	3
{E}	2
{K}	1

- ② Prune step ( $L_1$ ) :-  $C_1$  shows that Item set  $\{C\}$ ,  $\{E\}$  &  $\{K\}$  does not meet the min sup

Itemset	Count
$\{A\}$	4
$\{B\}$	4
$\{D\}$	3

- ③ Join step ( $C_1$ ) :- from  $C_2$  from  $L_1 \bowtie L_1$  and find out their occurrence

Itemset	Count
$\{A, B\}$	4
$\{A, D\}$	3
$\{B, D\}$	3

- ④ Prune step ( $L_2$ ) :-  $C_2$  shows that all Itemset does not meet the min-sup

Itemset	Count
$\{A, B\}$	4
$\{A, D\}$	3
$\{B, D\}$	3

- ⑤ Join step ( $C_3$ ) :- from  $C_3$  from  $L_2 \bowtie L_2$  and find out their occurrence

Itemset	Count
$\{A, B, D\}$	3

Thus  $\{A, B, D\}$  is frequent.

⑥ Generate Association Rule:-

From frequent itemset discovered above,  
the association could be:-

$$\bullet \{A, B\} \rightarrow \{D\}$$

$$\begin{aligned} \text{confidence} &= \frac{\text{support } \{A, B, D\}}{\text{support } \{A, B\}} \\ &= \left(\frac{3}{4}\right) \times 100 \\ &= 75\% \end{aligned}$$

$$\bullet \{A, D\} \rightarrow \{B\}$$

$$\begin{aligned} \text{confidence} &= \frac{\text{support } \{A, B, D\}}{\text{support } \{A, D\}} \\ &= \left(\frac{3}{3}\right) \times 100 \\ &= 100\% \end{aligned}$$

$$\bullet \{B, D\} \rightarrow \{A\}$$

$$\begin{aligned} \text{confidence} &= \frac{\text{support } \{A, B, D\}}{\text{support } \{B, D\}} \\ &= \left(\frac{3}{3}\right) \times 100 \\ &= 100\% \end{aligned}$$

$$\bullet \{A\} \rightarrow \{B, D\}$$

$$\begin{aligned} \text{confidence} &= \frac{\text{support } \{A, B, D\}}{\text{support } \{A\}} \\ &= \left(\frac{3}{4}\right) \times 100 \\ &= 75\% \end{aligned}$$

$$\bullet \{B\} \rightarrow \{A, D\}$$

$$\begin{aligned} \text{confidence} &= \frac{\text{support } \{A, B, D\}}{\text{support } \{B\}} \\ &= \left(\frac{3}{4}\right) \times 100 \\ &= 75\% \end{aligned}$$



$$\{D\} \rightarrow \{A, B\}$$

$$\text{confidence} = \frac{\text{support } \{A, B, D\}}{\text{support } \{D\}}$$

$$= \frac{(3/3)}{3} \times 100$$

$$= 100\%$$

So if maximum confidence is 80%, then  $\{A, D\} \rightarrow \{B\}$ ,  $\{B, D\} \rightarrow \{A\}$  and  $\{D\} \rightarrow \{A, B\}$  can be considered as strong association rules.

Q2) Generate frequent pattern from the following transaction with 30%.

Transaction ID	Items
T <sub>1</sub>	E, A, D, B
T <sub>2</sub>	D, A, C, E, B
T <sub>3</sub>	C, A, B, E
T <sub>4</sub>	B, A, D
T <sub>5</sub>	D
T <sub>6</sub>	D, B
T <sub>7</sub>	A, D, E
T <sub>8</sub>	B, C

Sol

$$\text{Sup - count} = 8 \times 30\% = 8 \times 0.3 = 2.4$$

$$\text{Sup - count} = 2.4$$

Step 1: Scan the database for count in each dataset

Item set	Sup. count
A	5
B	6
C	3
D	6
E	4

Step 2:- Sort the set of frequency itemset in the order of descending support order.

Item set	Sup. count
B	6
D	6
A	5
E	4
C	3

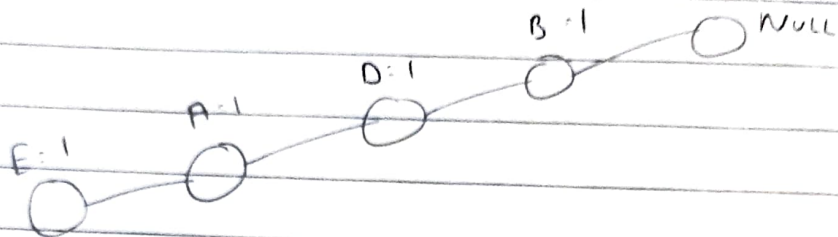
Step 3: Scan for 2<sup>nd</sup> time, sort acc to descending

Transaction ID	Item bought
T <sub>1</sub>	{B, D, A, E}
T <sub>2</sub>	{B, D, A, E, C}
T <sub>3</sub>	{B, A, E, C}
T <sub>4</sub>	{D}
T <sub>5</sub>	{B, B}
T <sub>6</sub>	{D}
T <sub>7</sub>	{D, A, E}
T <sub>8</sub>	{B, C}

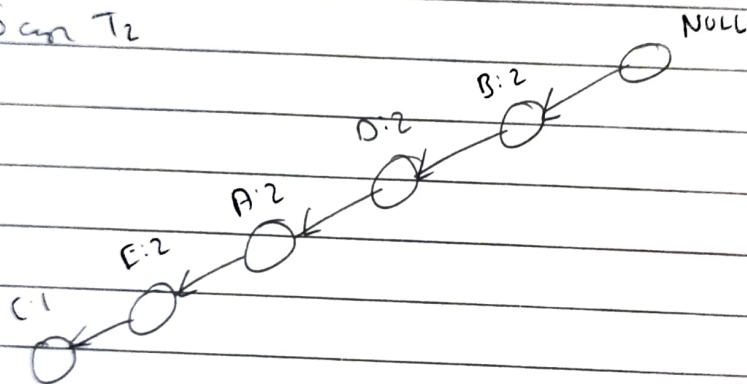
## Step 4: Construct of Frequent Pattern Tree

4.1 Create a root node with label null (0<sup>new</sup>)

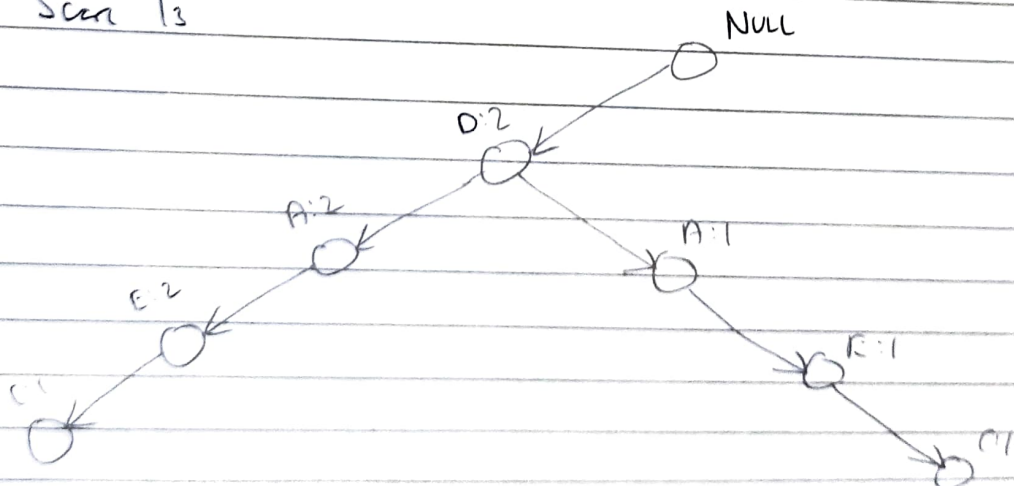
4.2 Scan  $T_1$



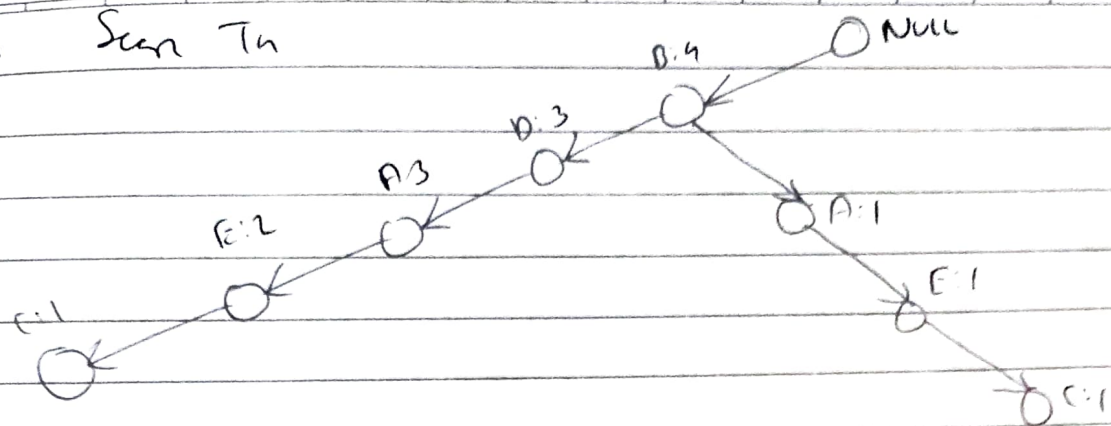
4.3 Scan  $T_2$



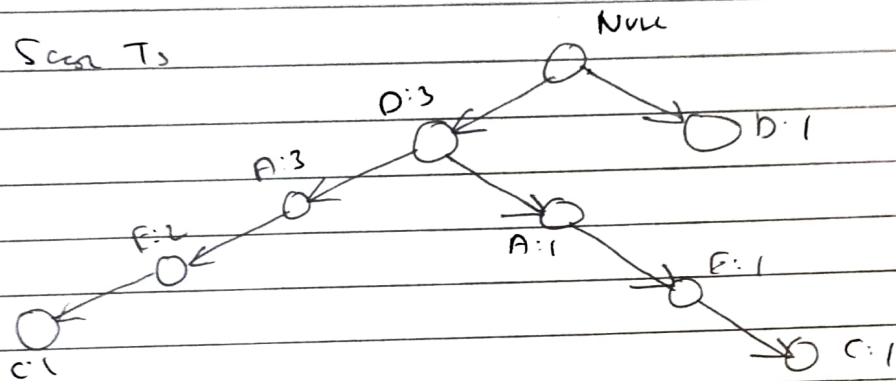
4.4 Scan  $T_3$



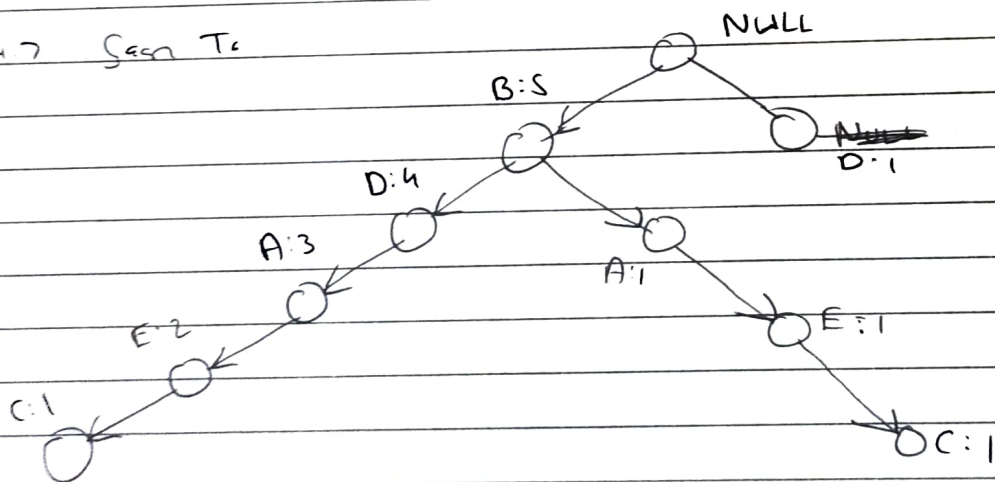
4.5 Scan Tn



4.6 Scan T3

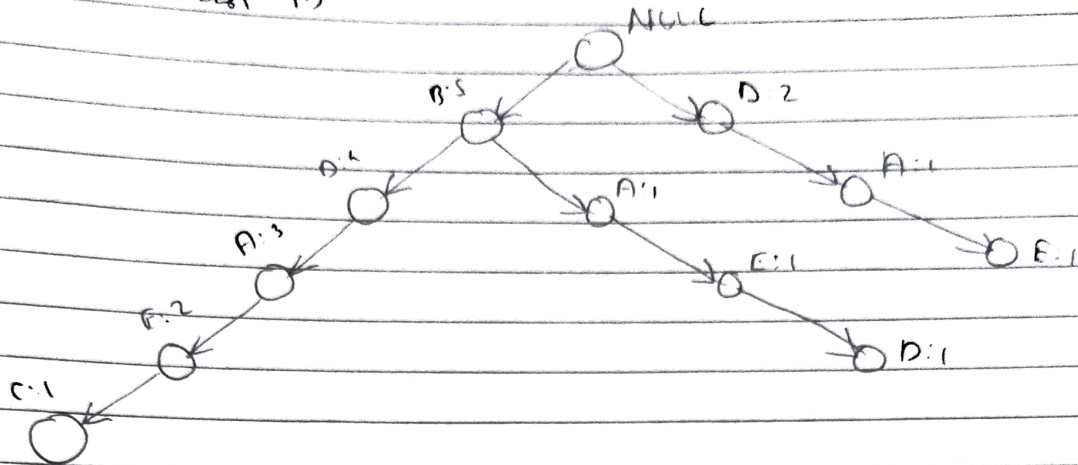


4.7 Scan T6





Q.7 Scan T<sub>2</sub>



Q.8 Scan T<sub>8</sub>

