Association Rules Mining

Association rule mining can be viewed as a two-step process:-

- Find all frequent item sets
    1. Apriori Method
    2. FP-Growth
- Generate strong association rules from the frequent item sets
    1. Must Satisfy min support
    2. Must satisfy min confidence

Apriori Algorithm in Data Mining

Minimum Support = 30%

Threshold Confidence = 80%

Transaction ID (TID)	Items
100	1 3 4
200	2 3 5
300	1 2 3 5
400	2 5

Step 1:

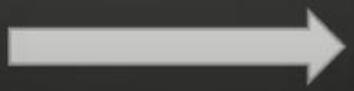
Items	Support
1	2/4 = 50%
2	3/4 = 75%
3	3/4 = 75%
4	1/4 = 25%
5	3/4 = 75%

So, Item set = {1, 2, 3, 5}

Step 2:

Item set	Support
{1,2}	1/4 = 25%
{1,3}	2/4 = 50%
{1,5}	1/4 = 25%
{2,3}	2/4 = 50%
{2,5}	3/4 = 75%
{3,5}	2/4 = 50%

Transaction ID (TID)	Items
100	1 3 4
200	2 3 5
300	1 2 3 5
400	2 5



Step 2:

Item set	Support
{1,3}	2/4 = 50%
{2,3}	2/4 = 50%
{2,5}	3/4 = 75%
{3,5}	2/4 = 50%

Step 2:

Item set	Support
{1,3}	2/4 = 50%
{2,3}	2/4 = 50%
{2,5}	3/4 = 75%
{3,5}	2/4 = 50%

Transaction ID (TID)	Items
100	1 3 4
200	2 3 5
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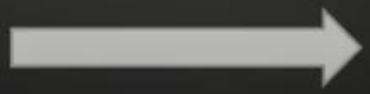

Step 3:

Item set	Support
{1,3,5}	1/4 = 25%
{2,3,5}	2/4 = 50%
{1,2,3}	1/4 =25%

Final Item Set: {2,3,5}

Step 4:

Rules	Support
(2 , 3) → 5	2
(3 , 5) → 2	2
(2 , 5) → 3	2
3 → (2 , 5)	2
2 → (3 , 5)	2
5 → (2 , 3)	2

Transaction ID (TID)	Items
100	1 3 4
200	2 3 5
300	1 2 3 5
400	2 5

Step 3:

Item set	Support
{1,3,5}	1/4 = 25%
{2,3,5}	2/4 = 50%
{1,2,3}	1/4 =25%

Final Item Set: {2,3,5}

Step 4:

Rules	Support
(2 , 3) → 5	2
(3 , 5) → 2	2
(2 , 5) → 3	2
3 → (2 , 5)	2
2 → (3 , 5)	2
5 → (2 , 3)	2

Step 2:

Item set	Support
{1,3}	2/4 = 50%
{2,3}	2/4 = 50%
{2,5}	3/4 = 75%
{3,5}	2/4 = 50%

Confidence (A → B) = Support(A U B) / Support(A)

So,

(2 , 3) → 5 = S((2 , 3) U 5) / S(2 , 3)
= 2 / 2
= 100%

(3 , 5) → 2 = S(3 , 5) U 2) / S(3 , 5)
= 2 / 2
= 100%

(2 , 5) → 3 = S((2 , 5) U 3) / S(2 , 5)
= 2 / 3
= 67%

3 → (2 , 5) = S(3 U (2 , 5)) / S(3)
= 2/ 3
= 67%

2 → (3 , 5) = S(2 U (3 , 5)) / S(2)
= 2 / 3
= 67%

5 → (2 ,3) = S(5 → (2 ,3)) / S(5)
= 2/3
= 67%

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Step 4:

Rules	Support
(2 , 3) → 5	2
(3 , 5) → 2	2
(2 , 5) → 3	2
3 → (2 , 5)	2
2 → (3 , 5)	2
5 → (2 , 3)	2

Minimum Support = 30%

Threshold Confidence = 80%

Transaction ID (TID)	Items
100	1 3 4
200	2 3 5
300	1 2 3 5
400	2 5

Step 5:

Rules	Support	Confidence
(2 , 3) → 5	2	2/2 = 100%
(3 , 5) → 2	2	2/2 = 100%
(2 , 5) → 3	2	2/3 = 67%
3 → (2 , 5)	2	2/3 = 67%
2 → (3 , 5)	2	2/3 = 67%
5 → (2 , 3)	2	2/3 = 67%

After compare with threshold confidence (80%):

Final rules are, (2 ,3) → 5 & (3 ,5) → 2