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**Cloud Computing for Data Analysis**

**Exercise 07 : Association Rules using Apriori algorithm**

6.Consider the market basket transactions shown in Table 6.2.

(a) What is the maximum number of association rules that can be extracted

from this data (including rules that have zero support)?

(b) What is the maximum size of frequent itemsets that can be extracted

(assuming *minsup >* 0)?

(c) Write an expression for the maximum number of size-3 itemsets that

can be derived from this data set.

(d) Find an itemset (of size 2 or larger) that has the largest support.

(e) Find a pair of items, a and b, such that the rules {a} → {b} and {b} → {a} have the same confidence.

Transaction ID

Items Bought

1

{Milk, Beer, Diapers}

2

{Bread, Butter, Milk}

3

{Milk, Diapers, Cookies}

4

{Bread, Butter, Cookies}

5

{Beer, Cookies, Diapers}

6

{Milk, Diapers, Bread, Butter}

7

{Bread, Butter, Diapers}

8

{Beer, Diapers}

9

{Milk, Diapers, Bread, Butter}

10

{Beer, Cookies}

ANSWERS:

(a) What is the maximum number of association rules that can be extracted

from this data (including rules that have zero support)?

Ans: We have six unique items.

1.Milk

2.Beer

3.Diapers

4.Cookies

5.Bread

6.Butter

Total number of itemsets = 2^d. Here d=6

So, the total number of association rules = (3^d)-(2^(d+1))+1

= (3^6)-(2^7)+1

= 602

b) What is the maximum size of frequent itemsets that can be extracted

(assuming *minsup >* 0)?

Ans: The itemset {Milk, Diapers, Bread, Butter} is the biggest item set and frequency=2.

c) Write an expression for the maximum number of size-3 itemsets that

can be derived from this data set.

Ans: The maximum number of size 3 itemsets that can be derived is 6C3= 20

d) Find an itemset (of size 2 or larger) that has the largest support.

Ans: The itemset (Bread,Butter) has the largest support which is 5.

(e) Find a pair of items, a and b, such that the rules {a} → {b} and {b} → {a} have the same confidence.

Ans:

conf(A-&gt;B) = sup((A,B))/sup((A))

conf(Bread→Butter)=sup(Bread,Butter})/sup(Bread)=5/5=1and

conf(Butter →Bread) = sup(Bread, Butter)/sup(Butter) = 5/5 = 1

conf(Milk→Butter)=sup(Milk,Butter})/sup(Milk)=3/5and

conf(Butter →Milk) = sup(Milk, Butter)/sup(Butter) = 3/5

conf(Beer→Cookies)=sup(Beer,Cookies})/sup(Beer)=2/4=1/2and

conf(Cookies →Beer) = sup(Cookies, Beer)/sup(Cookies) = 2/4=1/2

Therefore, the pair of items having same confidence are Bread and Butter, Milk

and butter, Beer and cookies.