APPLICATION
OF
APRIORI IN DATA MINING
ON
TOWN YOUNGSTERS’ DATA

: Apriori in Data Mining - Theory Introduction :

In computer science and data mining, **Apriori** is a classic algorithm for learning association rules. Apriori is designed to operate on databases containing transactions (for example, collections of items bought by customers, or details of a website frequentation).

As is common in association rule mining, given a set of *itemsets* (for instance, sets of retail transactions, each listing individual items purchased), the algorithm attempts to find subsets which are common to at least a minimum number C (the cutoff, or confidence threshold) of the itemsets. Apriori uses a "bottom up" approach, where frequent subsets are extended one item at a time (a step known as *candidate generation*), and groups of candidates are tested against the data. The algorithm terminates when no further successful extensions are found.

[http://en.wikipedia.org/wiki/Apriori_algorithm]

: MY FOCUS :

GENERATING ASSOSIATION RULES,

SUCH AS

The case where a MALE youngster having Computer, does have Internet too, is supported by data observations with so percentage.

The case where a Female youngster having Car, does have Computer too, is supported by data observations with so percentage.

One result, from algorithm will make you understand better as follow,

“The case where any youngster having Internet, does have Computer too, is supported by data observation with almost 100%. And this is quite obvious. Right!”

Confidence is defined as the measure of certainty or trustworthiness associated with each discovered pattern

$$\text{Confidence(A->B)} = \frac{\text{Number of tuples containing both A and B}}{\text{Number of Tuples containing A}}$$

SUPPORT:

The support of an association pattern is the percentage of task relevant data transactions for which the pattern is true.

$$\text{Support(A->B)} = \frac{\text{Number of tuples containing both A and B}}{\text{Total Number of Tuples.}}$$

Number of tuples containing A is also sometimes called support count of A.

:Steps in brief:

A) Choosing target attributes and based on specific criteria generalize the original table into 0 and 1s as data.
B) Decide what will be your minimum_support and minimum_confidence. Apply the apriori algorithm.
C) Conclusion/What we mined.

(A – MALE PROCESSING)

Choosing target attribute and based on specific criteria generalize the original table into 0 and 1s as data.

Key attributes - Metadata of table under process:

“Town Youngsters’ Info" (Selected Columns only)

ATTRIBUTE	ATTRIBUTE DESCRIPTION
Gender	Gender M-Male F-Female
M Phone	M Phone
Computer	1 means having , 0 means not
Internet	1 means having , 0 means not
Cars	Blank means not having car, any number otherwise.

Now, As apriori algorithm requires input table in 0 an 1 form of data.

Using either update in SQL or excel if function,

:PROCESSING FOR MALES:

Gender, 1 if Male, 0 if Female
Cars, 1 if 1 or more cars, 0 if blank.

```
SQL> desc town_youngsters;
 Name                                      Null?    Type
 ----------------------------------------- --------
----------------------------
 I1                                                 NUMBER
 I2                                                 NUMBER
 I3                                                 NUMBER
 I4                                                 NUMBER
 I5                                                 NUMBER

SQL> @ datamale;
```

```
1 row created.
1 row created…..

SQL> select * from Town_youngsters;

        I1         I2         I3         I4         I5
---------- ---------- ---------- ---------- ----------
         1          1          1          1          1
         1          0          1          1          1
         1          0          0          0          0
         0          1          1          1          0
         1          0          1          1          1
         0          0          1          1          0
         0          0          0          0          1
         0          0          1          1          0
         0          1          1          1          1
         1          0          1          1          0
         0          0          1          0          0
         0          0          1          0          0
         1          1          0          0          1
         0          0          1          1          0
         1          0          1          1          0
         0          1          1          1          1
         1          0          1          1          1
         1          0          1          0          1
         0          0          1          1          1
         1          0          1          0          0
         0          0          1          0          0
         1          0          1          1          1

         0          0          1          0          0
         1          0          1          1          0
         1          1          1          0          1
         1          0          1          0          0
         0          1          1          1          1
         0          1          0          0          1
         1          0          0          0          0
         1          0          0          0          0
         1          0          1          0          0
         0          0          1          1          1
         1          0          1          1          0
         1          1          1          1          1
         1          0          1          1          1
         1          1          1          1          0
         0          0          1          0          0
         1          0          1          0          0
         1          0          0          0          0
         1          1          1          0          1
         0          0          1          1          1
         1          0          1          1          0
         0          1          1          1          1
         0          1          1          1          0
         0          0          1          1          1
         1          0          1          1          0
         1          0          1          0          1
```

1	0	1	1	0
1	0	1	1	1
0	0	1	1	0
0	1	1	1	1
1	0	1	1	1
0	0	1	0	0
0	0	1	0	1
1	1	1	1	1
1	0	1	0	1
0	1	1	1	0
1	0	1	1	1
1	0	1	1	0
0	0	1	1	1
0	0	1	1	1
0	1	1	1	0
1	0	1	1	0
0	0	1	0	0
1	1	0	0	0
1	1	1	1	1
0	1	1	1	1
0	1	1	0	0
0	1	1	0	1
1	1	1	1	0
1	0	1	0	1
0	1	1	1	1
0	0	1	0	0
1	0	1	0	1
1	0	1	1	1
1	0	0	0	0
0	1	1	0	1
0	1	0	0	0
0	0	1	1	1
1	0	1	1	1
0	0	1	0	0
1	0	1	0	0
1	1	1	1	0
0	1	1	1	1
0	0	1	0	0
1	1	1	1	1
1	0	1	1	1
0	0	1	0	0
1	0	1	1	1
0	0	1	0	0
0	1	1	1	1
0	1	1	1	1
0	1	1	1	1
1	1	1	0	1
0	1	1	0	1
1	0	1	0	1
1	1	1	1	1
1	1	1	1	1
0	0	1	1	1
0	1	1	0	1
1	1	1	1	1
0	0	1	0	0
1	1	1	1	1
0	0	1	0	0

```
         0          0          1          1          1
         0          0          1          0          0
         1          0          1          0          0
         1          0          0          0          0
         0          1          1          1          1
         0          1          1          1          0
         1          0          1          1          0
         1          1          1          1          1
         1          0          1          0          1
         0          1          1          1          0
         0          0          1          0          1
         0          1          0          0          1
         0          1          1          1          1
         1          0          1          1          0
         1          1          1          1          1
         0          1          1          1          1
         0          1          1          1          1
         0          0          0          0          0
         0          0          1          0          1
         0          1          1          0          0
         1          0          1          0          0
         1          1          1          1          1
         0          0          1          1          1
         0          0          1          1          0
         0          0          1          1          0
         0          1          0          0          1
         1          1          1          1          0
         1          1          1          0          1
         1          1          1          1          1
         0          0          0          0          1
         1          0          1          0          1
         0          1          1          0          1
         1          0          1          0          0
         0          0          1          1          0
         1          0          1          0          0
         1          0          1          1          1
         0          0          1          1          0
         0          1          1          1          0
         1          1          1          1          1
         1          0          1          1          0
         0          1          1          1          0
         0          1          1          0          1
         1          1          1          1          1
         0          1          1          0          1
         1          1          0          0          1
         1          0          1          1          1

150 rows selected.
```

Sample Input/Output:

```
SQL> @algo;
Enter value for minimum_support: 0.8
Enter value for minimum_confidence: 0.8
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.7
Enter value for minimum_confidence: 0.7
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.6
Enter value for minimum_confidence: 0.6
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0

PL/SQL procedure successfully completed.
```

Above indicate that for selected minimum_support and minimum_confidence there are no characteristic rules generated.

```
SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.4
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
```

```
NO. OF TUPLES IN III 0
I1 -> I3   Support:.44   Confidence:.88
I3 -> I1   Support:.44   Confidence:.49
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.
```

```
SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.5
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.44   Confidence:.88
xxx
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @ algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.4
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.


SQL> @ algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.5
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 00.4
Enter value for minimum_confidence: 0.6
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.44   Confidence:.88
xxx
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.6
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
```

```
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.



SQL> @algo;
Enter value for minimum_support: 0.6
Enter value for minimum_confidence: 0.6
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0

PL/SQL procedure successfully completed



SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.7
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.44   Confidence:.88
xxx
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.
```

```
SQL> @algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.7
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.
```

:PROCESSING FOR FEMALES:

Gender, 1 if FeMale, 0 if male
Cars, 1 if 1 or more cars, 0 if blank.

```
SQL> desc town_youngsters;
 Name                                      Null?    Type
 ----------------------------------------- --------
----------------------------
 I1                                                 NUMBER
 I2                                                 NUMBER
 I3                                                 NUMBER
 I4                                                 NUMBER
 I5                                                 NUMBER

SQL> @ datafemale;

1 row created.
1 row created…..

select * from town_youngsters;

        I1         I2         I3         I4         I5
---------- ---------- ---------- ---------- ----------
         0          1          1          1          1
         0          0          1          1          1
```

```
0           0           0           0           0
1           1           1           1           0
0           0           1           1           1
1           0           1           1           0
1           0           0           0           1
1           0           1           1           0
1           1           1           1           1
0           0           1           1           0
1           0           1           0           0
1           0           1           0           0
0           1           0           0           1
1           0           1           1           0
0           0           1           1           0
1           1           1           1           1
0           0           1           1           1
0           0           1           0           1
1           0           1           1           1
0           0           1           0           0
1           0           1           0           0
0           0           1           1           1
1           0           1           0           0
0           0           1           1           0
0           1           1           0           1
0           0           1           0           0
1           1           1           1           1
1           1           0           0           1
0           0           0           0           0
0           0           0           0           0
0           0           1           0           0
1           0           1           1           1
0           0           1           1           0
0           1           1           1           1
0           0           1           1           1
0           1           1           1           0
1           0           1           0           0
0           0           1           0           0
0           0           0           0           0
0           1           1           0           1
1           0           1           1           1
0           0           1           1           0
1           1           1           1           1
1           1           1           1           0
1           0           1           1           1
0           0           1           1           0
0           0           1           0           1
0           0           1           1           0
0           0           1           1           1
1           0           1           1           0
1           1           1           1           1
0           0           1           1           1
1           0           1           0           0
1           0           1           0           1
0           1           1           1           1
0           0           1           0           1
1           1           1           1           0
0           0           1           1           1
0           0           1           1           0
```

1	0	1	1	1
1	0	1	1	1
1	1	1	1	0
0	0	1	1	0
1	0	1	0	0
0	1	0	0	0
0	1	1	1	1
1	1	1	1	1
1	1	1	0	0
1	1	1	0	1
0	1	1	1	0
0	0	1	0	1
1	1	1	1	1
1	0	1	0	0
0	0	1	0	1
0	0	1	1	1
0	0	0	0	0
1	1	1	0	1
1	1	0	0	0
1	0	1	1	1
0	0	1	1	1
1	0	1	0	0
0	0	1	0	0
0	1	1	1	0
1	1	1	1	1
1	0	1	0	0
0	1	1	1	1
0	0	1	1	1
1	0	1	0	0
0	0	1	1	1
1	0	1	0	0
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
0	1	1	0	1
1	1	1	0	1
0	0	1	0	1
0	1	1	1	1
0	1	1	1	1
1	0	1	1	1
1	1	1	0	1
0	1	1	1	1
1	0	1	0	0
0	1	1	1	1
1	0	1	0	0
1	0	1	1	1
1	0	1	0	0
0	0	1	0	0
0	0	0	0	0
1	1	1	1	1
1	1	1	1	0
0	0	1	1	0
0	1	1	1	1
0	0	1	0	1
1	1	1	1	0
1	0	1	0	1
1	1	0	0	1

```
         1          1          1          1          1
         0          0          1          1          0
         0          1          1          1          1
         1          1          1          1          1
         1          1          1          1          1
         1          0          0          0          0
         1          0          1          0          1
         1          1          1          0          0
         0          0          1          0          0
         0          1          1          1          1
         1          0          1          1          1
         1          0          1          1          0
         1          0          1          1          0
         1          1          0          0          1
         0          1          1          1          0
         0          1          1          0          1
         0          1          1          1          1
         1          0          0          0          1
         0          0          1          0          1
         1          1          1          0          1
         0          0          1          0          0
         1          0          1          1          0
         0          0          1          0          0
         0          0          1          1          1
         1          0          1          1          0
         1          1          1          1          0
         0          1          1          1          1
         0          0          1          1          0
         1          1          1          1          0
         1          1          1          0          1
         0          1          1          1          1
         1          1          1          0          1
         0          1          0          0          1
         0          0          1          1          1

150 rows selected.



SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.5
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
```

```
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.45   Confidence:.9
I3 -> I1   Support:.45   Confidence:.5
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.



SQL> @algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.5
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
I3 -> I5   Support:.5   Confidence:.56
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.6
Enter value for minimum_confidence: 0.5
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0
```

```
PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.6
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.45   Confidence:.9
xxx
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.7
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
```

```
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.45   Confidence:.9
xxx
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.8
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I1 -> I3   Support:.45   Confidence:.9
xxx
xxx
```

```
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 0.9
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
xxx
xxx
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.4
Enter value for minimum_confidence: 1
the item is not removed. I1
the item is not removed. I2
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 2
The items is not removed. 1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
ITEM REMOVED.2 3
ITEM REMOVED.2 4
ITEM REMOVED.2 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 3
ITEM REMOVED.1 2 3
ITEM REMOVED.1 2 4
ITEM REMOVED.1 2 5
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.2 3 4
ITEM REMOVED.2 3 5
ITEM REMOVED.2 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
xxx
xxx
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
xxx

PL/SQL procedure successfully completed.


SQL> @algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.6
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
I3 -> I4   Support:.57   Confidence:.64
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.5
Enter value for minimum_confidence: 0.7
the item is not removed. I1
the item is not removed. I3
the item is not removed. I4
the item is not removed. I5
ITEM REMOVED.1 3
ITEM REMOVED.1 4
ITEM REMOVED.1 5
The items is not removed. 3 4
The items is not removed. 3 5
ITEM REMOVED.4 5
NO. OF TUPLES IN II 2
ITEM REMOVED.1 3 4
ITEM REMOVED.1 3 5
ITEM REMOVED.1 4 5
ITEM REMOVED.3 4 5
NO. OF TUPLES IN III 0
xxx
I4 -> I3   Support:.57   Confidence:1
xxx
I5 -> I3   Support:.5   Confidence:.91

PL/SQL procedure successfully completed.

SQL> @algo;
Enter value for minimum_support: 0.6
Enter value for minimum_confidence: 0.6
the item is not removed. I3
NO. OF TUPLES IN II 0
NO. OF TUPLES IN III 0

PL/SQL procedure successfully completed.

SQL>
```

```
/* Following is the PL/SQL Code for Apriori Algorithm. It
is handling up to two levels of c to l transformation FOR
ANY INPUT DATABASE.
Replace the name of table as yours,
Initialize number_of_items to attribute of your table.
The input table must be only in the form of 0 and 1.
I1 stands for first attribute, I2 stands for second
attribute and so on in result.

*/
```

```
SQL> ed
Wrote file afiedt.buf

  DECLARE
   TYPE cursor_type IS REF CURSOR;
   LOOP_COUNTER NUMBER:=1;
   NUMBER_OF_ITEMS NUMBER:=5;
```

```
 ii_CURSOR cursor_type;
 iii_CURSOR cursor_type;
 a NUMBER;
 B NUMBER;
 C NUMBER;
 VAL NUMBER;
 str char(5);
 query varchar2(100);
 total_transactions number;
 supportF float;
 VAL_A float;
 VAL_B float;
 val_AANDB float;
 CONFIDENCE_aTOB float;
 CONFIDENCE_BTOA float;
 Support float;
 minimum_support float;
 minimum_confidence float;
BEGIN
  --EXECUTE IMMEDIATE 'DROP TABLE I1';
  EXECUTE IMMEDIATE 'CREATE TABLE  I1 (ITEMID NUMBER)';
  LOOP
   query:='INSERT INTO I1 VALUES ('||to_char(LOOP_COUNTER)||')';
   execute immediate query;
   LOOP_COUNTER:=LOOP_COUNTER+1;
   EXIT WHEN LOOP_COUNTER>NUMBER_OF_ITEMS;
  END LOOP;
  minimum_support:=&minimum_support;
 minimum_confidence:=&minimum_confidence;
  select count(*) into total_transactions from Town_Youngsters;
  LOOP_COUNTER:=1;
  LOOP
   --find occurances of item in Town_Youngsters
   str:='I'||to_char(LOOP_COUNTER);
   query:='select count(*) from Town_Youngsters where '||str||'='||1;
   execute immediate query into val;
   --find support
   support := (val / trunc(total_transactions,2));
   --remove items if having support less than minimum.
   IF support<minimum_support THEN
           query:='delete I1 where itemid='||to_char(loop_counter);
           execute immediate query;
   ELSE
           dbms_output.put_line(' the item is not removed. '||str);
   END IF;
   loop_counter:=loop_counter+1;
   exit when loop_counter>number_of_items;
  END LOOP;
  --Here somewhere a loop for all LLL should start...
  EXECUTE IMMEDIATE 'CREATE TABLE II(ITEMID1 NUMBER, ITEMID2 NUMBER)';
  EXECUTE IMMEDIATE 'INSERT INTO II(ITEMID1, ITEMID2) SELECT M1.ITEMID
ITEMID1 , M2.ITEMID ITEM
  --EXECUTE IMMEDIATE 'COMMIT';
  --COMMIT;
  open ii_CURSOR for 'select * FROM II';
  LOOP
        FETCH ii_CURSOR INTO a, b;
        EXIT WHEN ii_CURSOR%NOTFOUND;
        query:='select count(*) from Town_Youngsters where I'||
to_char(a)||'=1 and I'||to_char(b)||
        execute immediate query into val;
        --find support
           support := (val / total_transactions);
```

```
         --remove items if having support less than minimum.
         IF support<minimum_support THEN
                 query:='delete ii where itemid1='||to_char(a)||' AND itemid2='||to_char(b);
                 execute immediate query;
                 dBMS_OUTPUT.PUT_LINE(' ITEM REMOVED.' ||A||' '||B);
         ELSE
                 dbms_output.put_line(' The items is not removed. '||a||' '||b);
         END IF;
 END LOOP;
  close ii_CURSOR;
EXECUTE IMMEDIATE 'SELECT COUNT(*) FROM II' INTO VAL;
dBMS_OUTPUT.PUT_LINE(' NO. OF TUPLES IN II '||VAL);
EXECUTE IMMEDIATE 'CREATE TABLE III(ITEMID1 NUMBER, ITEMID2 NUMBER, ITEMID3 NUMBER)';
EXECUTE IMMEDIATE 'INSERT INTO III(ITEMID1, ITEMID2, ITEMID3) SELECT M1.ITEMID ITEMID1 , M2.I
open iiI_CURSOR for 'select * FROM III';
LOOP
      FETCH iiI_CURSOR INTO a, b, C ;
      EXIT WHEN iiI_CURSOR%NOTFOUND;
      query:='select count(*) from Town_Youngsters where I'||to_char(a)||'=1 and I'||to_char(b)||
      execute immediate query into val;
      --find support
         support := (val / total_transactions);
         --remove items if having support less than minimum.
         IF support<minimum_support THEN
                 query:='delete iiI where itemid1='||to_char(a)||' AND itemid2='||to_char(b)||'AND ITEMID3='|
                 DBMS_OUTPUT.PUT_LINE(' ITEM REMOVED.' ||A||' '||B||' '||C);
                 execute immediate query;
         ELSE
                 dbms_output.put_line(' The items is not removed. '||a||' '||b||' '||C);
         END IF;
 END LOOP;
  CLOSE III_CURSOR;
   --EXECUTE IMMEDIATE 'DROP TABLE III';
  EXECUTE IMMEDIATE 'SELECT COUNT(*) FROM III' INTO VAL;
  dBMS_OUTPUT.PUT_LINE(' NO. OF TUPLES IN III '||VAL);
 --ACCORDINT TO MIN CONFIDENCE DO DISPLAY FINAL RESULTS.
open ii_CURSOR for 'select * FROM II';
LOOP
      FETCH ii_CURSOR INTO a, b;
      EXIT WHEN ii_CURSOR%NOTFOUND;
      query:='select count(*) from Town_Youngsters where I'||to_char(a)||'=1' ;
      execute immediate query into val_A;
      query:='select count(*) from Town_Youngsters where I'||to_char(B)||'=1' ;
      execute immediate query into val_B;
      query:='select count(*) from Town_Youngsters where I'||to_char(a)||'=1 and I'||to_char(b)||
      execute immediate query into val_AANDB;
      SupportF:= trunc( VAL_AANDB / total_transactions,2 );
      --find CONFIDENCE
         CONFIDENCE_ATOB := trunc(VAL_AANDB  / VAL_A ,2);
         CONFIDENCE_BTOA := trunc(VAL_AANDB / VAL_B ,2);
         --display items if having confidence greater than minimum.
         IF CONFIDENCE_ATOB > minimum_confidence THEN
```

```
118                     dBMS_OUTPUT.PUT_LINE('I'||A||' -> ' ||'I'||B||'
Support:'||SupportF||'   Confidence:'||con
119                     --dBMS_OUTPUT.PUT_LINE('I'||A||' -> ' ||'I'||B||'
Confidence:'||confidence_atob);
120             ELSE
121                     dbms_output.put_line('xxx');
122             end if;
123             IF CONFIDENCE_bTOa >= minimum_confidence THEN
124                     dBMS_OUTPUT.PUT_LINE('I'||b||' -> ' ||'I'||a||'
Support:'||SupportF||'   Confidence:'||con
125                     --dBMS_OUTPUT.PUT_LINE('I'||b||' -> ' ||'I'||a||'
Confidence:'||confidence_btoa);
126             ELSE
127                     dbms_output.put_line('xxx');
128             END IF;
129     END LOOP;
130      close ii_CURSOR;
131* END;
132
```

(C)
Conclusion/What we mined.

The following association rules are generated via different runs. Only superset is displayed here with support and confidence of the rule.
Meaning of I1 is Gender, I2 is HavingMobile,…

I1	I2	I3	I4	I5
Gender	M Phone	Computer	Internet	Cars

	Association Rule By Program	Support	Confidence	Meaning as per our table
PROCESSING FOR MALE	**I1 -> I3**	**44 %**	88 %	The case where a MALE youngster having Computer, is supported by data observations with 88 percentage.
	I3 -> I1	44 %	49%	The case where a some youngster having Computer, can be MALE is supported by data observations with 49 percentage.
	I3 -> I4	57 %	64 %	The case where a MALE youngster having Computer, does have Internet too, is supported by data observations with 64 percentage.
	I4 -> I3	57 %	100 %	The case where a MALE youngster having Internet, does have Computer too, is supported by data observations with 100 percentage.
	I3 -> I5	50%	56%	The case where a MALE youngster having Computer, does have Car too, is supported by data observations with 56 percentage.
	I5 -> I3	50%	91%	The case where a MALE youngster having Car, does

				have Computer too, is supported by data observations with 91 percentage.
PROCESSING FOR FEMALES	I1 -> I3	45 %	90%	The case where a FEMALE youngster having Computer, is supported by data observations with 90 percentage.
	I3 -> I1	45 %	50%	The case where a some youngster having Computer, can be FEMALE is supported by data observations with 50 percentage.
	I3 -> I4	57%	64%	The case where a FEMALE youngster having Computer, does have Internet too, is supported by data observations with 64 percentage.
	I4 -> I3	57%	100%	The case where a FEMALE youngster having Internet, does have Computer too, is supported by data observations with 100 percentage
	I3 -> I5	50%	56%	The case where a FEMALE youngster having Computer, does have Car too, is supported by data observations with 56 percentage.
	I5 -> I3	50%	91%	The case where a FEMALE youngster having Car, does have Computer too, is supported by data observations with 91 percentage

PL/SQL Work by Jigar M. Pandya