Data Mining Midterm Project

On

APRIORI ALGORITHM IMPLEMENTATION

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1. Introduction

Apriori is an algorithm for frequent item set mining and association rule learning over transactional databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database. The frequent item sets determined by Apriori can be used to determine association rules which highlight general trends in the database. This has applications in domains such as market basket analysis.

2. Description

The below mentioned is the standard description of an Apriori algorithm:

$$
\begin{aligned}
&\text{Apriori}(T, \epsilon) \\
&\quad L_1 \leftarrow \{\text{large } 1 - \text{itemsets}\} \\
&\quad k \leftarrow 2 \\
&\quad \textbf{while } L_{k-1} \neq \emptyset \\
&\qquad C_k \leftarrow \{a \cup \{b\} \mid a \in L_{k-1} \wedge b \notin a\} - \{c \mid \{s \mid s \subseteq c \wedge |s| = k-1\} \nsubseteq L_{k-1}\} \\
&\qquad \textbf{for } \text{transactions } t \in T \\
&\qquad\quad C_t \leftarrow \{c \mid c \in C_k \wedge c \subseteq t\} \\
&\qquad\quad \textbf{for } \text{candidates } c \in C_t \\
&\qquad\qquad count[c] \leftarrow count[c] + 1 \\
&\qquad L_k \leftarrow \{c \mid c \in C_k \wedge \ count[c] \geq \epsilon\} \\
&\qquad k \leftarrow k + 1 \\
&\quad \textbf{return } \bigcup_k L_k
\end{aligned}
$$

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.

3. Purpose

The purpose of this Project is to minimize the effort in hand doing the Apriori algorithm by implementing the Algorithm using known knowledge of Matlab. This helps in understanding how the algorithm can be applied to various transactions in real time and how the association rules are made.

4. Assumptions

- Database we are using is a simulated database of particular shopping websites.
- NJIT UCID already exists and has access to Oracle Database Server on prophet.njit.edu
  - For information on how gain access to Oracle visit
    http://ist.njit.edu/support/db/oracle.php

- VPN connection is established to NJIT VPN server webvpn.njit.edu using CISCO AnyConnect software.
    - If VPN client is not installed, check "Install and Connect to VPN Client" section in this document

- Aqua Data Studio was installed and activated.
    - For information how to download and activate ADS visit http://ist.njit.edu/software/download.php
    - If ADS is not activated, check "Activate ADS (Aqua Data Studio)" section in this document

5. Requirement

Requirements can be classified into Software requirement and Hardware requirement:

5.1. Software Requirement

Component	Requirement
Database	Aqua Data Studio 12.0
Front End	Matlab R2017a
Operating System	Windows 7,8,10 or Macinthosh

5.2 Hardware Requirement

Component	Requirement
Machine	Laptop or Desktop PC

6. Download required software

Download Matlab from the web here.
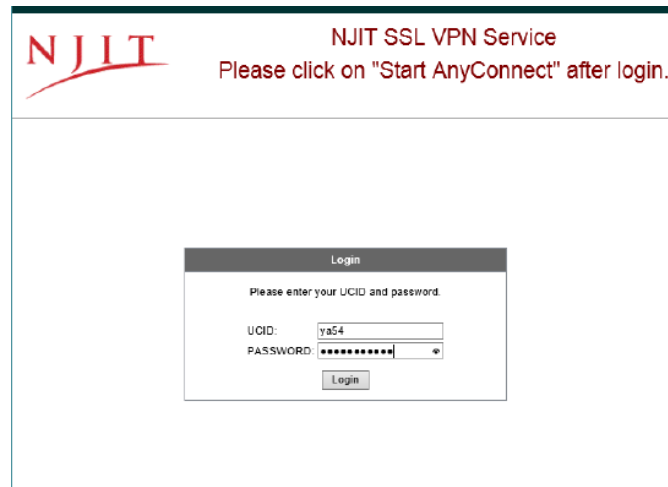
7. Install and connect to VPN client

VPN connection is required in order to access Oracle server on prophet.njit.edu. The connection can be client less that doesn't require client install. This connection is done through the web browser. Alternatively, if the web based, client less, connection failed, you may download and install the client to establish the connection.
Follow the instruction provided in this section to install and connect to the NJIT VPN server.

7.1.   Clientless Connection

1. Client-less connection is established through a web browser as follows 1) Point your browser of choice, FireFox or IE, to the following URL: http://webvpn.njit.edu
2. You will be prompted to enter your UCID and password:

3. Once you are logged in, the AnyConnect menu is found in the left side of the page.
NOTE: Take a minute to read the requirements to make sure your machine is complying.

4. Click on "Start AnyConnect" link to go to the download page to start establishing the connection.
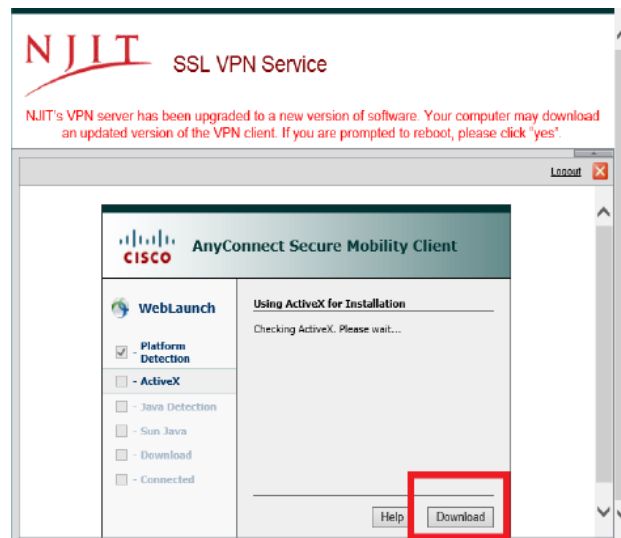
The connection will be established and a note in the Windows Tray will appear:
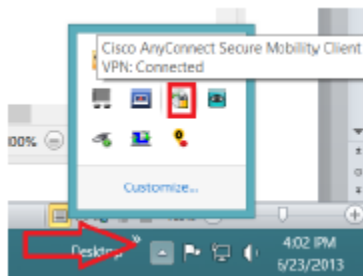
NOTE: If the client-less connection failed or you wish to install the client, follow the instruction in the next section.

7.2. Client Connection

Installing the VPN client is suitable for any following conditions:
1) The client-less, web-based (automatic) , connection failed in section 4.1
2) You are running Windows 8 Software
3) You want to use the installed client instead of the browser.
To download and install the client, follow the instructions:
1) You can directly download the client from this link:
http://ist.njit.edu/vpn/download.php.
Choose the suitable installer for your operating systems and save it in your machine.
NOTE: Windows 8 users should use Windows 7 64 bit installer
Alternatively, if you use Windows 8, you may follow the instruction in section "4.1
Client-Less Connection", wait until it fails, then Click on the link to automatically run the installer software.
2) Locate the installer software and double click to start the installation.
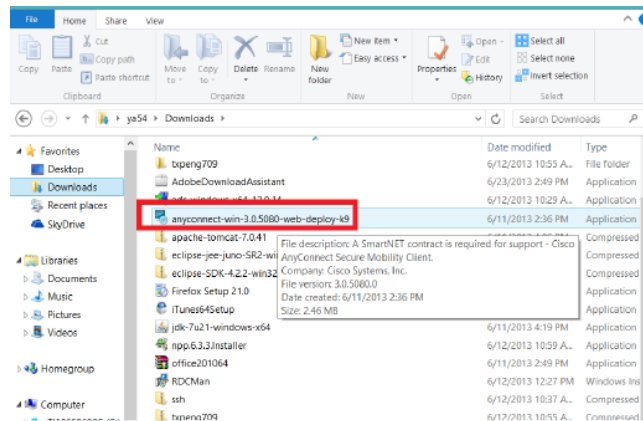
NOTE: You may be prompted to unzip the file, click on "unzip" to continue:
The installer will start, click next and follow the onscreen instruction

NOTE: when prompted, leave the default values.
4) The installer will finish

If there is a problem during the installation, you may contact NJIT tech support or for more information visit: http://ist.njit.edu/vpn/

7.3.   **Start VPN AnyConnect Client**

To start CICO AnyConnect Client:
1) Windows 7: Start -> All Programs -> Cicso -> Cisco AnyConnect Secure Mobility
2) Windows 8: Metro UI has a short cut icon:

3) Use Window try icon.

8. **Install and Activate ADS**

8.1. Add Your UCID to ADS Access List
Call Help Desk @ 973-596-2900.

You need to call help desk to add your UCID to the Activation list. You have to tell them that you need to be added to the Aqua Data Studio. If you don't do that, when you activate the software it will throw an error. Or if you run it with a user other than your UCID:

9
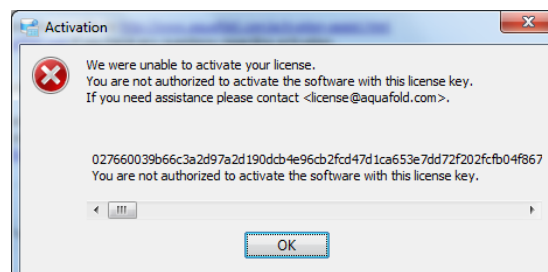
8.2. Install ADS

1) Visit the following site to download the software:
http://ist.njit.edu/software/display.php?id=559 Click on the "Download" button to start downloading the software
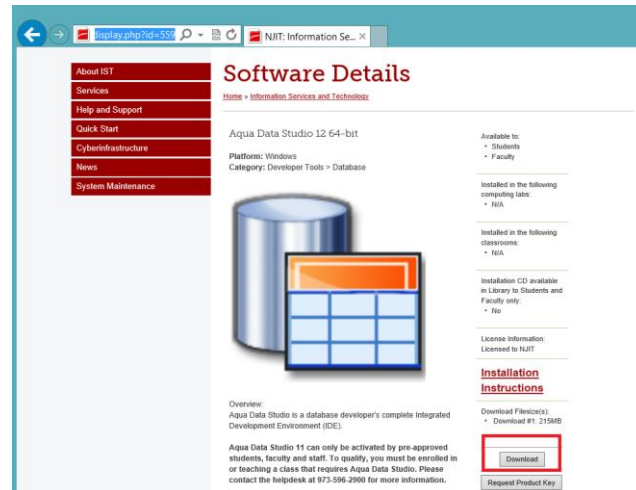
2) Locate the installer software
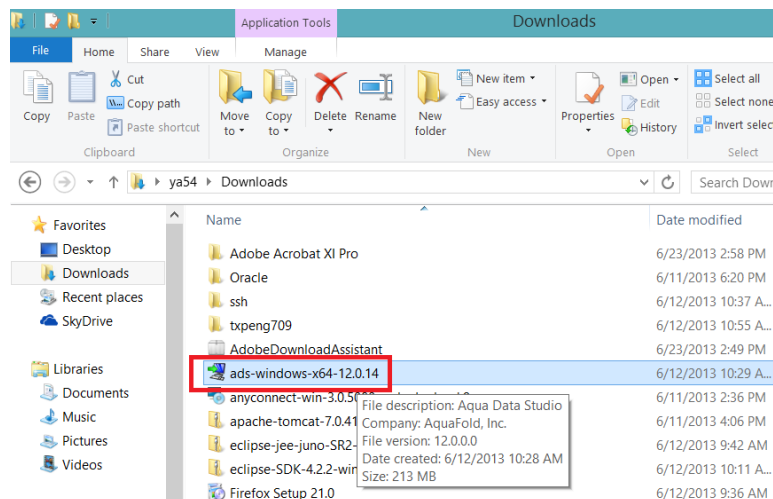
3) Double click the software package name to start the installer. Accept the language setting and license agreement, then choose the download directory
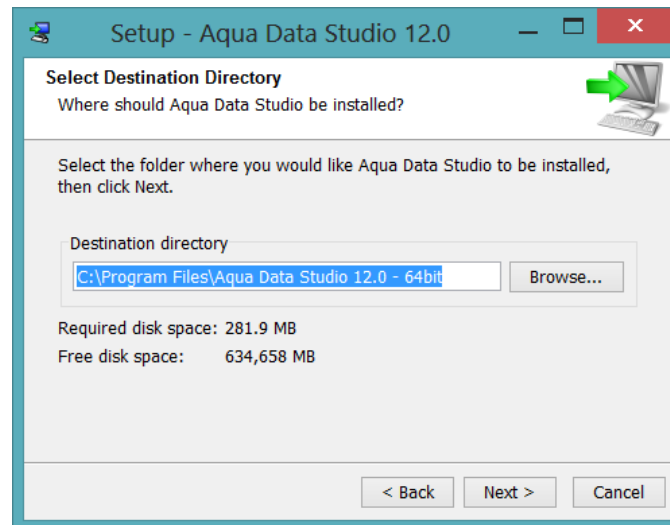
4) Follow the onscreen instruction to finish the installation

5) You will be prompted to activate the product. To do that, follow the instruction in the next section "5.2 Activate ADS".

8.3. Activate ADS

If ADS is not installed, follow the instruction in section "5.1 Install ADS" to install it before activating the software.

8.3.1. Create Local User

If the Windows user is not the same as your UCID, you must create a new user with the same name and administration permission.

You must create a user with very same name as your UCID and must be admin.

Windows 7:

Start -> Control Panel -> Add or Remove Users:

Windows 8:

In Metro UI type "Control Panel" ->

8.3.2. Request Product Key

To request a product visit the same download site and click on "Request Product Key". You will be prompted to enter your UCID and password.

http://ist.njit.edu/software/display.php?id=559
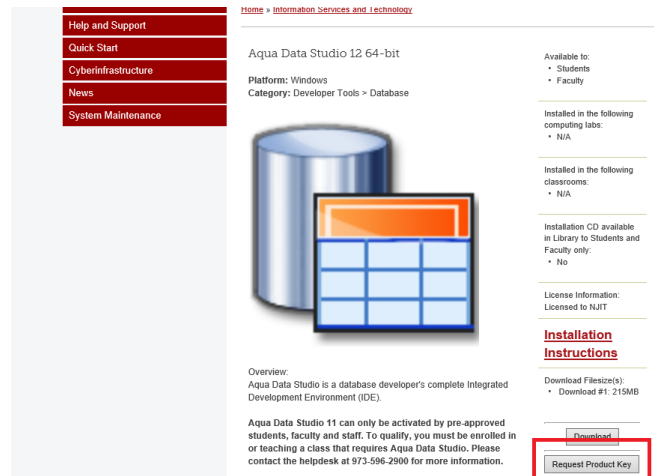
8.3.3. Activate Product Key

1) Start ADS, if it's not started already:

2) You will prompted to activate the license key:
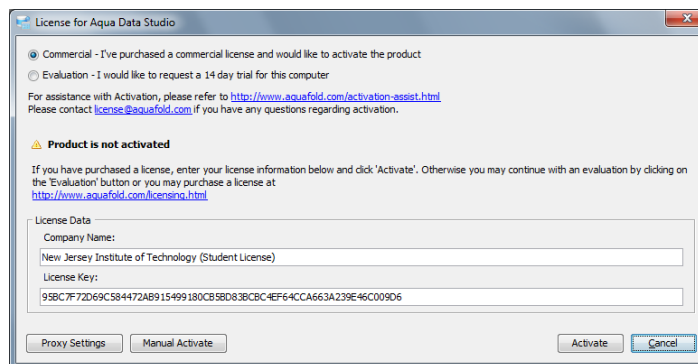
3) You must enter the exact words "**New Jersey Institute of Technology (Student License)"**

4) Click Activate button to send the data to the server.

9. Connect To Oracle Using ADS

9.1. Start ADS

ADS application is installed and located, by default, in "C:\Program Files\Aqua Data Studio 12.0 - 64bit\". To start it, run the command "C:\Program Files\Aqua Data Studio 12.0 - 64bit\datastudio.exe" or double click on the desktop shortcut:

NOTE: if you installed the software with a user other than your UCID , you must start it with "Start with different user option". To do that:
1) Locate the ADS icon on the desk top
2) Press Shift + right click mouse to bring the menu
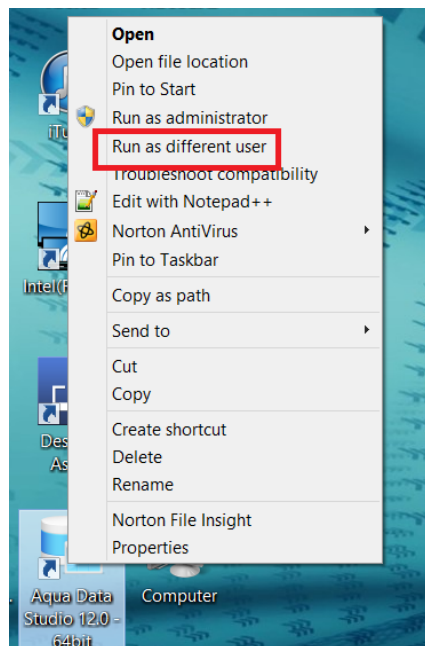
3) Enter your local UCID account and password
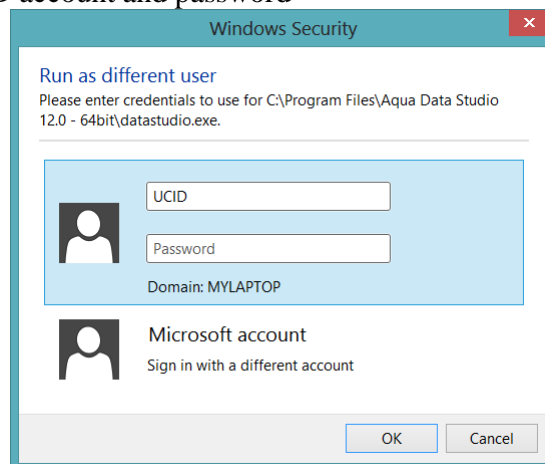
9.2. Register Oracle Server in ADS

CS 631 is using Oracle server running on prophet.njit.edu and SID COURSE.
After you start ADS application, register Oracle server as follows:
From the menu bar choose "Server" - > "Register Server"
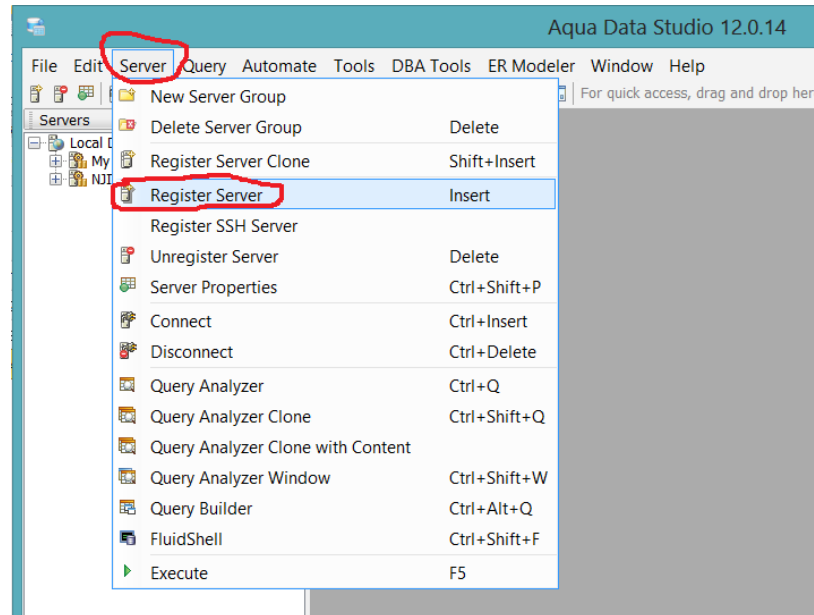
A new "Register Server" window will open. In this window, enter the following information:
- Make sure you are in the "General" tab
- Select "Oracle 9i/10g/11g in the left hand side selection.
- Name: <any name you want> ie NJIT Oracle On Prophet
- Type: keep default "Production" or anything else
- Login Name: <your UCID>, ie ya54
- Password: <your oracle password> ******
- Connect as: Normal
- Check "Save password" checkbox so that it connects automatically
- Host: prophet.njit.edu
- Port: 1521
- SID: course
- Click ok to save it
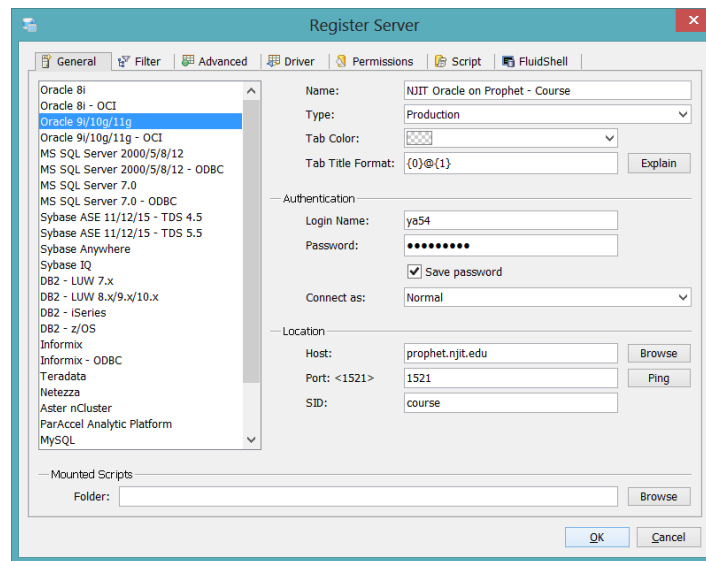
9.3. Start Query Analyzer in ADS.
The Query Analyzer is the command interface to execute SQL queries
After starting ADS:

      a) From the menu bar choose "Server" - > Query Analyzer.

      b) Or right click on the connection and choose "Query Analyzer"

The query analyzer will allow you to execute Oracle SQL commands:
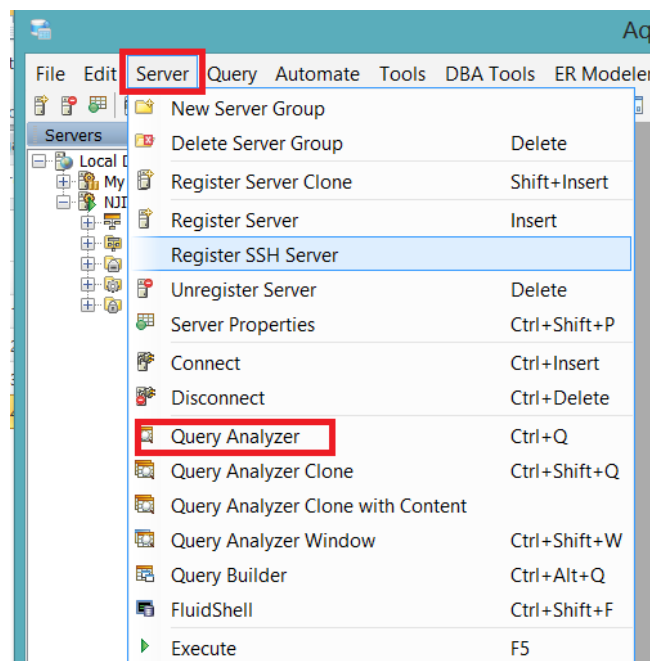
A new query analyzer will open in the right hand side panel:
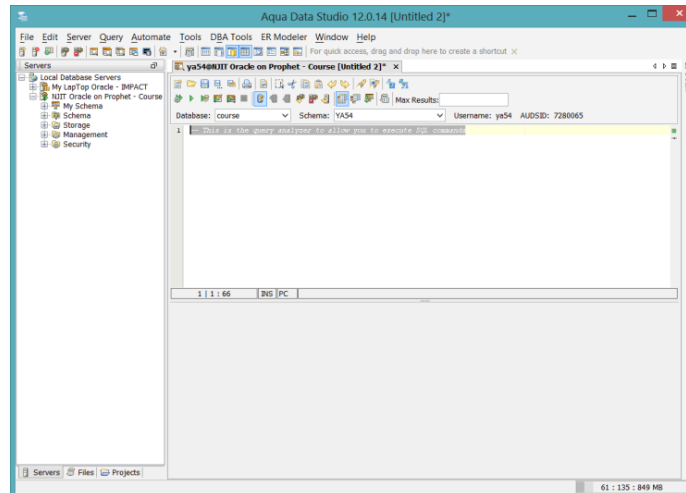
10. Database Data

This section includes the SQL commands that are needed to create, insert, and query the tables in the database.

10.1 Create Table

10.1.1 TransDB1
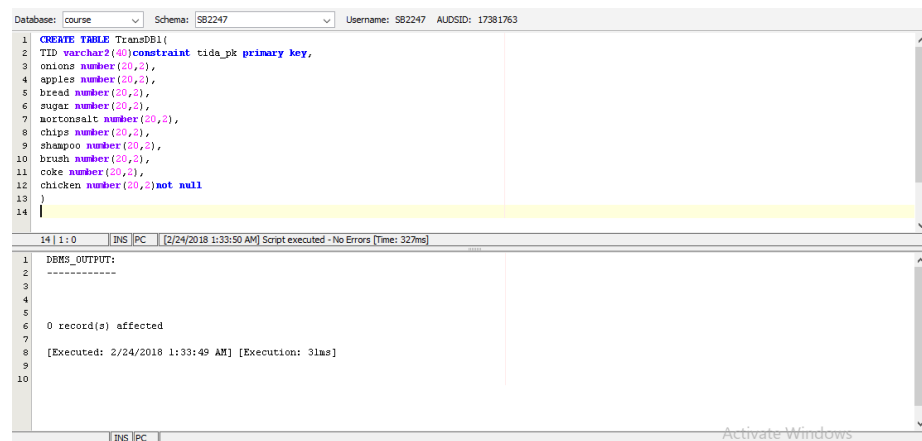
10.1.2 Create Table TransDB2

```
1   CREATE TABLE TransDB2 (
2   TID varchar2(40)constraint tidb_pk primary key,
3   beer number(20,2),
4   oreos number(20,2),
5   curd number(20,2),
6   rice number(20,2),
7   milk number(20,2),
8   egg number(20,2),
9   prawn number(20,2),
10  spinach number(20,2),
11  cornflakes number(20,2),
12  cheese number(20,2)not null
13  )
14
```

```
14 | 1 : 0      INS PC    [2/24/2018 1:56:24 AM] Script executed - No Errors [Time: 156ms]
```

```
1   DBMS_OUTPUT:
2   ------------
3
4
5
6   0 record(s) affected
7
8   [Executed: 2/24/2018 1:56:24 AM] [Execution: 15ms]
9
10
```

10.1.3 Create Table TransDB3

```
1   CREATE TABLE TransDB3(
2   TID varchar2(40)constraint tidc_pk primary key,
3   tshirt number(20,2),
4   pant number(20,2),
5   monopoly number(20,2),
6   flower number(20,2),
7   bedcover number(20,2),
8   comforter number(20,2),
9   icecream number(20,2),
10  glue number(20,2),
11  shoes number(20,2),
12  socks number(20,2)not null
13  )
14
```

```
14 | 1 : 0      INS PC
```

```
1   DBMS_OUTPUT:
2   ------------
3
4
5
6   0 record(s) affected
7
8   [Executed: 2/24/2018 2:02:36 AM] [Execution: 47ms]
9
10
```

```
INS PC
```

10.1.4 Create Table TransDB4

```
1   CREATE TABLE TransDB4(
2   TID varchar2(40)constraint tidd_pk primary key,
3   butter number(20,2),
4   rice number(20,2),
5   meat number(20,2),
6   bodywash number(20,2),
7   handwash number(20,2),
8   gum number(20,2),
9   notebook number(20,2),
10  pen number(20,2),
11  pencil number(20,2),
12  magazine number(20,2)not null
13  )
14
```

```
14 | 1 : 0      INS PC    [2/24/2018 2:18:32 AM] Script executed - No Errors [Time: 125ms]
```

```
1   DBMS_OUTPUT:
2   ------------
3
4
5
6   0 record(s) affected
7
8   [Executed: 2/24/2018 2:18:32 AM] [Execution: 47ms]
9
10
```

```
INS PC
```

10.1.5 Create Table TransDB5

17

10.2 Insert into Table

10.2.1 Insert into TransDB1

10.2.2 Insert into TransDB2

10.2.3 Insert into TransDB3

```
1   INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T1',1,0,0,1,1,0,0,1,0,1)
2   GO
3   INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T2',1,1,0,0,1,0,1,1,1,1)
4   GO
5   INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T3',0,0,1,0,0,1,1,0,1,1)
6   GO
7   INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T4',0,1,0,0,1,0,0,1,0,0)
8   GO
9   INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T5',1,1,0,1,0,0,1,1,0,0)
10  GO
11  INSERT INTO TransDB3 (TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS) VALUES ('T6',0,0,1,0,0,1,1,1,0,0)
```

39 | 54 : 0   INS PC   [2/24/2018 2:11:31 AM] Script executed - No Errors [Time: 659ms]

20 record(s) [Fetch Data: 0ms]   Sum: 0

|	TID	TSHIRT	PANT	MONOPOLY	FLOWER	BEDCOVER	COMFORTER	ICECREAM	GLUE	SHOES	SOCKS
1	T1	1	0	0	1	1	0	0	1	0	1
2	T2	1	1	0	0	1	0	1	1	1	1
3	T3	0	0	1	0	0	1	1	0	1	1
4	T4	0	1	0	0	1	0	0	1	0	0
5	T5	1	1	0	1	0	0	1	1	0	0
6	T6	0	0	1	0	0	1	1	1	0	0
7	T7	1	1	1	0	0	1	1	0	0	1
8	T8	0	1	0	1	0	1	0	1	0	1
9	T9	1	1	0	0	1	1	0	1	1	0
10	T10	0	0	1	1	0	0	1	0	1	0
11	T11	0	1	0	0	1	1	1	0	1	0
12	T12	0	0	1	1	1	0	0	0	1	0
13	T13	1	1	1	0	1	1	1	0	0	1
14	T14	1	0	1	1	1	1	0	1	0	1
15	T15	0	0	0	0	0	0	1	0	0	1

10.2.4 Insert into TransDB4

```
1   INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T1',1,1,1,1,1,0,1,0,1,0)
2   GO
3   INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T2',0,0,0,0,0,1,0,0,0,0)
4   GO
5   INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T3',0,0,1,0,0,1,0,0,1,0)
6   GO
7   INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T4',1,0,0,1,0,0,0,0,1,0)
8   GO
9   INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T5',1,1,0,1,1,1,1,0,1,1)
10  GO
11  INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T6',0,1,1,1,1,0,1,1,1,1)
12  GO
13  INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T7',0,1,1,1,0,1,1,1,0,1)
14  GO
15  INSERT INTO TransDB4 (TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES ('T8',1,1,0,0,0,0,1,1,0,1)
```

8 | 3 : 0   INS PC   [2/24/2018 2:26:46 AM] Script executed - (20) Error(s) [Time: 817ms]

20 record(s) [Fetch Data: 0ms]   Sum: 0

	TID	BUTTER	RICE	MEAT	BODYWASH	HANDWASH	GUM	NOTEBOOK	PEN	PENCIL	MAGAZINE
1	T1	1	1	1	1	1	0	1	0	1	0
2	T2	0	0	0	0	0	1	0	0	0	0
3	T4	1	0	0	1	0	0	0	0	1	0
4	T5	1	1	0	1	1	1	1	0	1	1
5	T6	0	1	1	1	1	0	1	1	1	1
6	T7	0	1	1	1	0	1	1	1	0	1
7	T8	1	1	0	0	0	0	1	1	0	1
8	T9	1	0	0	0	0	1	0	0	0	0
9	T10	0	0	1	1	1	1	0	1	0	0
10	T11	0	0	0	0	1	0	1	1	1	1
11	T12	1	1	1	1	0	1	0	1	1	1
12	T13	1	0	0	1	1	0	0	1	0	0

10.2.5 Insert into TransDB5

```
27  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T14',0,0,1,1,0,1,0,0,1,0)
28  GO
29  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T15',0,0,0,0,1,0,1,1,0,1)
30  GO
31  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T16',1,1,0,0,0,1,1,0,1,0)
32  GO
33  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T17',1,1,1,0,1,0,0,1,0,0)
34  GO
35  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T18',0,0,0,1,1,1,0,0,1,1)
36  GO
37  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T19',1,1,1,1,1,0,0,1,0,0,1)
38  GO
39  INSERT INTO TransDB5 (TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER) VALUES ('T20',1,0,1,1,1,0,0,0,1,1)
40  GO
41  SELECT * FROM TransDB5
```

39 | 35 : 0   INS PC   [2/24/2018 2:46:26 AM] Script executed - No Errors [Time: 736ms]

20 record(s) [Fetch Data: 0ms]   Sum: 0

	TID	TOMATOES	CARROTS	OATS	BOTTLE	LIPSTICK	EYELINER	TOOTHBRUSH	STAPLER	FILES	MARKER
1	T1	1	0	0	0	1	1	1	0	0	1
2	T2	0	0	1	0	1	0	0	1	1	0
3	T3	0	0	1	0	1	1	1	1	1	1
4	T4	0	1	1	1	0	0	0	0	0	0
5	T5	0	1	0	0	0	0	0	0	0	1
6	T6	1	0	0	0	0	0	0	0	1	0
7	T7	1	0	0	1	0	1	1	1	0	0
8	T8	0	1	1	1	1	1	0	1	1	1
9	T9	0	1	0	0	1	0	0	0	0	1
10	T10	1	0	1	0	0	0	1	0	1	0
11	T11	1	0	1	1	0	1	0	0	1	1

APPENDIX A

1. **Test.m**

```
clc;
clear;
close all;

amazon = importdata('datab5.csv',',');

prompt='enter min supp as decimal e.g 0.2\n';
minSup=input(prompt);

promp='enter min conf as decimal e.g 0.6\n';
minConf=input(promp);
nRules = 100;
sortFlag = 1;
fname='associationrules';
labels= {'onions', 'apples', 'bread', 'sugar','salt', 'lays','shampoo', 'brush','coke','chicken'};



[Rules, FreqItemsets] = findRules(amazon, minSup, minConf, nRules, sortFlag, labels,
fname);
disp(['For the association rules check the file named ' fname '.txt']);
```

2. **findRules.m**

```
function [Rules FreqItemsets] = findRules(transactions, minSup, minConf, nRules, sortFlag,
labels, fname)

T1 = size(transactions,1);
T2 = size(transactions,2);

if nargin < 7
    fname = 'default';
end

if nargin < 6
    labels = cellfun(@(x){num2str(x)}, num2cell(1:T2));
end

if nargin < 5
    sortFlag = 1;
end
```

```matlab
if nargin < 4
   nRules = 100;
end

if nargin < 3
   minConf = 0.5;
end

if nargin < 2
   minSup = 0.5;
end

if nargin == 0
   error('No input arguments were supplied.  At least one is expected.');
end

maxSize = 10^2;
Rules = cell(2,1);
Rules{1} = cell(nRules,1);
Rules{2} = cell(nRules,1);
FreqItemsets = cell(maxSize);
RuleConf = zeros(nRules,1);
RuleSup = zeros(nRules,1);
ct = 1;

M = [];
for i = 1:T2
   S = sum(transactions(:,i))/T1;
   if S >= minSup
      M = [M; i];
   end
end
FreqItemsets{1} = M;

for steps = 2:T2

   U = unique(M);
   if isempty(U) || size(U,1) == 1
      Rules{1}(ct:end) = [];
      Rules{2}(ct:end) = [];
      FreqItemsets(steps-1:end) = [];
      break
   end

   Combinations = nchoosek(U',steps);
```

```matlab
    TOld = M;
    M = [];

    for j = 1:size(Combinations,1)
        if ct > nRules
            break;
        else
            if sum(ismember(nchoosek(Combinations(j,:),steps-1),TOld,'rows')) - steps+1>0


                S = mean((sum(transactions(:,Combinations(j,:)),2)-steps)>=0);
                if S >= minSup
                    M = [M; Combinations(j,:)];


                    for depth = 1:steps-1
                        R = nchoosek(Combinations(j,:),depth);
                        for r = 1:size(R,1)
                            if ct > nRules
                                break;
                            else

                                Ctemp = S/mean((sum(transactions(:,R(r,:)),2)-depth)==0);
                                if Ctemp > minConf


                                    Rules{1}{ct} = R(r,:);
                                    Rules{2}{ct} = setdiff(Combinations(j,:),R(r,:));
                                    RuleConf(ct) = Ctemp;
                                    RuleSup(ct) = S;
                                    ct = ct+1;
                                end
                            end
                        end
                    end
                end
            end
        end
    end


    FreqItemsets{steps} = M;
end


FreqItemsets(steps-1:end) = [];
```

```matlab
RuleConf = RuleConf(1:ct-1);
RuleSup = RuleSup(1:ct-1);


switch sortFlag
   case 1
      [V ind] = sort(RuleSup,'descend');
   case 2
      [V ind] = sort(RuleConf,'descend');
end

RuleConf = RuleConf(ind);
RuleSup = RuleSup(ind);

for i = 1:2
   temp = Rules{i,1};
   temp = temp(ind);
   Rules{i,1} = temp;
end



fid = fopen([fname '.txt'], 'w');
fprintf(fid, '%s   (%s, %s) \n', 'Rule', 'Support', 'Confidence');

for i = 1:size(Rules{1},1)
   s1 = '';
   s2 = '';
   for j = 1:size(Rules{1}{i},2)
      if j == size(Rules{1}{i},2)
         s1 = [s1 labels{Rules{1}{i}(j)}];
      else
         s1 = [s1 labels{Rules{1}{i}(j)} ','];
      end
   end
   for k = 1:size(Rules{2}{i},2)
      if k == size(Rules{2}{i},2)
         s2 = [s2 labels{Rules{2}{i}(k)}];
      else
         s2 = [s2 labels{Rules{2}{i}(k)} ','];
      end
   end
   s3 = num2str(RuleSup(i)*100);
   s4 = num2str(RuleConf(i)*100);
   fprintf(fid, '%s -> %s  (%s%%, %s%%)\n', s1, s2, s3, s4);
end
```

```
fclose(fid);
end
```

APPENDIX B

1. Datab1.csv

```sql
CREATE TABLE TransDB1(
TID varchar2(40)constraint tida_pk primary key,
onions number(20,2),
apples number(20,2),
bread number(20,2),
sugar number(20,2),
mortonsalt number(20,2),
chips number(20,2),
shampoo number(20,2),
brush number(20,2),
coke number(20,2),
chicken number(20,2)not null
)

INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T1',1,0,1,1,0,0,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T2',0,0,1,1,1,0,1,1,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T3',1,0,1,0,0,0,1,1,1,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T4',1,1,1,1,0,1,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T5',0,1,0,1,0,1,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T6',0,1,0,1,1,1,0,1,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T7',1,0,1,0,1,0,1,1,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T8',0,1,1,1,1,1,0,1,0,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T9',1,1,0,1,0,1,0,1,1,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T10',1,0,1,1,0,0,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
```

```
('T11',0,0,0,1,0,1,1,1,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T12',1,1,0,0,1,0,0,1,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T13',0,0,1,0,0,0,1,0,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T14',1,1,0,0,1,1,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T15',0,1,1,1,0,0,0,1,1,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T16',0,0,0,1,1,0,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T17',1,1,0,0,1,1,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T18',0,0,1,0,1,0,1,0,0,1)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T19',1,0,1,1,1,0,1,0,1,0)
GO
INSERT INTO TransDB1 (TID, ONIONS,
APPLES,BREAD,SUGAR,MORTONSALT,CHIPS,SHAMPOO,BRUSH,COKE,CHICKEN) VALUES
('T20',0,1,0,0,1,0,1,0,0,1)
GO
SELECT * FROM TransDB1
```

2. **Datab2.csv**

```
CREATE TABLE TransDB2 (
TID varchar2(40)constraint tidb_pk primary key,
beer number(20,2),
oreos number(20,2),
curd number(20,2),
rice number(20,2),
milk number(20,2),
egg number(20,2),
prawn number(20,2),
spinach number(20,2),
cornflakes number(20,2),
cheese number(20,2)not null
)

INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
```

('T1',1,0,0,1,0,1,1,0,0,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T2',0,1,1,1,0,0,1,0,0,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T3',0,1,0,1,1,0,1,1,1,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T4',0,1,0,0,1,1,1,1,0,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T5',0,1,0,1,0,1,0,1,0,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T6',1,1,0,1,0,1,0,1,0,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T7',1,0,0,1,1,1,0,0,1,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T8',0,1,0,1,0,1,0,1,0,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T9',1,1,1,1,0,0,0,0,1,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T10',1,0,1,1,1,0,0,1,1,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T11',1,0,1,0,0,0,0,0,0,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T12',1,0,1,1,0,1,0,0,1,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T13',1,0,1,0,1,0,1,1,1,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T14',1,1,0,0,1,1,1,1,0,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T15',1,0,1,0,1,0,1,0,1,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T16',1,1,1,0,1,1,1,0,1,0)
GO

```sql
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T17',1,1,0,0,0,1,0,1,0,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T18',1,0,1,0,1,0,1,0,1,0)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T19',1,0,1,0,0,0,1,0,1,1)
GO
INSERT INTO TransDB2
(TID,BEER,OREOS,CURD,RICE,MILK,EGG,PRAWN,SPINACH,CORNFLAKES,CHEESE) VALUES
('T20',0,1,0,1,1,1,0,0,1,0)
GO
SELECT * FROM TransDB2
```

3. Datab.csv

```sql
CREATE TABLE TransDB3(
TID varchar2(40)constraint tidc_pk primary key,
tshirt number(20,2),
pant number(20,2),
monopoly number(20,2),
flower number(20,2),
bedcover number(20,2),
comforter number(20,2),
icecream number(20,2),
glue number(20,2),
shoes number(20,2),
socks number(20,2)not null
)

INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T1',1,0,0,1,1,0,0,1,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T2',1,1,0,0,1,0,1,1,1,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T3',0,0,1,0,0,1,1,0,1,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T4',0,1,0,0,1,0,0,1,0,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T5',1,1,0,1,0,0,1,1,0,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
```

```
VALUES ('T6',0,0,1,0,0,1,1,1,0,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T7',1,1,1,0,0,1,1,0,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T8',0,1,0,1,0,1,0,1,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T9',1,1,0,0,1,1,0,1,1,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T10',0,0,1,1,0,0,1,0,1,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T11',0,1,0,0,1,1,1,0,1,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T12',0,0,1,1,1,0,0,0,1,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T13',1,1,1,0,1,1,1,0,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T14',1,0,1,1,1,1,0,1,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T15',0,0,0,0,0,0,1,0,0,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T16',0,1,0,0,0,0,0,1,1,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T17',1,0,1,1,1,1,1,0,0,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T18',0,1,0,1,1,1,0,1,1,1)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T19',1,1,0,1,0,1,1,1,0,0)
GO
INSERT INTO TransDB3
(TID,TSHIRT,PANT,MONOPOLY,FLOWER,BEDCOVER,COMFORTER,ICECREAM,GLUE,SHOES,SOCKS)
VALUES ('T20',0,0,1,0,0,0,0,0,1,1)
GO
SELECT * FROM TransDB3
```

4. Datab4.csv

```sql
CREATE TABLE TransDB4(
TID varchar2(40)constraint tidd_pk primary key,
butter number(20,2),
rice number(20,2),
meat number(20,2),
bodywash number(20,2),
handwash number(20,2),
gum number(20,2),
notebook number(20,2),
pen number(20,2),
pencil number(20,2),
magazine number(20,2)not null
)


INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T1',1,1,1,1,1,0,1,0,1,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T2',0,0,0,0,0,1,0,0,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T3',0,0,1,0,0,1,0,0,1,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T4',1,0,0,1,0,0,0,0,1,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T5',1,1,0,1,1,1,1,0,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T6',0,1,1,1,1,0,1,1,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T7',0,1,1,1,0,1,1,1,0,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T8',1,1,0,0,0,0,1,1,0,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T9',1,0,0,0,0,1,0,0,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T10',0,0,1,1,1,1,0,1,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T11',0,0,0,0,1,0,1,1,1,1)
GO
INSERT INTO TransDB4
```

```
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T12',1,1,1,1,0,1,0,1,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T13',1,0,0,1,1,0,0,1,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T14',1,1,0,0,1,1,1,0,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T15',0,1,0,1,0,0,1,0,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T16',0,0,1,0,1,0,1,0,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T17',0,1,1,1,0,1,0,1,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T18',0,0,0,0,1,1,0,1,0,0)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T19',1,0,0,1,0,1,0,0,1,1)
GO
INSERT INTO TransDB4
(TID,BUTTER,RICE,MEAT,BODYWASH,HANDWASH,GUM,NOTEBOOK,PEN,PENCIL,MAGAZINE) VALUES
('T20',0,1,1,0,1,0,1,1,0,0)
GO
SELECT * FROM TransDB4
```

5. **Datab5.csv**

```
CREATE TABLE TransDB5(
TID varchar2(40)constraint tide_pk primary key,
tomatoes number(20,2),
carrots number(20,2),
oats number(20,2),
bottle number(20,2),
lipstick number(20,2),
eyeliner number(20,2),
toothbrush number(20,2),
stapler number(20,2),
files number(20,2),
marker number(20,2)not null
)

INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T1',1,0,0,0,1,1,1,0,0,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
```

```
VALUES ('T2',0,0,1,0,1,0,0,1,1,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T3',0,0,1,0,1,1,1,1,1,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T4',0,1,1,1,0,0,0,0,0,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T5',0,1,0,0,0,0,0,0,0,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILE,MARKER)
VALUES ('T6',1,0,0,0,0,0,0,0,1,0)
GO
INSERT INTO TransDB5
(TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T7',1,0,0,1,0,1,1,1,0,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T8',0,1,1,1,1,1,0,1,1,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T9',0,1,0,0,1,0,0,0,0,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T10',1,0,1,0,0,0,1,0,1,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T11',1,0,1,1,0,1,0,0,1,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T12',1,1,0,1,0,1,0,0,0,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T13',0,1,0,1,1,0,1,1,0,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T14',0,0,1,1,0,1,0,0,1,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T15',0,0,0,0,1,0,1,1,0,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T16',1,1,0,0,0,1,1,0,1,0)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T17',1,1,1,0,1,0,0,1,0,0)
GO
```

```
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T18',0,0,0,1,1,1,0,0,1,1)
GO
INSERT INTO TransDB5 (TID,
TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T19',1,1,1,1,0,0,1,0,0,1)
GO
INSERT INTO TransDB5
(TID,TOMATOES,CARROTS,OATS,BOTTLE,LIPSTICK,EYELINER,TOOTHBRUSH,STAPLER,FILES,MARKER)
VALUES ('T20',1,0,1,1,1,0,0,0,1,1)
GO
SELECT * FROM TransDB5
```

APPENDIX C

1. Screenshot 1 (Datab1.csv):

```
1   Rule   (Support, Confidence)
2   shampoo -> coke   (50%, 66.6667%)
3   coke -> shampoo   (50%, 83.3333%)
4   bread -> shampoo   (45%, 81.8182%)
5   sugar -> coke   (45%, 75%)
6   coke -> sugar   (45%, 75%)
7   onions -> shampoo   (40%, 80%)
8   onions -> coke   (40%, 80%)
9   coke -> onions   (40%, 66.6667%)
10  sugar -> shampoo   (40%, 66.6667%)
11  salt -> shampoo   (40%, 72.7273%)
12  apples -> lays   (35%, 70%)
13  lays -> apples   (35%, 87.5%)
14  bread -> sugar   (35%, 63.6364%)
15  bread -> coke   (35%, 63.6364%)
16  brush -> chicken   (35%, 77.7778%)
17  chicken -> brush   (35%, 70%)
18  onions -> shampoo,coke   (35%, 70%)
19  onions,shampoo -> coke   (35%, 87.5%)
20  onions,coke -> shampoo   (35%, 87.5%)
21  shampoo,coke -> onions   (35%, 70%)
22  sugar,shampoo -> coke   (35%, 87.5%)
23  sugar,coke -> shampoo   (35%, 77.7778%)
24  shampoo,coke -> sugar   (35%, 70%)
25  lays -> sugar   (30%, 75%)
26  brush -> sugar   (30%, 66.6667%)
27  onions,bread -> shampoo   (30%, 100%)
28  onions,shampoo -> bread   (30%, 75%)
29  bread,shampoo -> onions   (30%, 66.6667%)
30  bread,sugar -> coke   (30%, 85.7143%)
31  bread,coke -> sugar   (30%, 85.7143%)
```

```
32  sugar,coke -> bread   (30%, 66.6667%)
33  bread,shampoo -> coke   (30%, 66.6667%)
34  bread,coke -> shampoo   (30%, 85.7143%)
35  lays -> shampoo   (25%, 62.5%)
36  lays -> coke   (25%, 62.5%)
37  onions,bread -> coke   (25%, 83.3333%)
38  onions,coke -> bread   (25%, 62.5%)
39  bread,coke -> onions   (25%, 71.4286%)
40  onions,sugar -> coke   (25%, 100%)
41  onions,coke -> sugar   (25%, 62.5%)
42  lays -> apples,sugar   (25%, 62.5%)
43  apples,sugar -> lays   (25%, 83.3333%)
44  apples,lays -> sugar   (25%, 71.4286%)
45  sugar,lays -> apples   (25%, 83.3333%)
46  lays -> apples,coke   (25%, 62.5%)
47  apples,lays -> coke   (25%, 71.4286%)
48  apples,coke -> lays   (25%, 83.3333%)
49  lays,coke -> apples   (25%, 100%)
50  bread,sugar -> shampoo   (25%, 71.4286%)
51  sugar,shampoo -> bread   (25%, 62.5%)
52  salt,shampoo -> coke   (25%, 62.5%)
53  salt,coke -> shampoo   (25%, 100%)
54  onions,apples -> lays   (20%, 80%)
55  onions,lays -> apples   (20%, 100%)
56  onions,apples -> coke   (20%, 80%)
57  apples,coke -> onions   (20%, 66.6667%)
58  onions,bread -> sugar   (20%, 66.6667%)
59  onions,sugar -> bread   (20%, 80%)
60  onions,sugar -> shampoo   (20%, 80%)
61  onions,salt -> shampoo   (20%, 80%)
62  onions,lays -> coke   (20%, 100%)
```

```
63  lays,coke -> onions   (20%, 80%)
64  onions,brush -> chicken   (20%, 100%)
65  onions,chicken -> brush   (20%, 100%)
66  apples,sugar -> brush   (20%, 66.6667%)
67  apples,brush -> sugar   (20%, 80%)
68  sugar,brush -> apples   (20%, 66.6667%)
69  apples,sugar -> coke   (20%, 66.6667%)
70  apples,coke -> sugar   (20%, 66.6667%)
71  apples,salt -> lays   (20%, 66.6667%)
72  salt,lays -> apples   (20%, 100%)
73  apples,shampoo -> lays   (20%, 80%)
74  lays,shampoo -> apples   (20%, 80%)
75  apples,shampoo -> coke   (20%, 80%)
76  apples,coke -> shampoo   (20%, 66.6667%)
77  apples,brush -> chicken   (20%, 80%)
78  apples,chicken -> brush   (20%, 80%)
79  bread,salt -> shampoo   (20%, 80%)
80  bread,chicken -> shampoo   (20%, 80%)
81  shampoo,chicken -> bread   (20%, 66.6667%)
82  sugar,lays -> brush   (20%, 66.6667%)
83  sugar,brush -> lays   (20%, 66.6667%)
84  lays,brush -> sugar   (20%, 100%)
85  sugar,brush -> chicken   (20%, 66.6667%)
86  sugar,chicken -> brush   (20%, 100%)
87  lays,shampoo -> coke   (20%, 80%)
88  lays,coke -> shampoo   (20%, 80%)
89  onions,apples -> lays,coke   (20%, 80%)
90  onions,lays -> apples,coke   (20%, 100%)
91  apples,coke -> onions,lays   (20%, 66.6667%)
92  lays,coke -> onions,apples   (20%, 80%)
93  onions,apples,lays -> coke   (20%, 100%)
```

```
94   onions,apples,coke -> lays   (20%, 100%)
95   onions,lays,coke -> apples   (20%, 100%)
96   apples,lays,coke -> onions   (20%, 80%)
97   onions,bread -> sugar,shampoo   (20%, 66.6667%)
98   onions,sugar -> bread,shampoo   (20%, 80%)
99   onions,bread,sugar -> shampoo   (20%, 100%)
100  onions,bread,shampoo -> sugar   (20%, 66.6667%)
101  onions,sugar,shampoo -> bread   (20%, 100%)
102
```

2. Screenshot 2(Datab1.csv):

```
1   Rule   (Support, Confidence)
2   coke -> shampoo   (50%, 83.3333%)
3   bread -> shampoo   (45%, 81.8182%)
4   sugar -> coke   (45%, 75%)
5   coke -> sugar   (45%, 75%)
6   onions -> shampoo   (40%, 80%)
7   onions -> coke   (40%, 80%)
8   salt -> shampoo   (40%, 72.7273%)
9   lays -> apples   (35%, 87.5%)
10  brush -> chicken   (35%, 77.7778%)
11  onions,shampoo -> coke   (35%, 87.5%)
12  onions,coke -> shampoo   (35%, 87.5%)
13  sugar,shampoo -> coke   (35%, 87.5%)
14  sugar,coke -> shampoo   (35%, 77.7778%)
15  lays -> sugar   (30%, 75%)
16  onions,bread -> shampoo   (30%, 100%)
17  onions,shampoo -> bread   (30%, 75%)
18  bread,sugar -> coke   (30%, 85.7143%)
19  bread,coke -> sugar   (30%, 85.7143%)
20  bread,coke -> shampoo   (30%, 85.7143%)
```

3. Screenshot 1(Datab2.csv):

```
 1   Rule    (Support, Confidence)
 2   bread -> onions   (45%, 90%)
 3   coke -> onions   (45%, 81.8182%)
 4   apples -> lays   (40%, 72.7273%)
 5   lays -> apples   (40%, 72.7273%)
 6   apples -> brush   (40%, 72.7273%)
 7   brush -> apples   (40%, 80%)
 8   bread -> coke   (40%, 80%)
 9   coke -> bread   (40%, 72.7273%)
10   salt -> coke   (40%, 80%)
11   coke -> salt   (40%, 72.7273%)
12   bread -> onions,coke   (40%, 80%)
13   coke -> onions,bread   (40%, 72.7273%)
14   onions,bread -> coke   (40%, 88.8889%)
15   onions,coke -> bread   (40%, 88.8889%)
16   bread,coke -> onions   (40%, 100%)
17
```

4. Screenshot 2(Datab2.csv):

```
 1   Rule    (Support, Confidence)
 2   onions -> bread   (45%, 64.2857%)
 3   bread -> onions   (45%, 90%)
 4   onions -> coke   (45%, 64.2857%)
 5   coke -> onions   (45%, 81.8182%)
 6   apples -> lays   (40%, 72.7273%)
 7   lays -> apples   (40%, 72.7273%)
 8   apples -> brush   (40%, 72.7273%)
 9   brush -> apples   (40%, 80%)
10   bread -> coke   (40%, 80%)
11   coke -> bread   (40%, 72.7273%)
12   salt -> coke   (40%, 80%)
13   coke -> salt   (40%, 72.7273%)
14   onions -> bread,coke   (40%, 57.1429%)
15   bread -> onions,coke   (40%, 80%)
16   coke -> onions,bread   (40%, 72.7273%)
17   onions,bread -> coke   (40%, 88.8889%)
18   onions,coke -> bread   (40%, 88.8889%)
19   bread,coke -> onions   (40%, 100%)
20
```

5. Screenshot 1 (Datab3.csv):

```
 1   Rule    (Support, Confidence)
 2   apples -> brush   (40%, 72.7273%)
 3   brush -> apples   (40%, 72.7273%)
 4   apples -> lays   (35%, 63.6364%)
 5   lays -> apples   (35%, 63.6364%)
 6   lays -> shampoo   (35%, 63.6364%)
 7   shampoo -> lays   (35%, 63.6364%)
 8   onions -> apples   (30%, 66.6667%)
 9   onions -> salt   (30%, 66.6667%)
10   onions -> lays   (30%, 66.6667%)
11   onions -> shampoo   (30%, 66.6667%)
12   onions -> brush   (30%, 66.6667%)
13   bread -> lays   (30%, 66.6667%)
14   bread -> shampoo   (30%, 66.6667%)
15   sugar -> brush   (30%, 66.6667%)
16   onions,apples -> shampoo   (25%, 83.3333%)
17   onions,shampoo -> apples   (25%, 83.3333%)
18   apples,shampoo -> onions   (25%, 83.3333%)
19   bread,lays -> shampoo   (25%, 83.3333%)
20   bread,shampoo -> lays   (25%, 83.3333%)
21   lays,shampoo -> bread   (25%, 71.4286%)
22   onions,apples -> lays   (20%, 66.6667%)
23   onions,lays -> apples   (20%, 66.6667%)
24   onions,apples -> brush   (20%, 66.6667%)
25   onions,brush -> apples   (20%, 66.6667%)
26   onions,bread -> lays   (20%, 100%)
27   onions,lays -> bread   (20%, 66.6667%)
28   bread,lays -> onions   (20%, 66.6667%)
29   onions,sugar -> brush   (20%, 80%)
30   onions,brush -> sugar   (20%, 66.6667%)
31   sugar,brush -> onions   (20%, 66.6667%)
32   onions,salt -> lays   (20%, 66.6667%)
33   onions,lays -> salt   (20%, 66.6667%)
34   salt,lays -> onions   (20%, 66.6667%)
35   onions,salt -> brush   (20%, 66.6667%)
36   onions,brush -> salt   (20%, 66.6667%)
37   salt,brush -> onions   (20%, 66.6667%)
38   onions,salt -> chicken   (20%, 66.6667%)
39   onions,chicken -> salt   (20%, 80%)
40   salt,chicken -> onions   (20%, 80%)
41   onions,lays -> shampoo   (20%, 66.6667%)
42   onions,shampoo -> lays   (20%, 66.6667%)
43   apples,sugar -> brush   (20%, 100%)
44   sugar,brush -> apples   (20%, 66.6667%)
45   apples,salt -> lays   (20%, 66.6667%)
46   salt,lays -> apples   (20%, 66.6667%)
47   apples,salt -> brush   (20%, 66.6667%)
48   salt,brush -> apples   (20%, 66.6667%)
49   apples,salt -> coke   (20%, 66.6667%)
50   apples,coke -> salt   (20%, 80%)
51   salt,coke -> apples   (20%, 80%)
52   apples,shampoo -> lays   (20%, 66.6667%)
53   lays,brush -> apples   (20%, 66.6667%)
54   apples,chicken -> lays   (20%, 80%)
55   lays,chicken -> apples   (20%, 66.6667%)
56   apples,coke -> brush   (20%, 80%)
57   brush,coke -> apples   (20%, 100%)
58   bread,lays -> chicken   (20%, 66.6667%)
59   bread,chicken -> lays   (20%, 80%)
60   lays,chicken -> bread   (20%, 66.6667%)
61   sugar,lays -> brush   (20%, 80%)
62   sugar,brush -> lays   (20%, 66.6667%)
```

```
63   lays,brush -> sugar    (20%, 66.6667%)
64   sugar,brush -> chicken    (20%, 66.6667%)
65   sugar,chicken -> brush    (20%, 100%)
66   brush,chicken -> sugar    (20%, 80%)
67   salt,brush -> chicken    (20%, 66.6667%)
68   salt,chicken -> brush    (20%, 80%)
69   brush,chicken -> salt    (20%, 80%)
70
```

6. Screenshot 2(Datab3.csv)

```
test.m  ×   findRules.m  ×   associationrules.txt  ×  +
1   Rule    (Support, Confidence)
2   apples -> brush   (40%, 72.7273%)
3   brush -> apples   (40%, 72.7273%)
4
```

7. Screenshot 1(Datab4.csv):

```
1   Rule   (Support, Confidence)
2   apples -> shampoo  (40%, 80%)
3   shampoo -> apples  (40%, 80%)
4   apples -> sugar   (35%, 70%)
5   sugar -> apples   (35%, 63.6364%)
6   sugar -> coke   (35%, 63.6364%)
7   coke -> sugar   (35%, 70%)
8   salt -> shampoo   (35%, 70%)
9   shampoo -> salt   (35%, 70%)
10  shampoo -> chicken   (35%, 70%)
11  chicken -> shampoo   (35%, 77.7778%)
12  coke -> chicken   (35%, 70%)
13  chicken -> coke   (35%, 77.7778%)
14  onions -> sugar   (30%, 66.6667%)
15  sugar -> onions   (30%, 54.5455%)
16  apples -> bread   (30%, 60%)
17  bread -> apples   (30%, 66.6667%)
18  apples -> brush   (30%, 60%)
19  brush -> apples   (30%, 60%)
20  apples -> chicken   (30%, 60%)
21  chicken -> apples   (30%, 66.6667%)
22  bread -> sugar   (30%, 66.6667%)
23  sugar -> bread   (30%, 54.5455%)
24  bread -> brush   (30%, 66.6667%)
25  brush -> bread   (30%, 60%)
26  sugar -> lays   (30%, 54.5455%)
27  lays -> sugar   (30%, 54.5455%)
28  sugar -> brush   (30%, 54.5455%)
29  brush -> sugar   (30%, 60%)
30  sugar -> chicken   (30%, 54.5455%)
31  chicken -> sugar   (30%, 66.6667%)
```

8. Screenshot 2(Datab4.csv):

```
1   Rule    (Support, Confidence)
2   apples -> shampoo   (40%, 80%)
3   shampoo -> apples   (40%, 80%)
4   chicken -> shampoo   (35%, 77.7778%)
5   chicken -> coke   (35%, 77.7778%)
6
```

9. Screenshot 1 (Datab5.csv):

```
1   Rule    (Support, Confidence)
2   salt -> chicken   (36.8421%, 77.7778%)
3   brush -> salt   (31.5789%, 85.7143%)
4
```

10. Screenshot 2(Datab5.csv):

```
 1   Rule    (Support, Confidence)
 2   salt -> chicken   (36.8421%, 77.7778%)
 3   chicken -> salt   (36.8421%, 70%)
 4   bread -> coke    (31.5789%, 66.6667%)
 5   coke -> bread    (31.5789%, 66.6667%)
 6   sugar -> lays    (31.5789%, 66.6667%)
 7   lays -> sugar    (31.5789%, 66.6667%)
 8   salt -> brush    (31.5789%, 66.6667%)
 9   brush -> salt    (31.5789%, 85.7143%)
10   lays -> coke    (31.5789%, 66.6667%)
11   coke -> lays    (31.5789%, 66.6667%)
12   shampoo -> onions   (26.3158%, 62.5%)
13   shampoo -> chicken   (26.3158%, 62.5%)
14   bread,salt -> brush   (21.0526%, 100%)
15   bread,brush -> salt   (21.0526%, 100%)
16   salt,brush -> bread   (21.0526%, 66.6667%)
17   bread,lays -> coke   (21.0526%, 100%)
18   bread,coke -> lays   (21.0526%, 66.6667%)
19   lays,coke -> bread   (21.0526%, 66.6667%)
20   sugar,lays -> coke   (21.0526%, 66.6667%)
21   sugar,coke -> lays   (21.0526%, 100%)
22   lays,coke -> sugar   (21.0526%, 66.6667%)
23   salt,lays -> chicken   (21.0526%, 100%)
24   lays,chicken -> salt   (21.0526%, 80%)
25   salt,shampoo -> chicken   (21.0526%, 100%)
26   shampoo,chicken -> salt   (21.0526%, 80%)
27   salt,brush -> chicken   (21.0526%, 66.6667%)
28   brush,chicken -> salt   (21.0526%, 100%)
29   lays,coke -> chicken   (21.0526%, 66.6667%)
30   lays,chicken -> coke   (21.0526%, 80%)
31   coke,chicken -> lays   (21.0526%, 100%)
```

REFERENCES

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- http://ist.njit.edu/support/db/oracle.php
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- http://ist.njit.edu/software/display.php?id=559
- https://webvpn.njit.edu
- http://ist.njit.edu/support/db/oracle.php
- www.stackexchange.com
- www.wikipedia.com
- https://www.mathworks.com/help/matlab/ref/