DATA PREPARATION AND ANALYSIS LABORATORY

LAB MANUAL

Academic Year : 2019

SubjectCode : BCSB20

Regulations : IARE -R18

Semester : II

Branch : CSE

PreparedBy

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500 043

COMPUTER SCIENCE AND ENGINEERING

1. PROGRAM OUTCOMES:

M.TECH-PROGRAM OUTCOMES(POS)	
PO1	Analyze a problem, identify and define computing requirements, design and implement appropriate solutions
PO2	Solve complex heterogeneous data intensive analytical based problems of real time scenario using state of the art hardware/software tools
PO3	Demonstrate a degree of mastery in emerging areas of CSE/IT like IoT, AI, Data Analytics, Machine Learning, cyber security, etc.
PO4	Write and present a substantial technical report/document
PO5	Independently carry out research/investigation and development work to solve practical problems
PO6	Function effectively on teams to establish goals, plan tasks, meet deadlines, manage risk and produce deliverables
PO7	Engage in life-long learning and professional development through self-study, continuing education, professional and doctoral level studies.

2. PROGRAM SPECIFIC OUTCOMES:

PROGRAM SPECIFIC OUTCOMES(PEO's)	
PEO1	Independently design and develop computer software systems and products based on sound theoretical principles and appropriate software development skills.
PEO2	Demonstrate knowledge of technological advances through active participation in life-long
PEO3	Accept to take up responsibilities upon employment in the areas of teaching, research,and software development.
PEO4	Exhibit technical communication, collaboration and mentoring skills and assume rolesboth as team members and as team leaders in an organization.

ATTAINMENT OF PROGRAM OUTCOMES

S. No	Experiment	Program Outcomes Attained
1	DATA PRE-PROCESSING AND DATA CUBE Data preprocessing methods on student and labor datasets Implement data cube for data warehouse on 3-dimensional data	PO1
2	DATA CLEANING Implement various missing handling mechanisms, Implement various noisy handling mechanisms	PO1
3	EXPLORATORY ANALYSIS Develop k-means and MST based clustering techniques, Develop the methodology for assessment of clusters for given dataset	PO2
4	ASSOCIATION ANALYSIS Design algorithms for association rule mining algorithms	PO2
5	HYPTOTHYSIS GENERATION Derive the hypothesis for association rules to discovery of strong association rules; Use confidence and support thresholds.	PO1
6	TRANSFORMATION TECHNIQUES Construct Haar wavelet transformation for numerical data, Construct principal component analysis (PCA) for 5-dimensional data.	PO7
7	DATA VISUALIZATION Implement binning visualizations for any real time dataset, Implement linear regression techniques	PO2
8	CLUSTERS ASSESSMENT Visualize the clusters for any synthetic dataset, Implement the program for converting the clusters into histograms	PO7
9	HIERARCHICAL CLUSTERING Write a program to implement agglomerative clustering technique ,Write a program to implement divisive hierarchical clustering technique	PO7
10	SCALABILITY ALGORITHMS Develop scalable clustering algorithms ,Develop scalable a priori algorithm	PO2

SYLLABUS:

II Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BCSB20	Core	0	0	4	2	30	70	100
Contact Classes: Nil	Total Tutorials: Nil	Total Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Learn pre-processing method for multi-dimensionaldata
II. Practice on data cleaningmechanisms
III. Learn various data exploratoryanalysis
IV. Develop the visualizations for clusters orpartitions

LIST OF EXPERIMENTS

Week-1	**DATA PRE-PROCESSING AND DATA CUBE**

Data preprocessing methods on student and labor datasets Implement data cube for data warehouse on 3-dimensional data

Week-2	**DATA CLEANING**

Implement various missing handling mechanisms ,Implement various noisy handling mechanisms

Week-3	**EXPLORATORY ANALYSIS**

Develop k-means and MST based clustering techniques, Develop the methodology for assessment of clusters for given dataset

Week-4	**ASSOCIATION ANALYSIS**

Design algorithms for association rule mining algorithms

Week-5	**HYPTOTHYSIS GENERATION**

Derive the hypothesis for association rules to discovery of strong association rules; Use confidence and support thresholds.

Week-6	**TRANSFORMATION TECHNIQUES**

Construct Haar wavelet transformation for numerical data, Construct principal component analysis (PCA) for 5-dimensional data.

Week-7	**DATA VISUALIZATION**

Implement binning visualizations for any real time dataset, Implement linear regression techniques

Week-8	**CLUSTERS ASSESSMENT**

Visualize the clusters for any synthetic dataset,Implement the program for converting the clusters into histograms	
Week-9	**HIERARCHICAL CLUSTERING**
Write a program to implement agglomerative clustering technique ,Write a program to implement divisive hierarchical clustering technique	
Week-10	**SCALABILITY ALGORITHMS**
Develop scalable clustering algorithms ,Develop scalable a priori algorithm	

Reference Books:

1. Sinan Ozdemir, “Principles of Data Science”, Packt Publishers, 2016.

Web References:

1. https://paginas.fe.up.pt/~ec/files_1112/week_03_Data_Preparation.pdf
2. https://socialresearchmethods.net/kb/statprep.php
3. https://www.quest.com/solutions/data-preparation-and-analysis/

SOFTWARE AND HARDWARE REQUIREMENTS FOR 18 STUDENTS:

SOFTWARE: Open source Weka 3.8, Python

HARDWARE: 18 numbers of Intel Desktop Computers with 4 GB RAM

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WEEK-1

Aim: Data preprocessing methods on student and labor datasets

Description:

We need to create an Employee Table with training data set which includes attributes like name, id, salary, experience, gender, phone number.

Procedure:

Steps:

1) Open Start → Programs → Accessories → Notepad →

2) Type the following training data set with the help of Notepad for Employee Table.

```
@relation employee
@attribute name {x,y,z,a,b}
@attribute id numeric
@attribute salary {low,medium,high}
@attribute exp numeric
@attribute gender {male,female}
@attribute phone numeric

@data
x,101,low,2,male,250311
y,102,high,3,female,251665
z,103,medium,1,male,240238
a,104,low,5,female,200200
b,105,high,2,male,240240
```

3) After that the file is saved with **.arff** file format.

4) Minimize the arff file and then open Start → Programs → weka-3-4. →

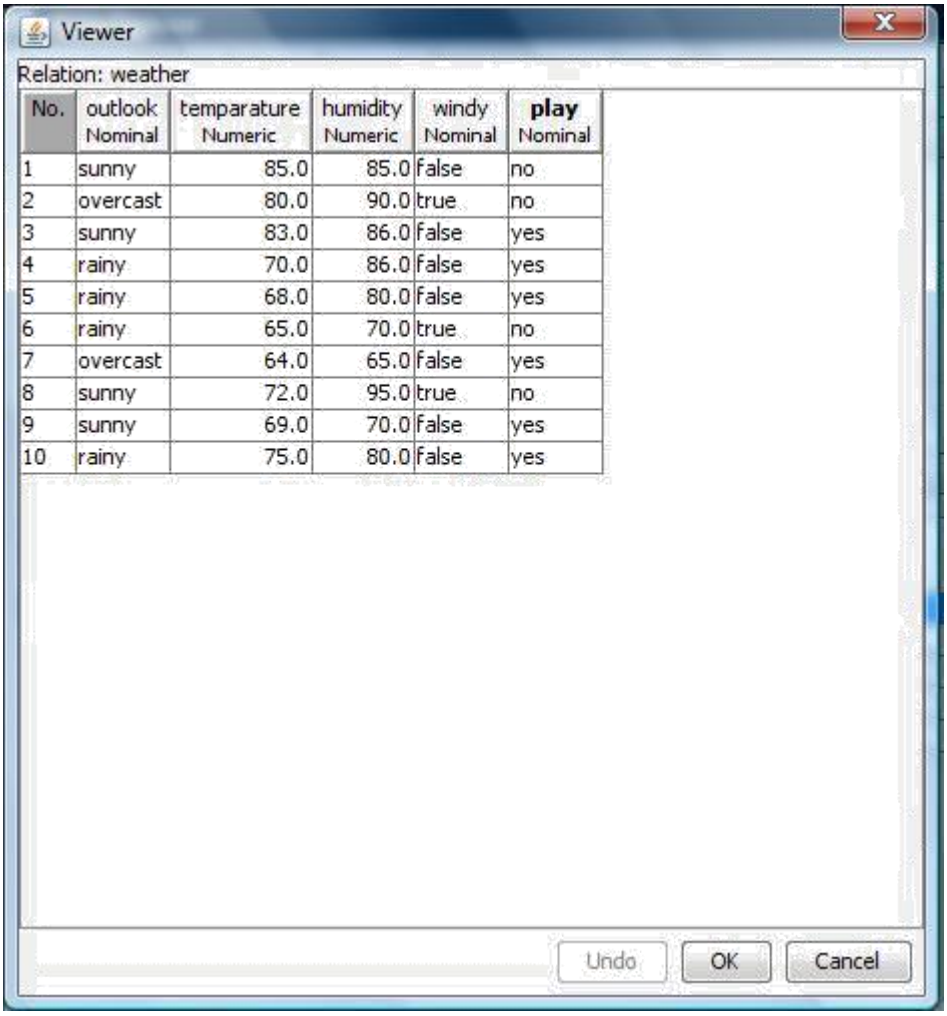
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.

6) In that dialog box there are four modes, click on **explorer**.

7) Explorer shows many options. In that click on **'open file'** and select the arff file

8) Click on **edit button** which shows employee table on weka.

Training Data Set–Weather Table



Result:

This program has been successfully executed.

Aim:

Implement data cube for data warehouse on 3-dimensional data

Description:

We need to create a Weather table with training data set which includes attributes like outlook, temperature, humidity, windy, play.

Procedure:

Steps:

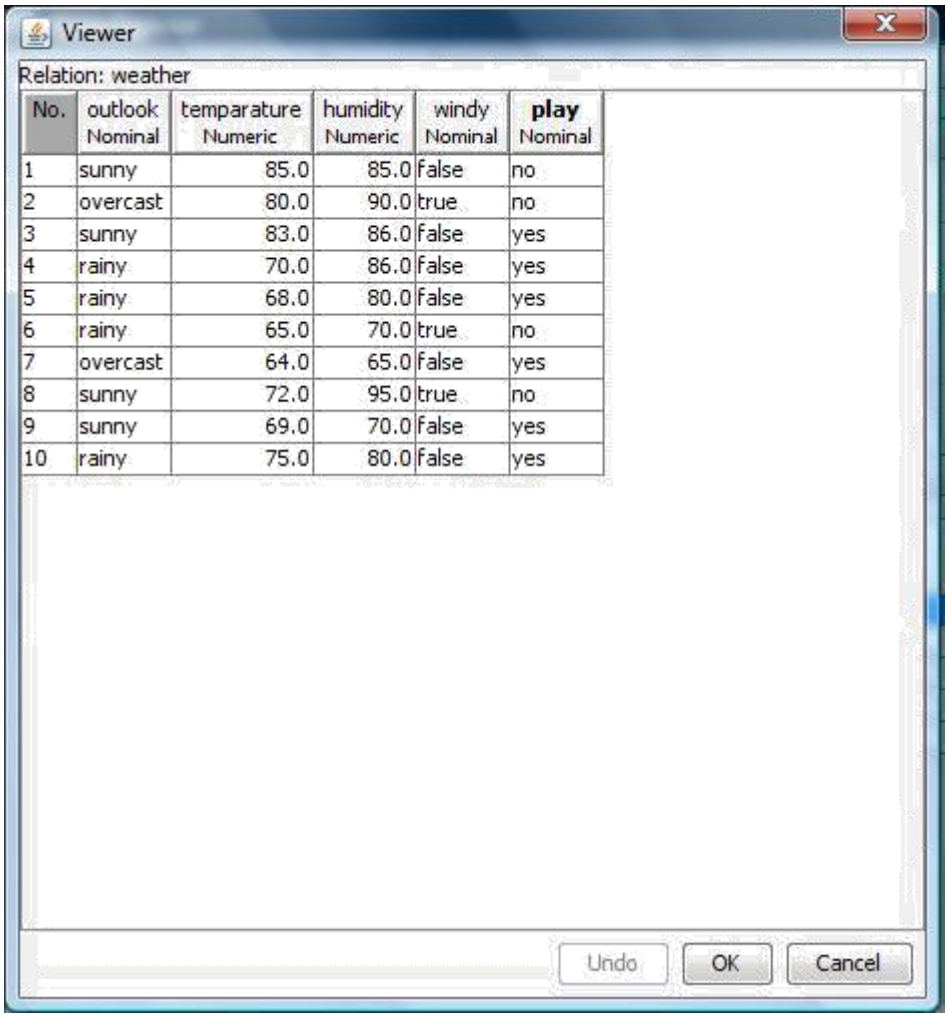
1) Open Start - Programs -Accessories - Notepad
2) Type the following training data set with the help of Notepad for Weather Table.

```
@relation weather
@attribute outlook {sunny,rainy,overcast}
@attribute temparature numeric
@attribute humidity numeric
@attribute windy {true,false}
@attribute play {yes,no}

@data
sunny,85.0,85.0,false,no
overcast,80.0,90.0,true,no
sunny,83.0,86.0,false,yes
rainy,70.0,86.0,false,yes
rainy,68.0,80.0,false,yes
rainy,65.0,70.0,true,no
overcast,64.0,65.0,false,yes
sunny,72.0,95.0,true,no
sunny,69.0,70.0,false,yes
rainy,75.0,80.0,false,yes
```

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start -Programs - weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows weather table on weka.

Training Data Set - Weather Table



Result:

This program has been successfully executed.

WEEK-2

Aim:

Implement various missing handling mechanisms

Description:

Real world databases are highly influenced to noise, missing and inconsistency due to their queue size so the data can be pre-processed to improve the quality of data and missing results and it also improves the efficiency.

There are 3 pre-processing techniques they are:

1) Add
2) Remove
3) Normalization

Creation of Weather Table:

Procedure:

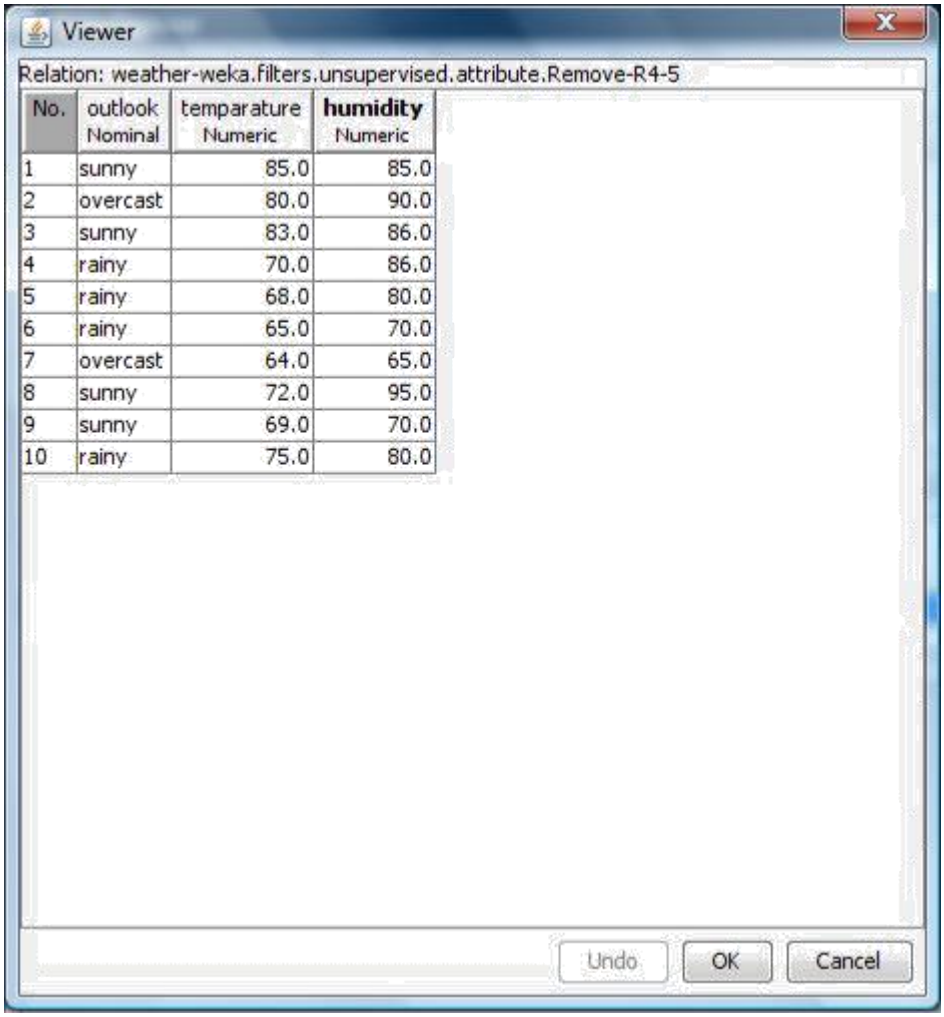
1) Open Start - Programs - Accessories - Notepad
2) Type the following training data set with the help of Notepad for Weather Table.

```
@relation weather
@attribute outlook {sunny,rainy,overcast}
@attribute temparature numeric
@attribute humidity numeric
@attribute windy {true,false}
@attribute play {yes,no}

@data
sunny,85.0,85.0,false,no
overcast,80.0,90.0,true,no
sunny,83.0,86.0,false,yes
rainy,70.0,86.0,false,yes
rainy,68.0,80.0,false,yes
rainy,65.0,70.0,true,no
overcast,64.0,65.0,false,yes
sunny,72.0,95.0,true,no
sunny,69.0,70.0,false,yes
rainy,75.0,80.0,false,yes
```

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows weather table on weka.

Weather Table after removing attributes WINDY, PLAY:



No.	outlook Nominal	temparature Numeric	**humidity** Numeric
1	sunny	85.0	85.0
2	overcast	80.0	90.0
3	sunny	83.0	86.0
4	rainy	70.0	86.0
5	rainy	68.0	80.0
6	rainy	65.0	70.0
7	overcast	64.0	65.0
8	sunny	72.0	95.0
9	sunny	69.0	70.0
10	rainy	75.0	80.0

Normalize -Pre-Processing Technique:

Procedure:

1) Start - Programs -Weka-3-4- Weka-3-4

2) Click on **explorer.**

3) Click on **open file.**

4) Select **Weather.arff** file and click on open.

5) Click on **Choose button** and select the **Filters option**.

6) In Filters, we have **Supervised** and **Unsupervised data**.

7) Click on **Unsupervised data**.

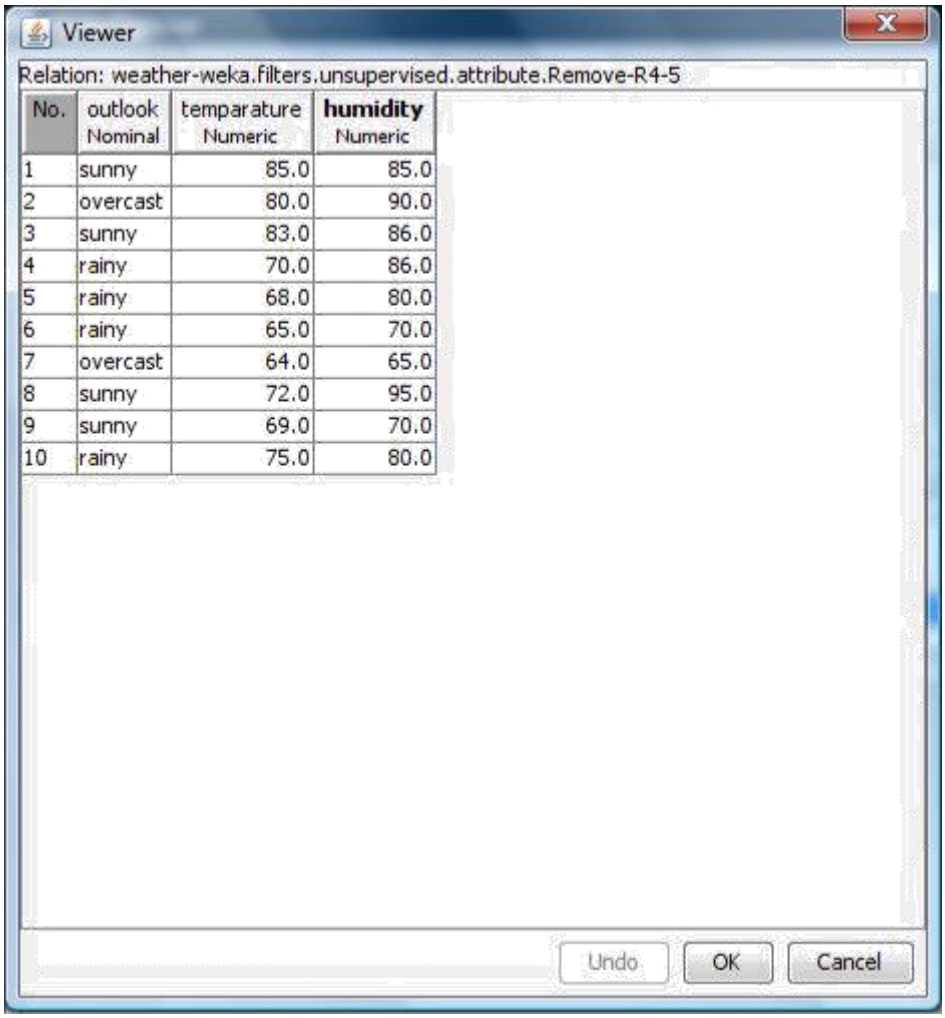
8) Select the attribute **Normalize**.

9) Select the attributes **temparature, humidity** to Normalize.

10) Click on **Apply button** and then **Save**.

11) Click on the **Edit button**, it shows a new Weather Table with normalized values on Weka.

Weather Table after Normalizing TEMPARATURE, HUMIDITY:
Weather Table after removing attributes WINDY, PLAY:



No.	outlook Nominal	temparature Numeric	humidity Numeric
1	sunny	85.0	85.0
2	overcast	80.0	90.0
3	sunny	83.0	86.0
4	rainy	70.0	86.0
5	rainy	68.0	80.0
6	rainy	65.0	70.0
7	overcast	64.0	65.0
8	sunny	72.0	95.0
9	sunny	69.0	70.0
10	rainy	75.0	80.0

Normalize -Pre-Processing Technique:
Procedure:

1) Start - Programs -Weka-3-4 -Weka-3-4

2) Click on **explorer.**

3) Click on **open file.**

4) Select **Weather.arff** file and click on open.

5) Click on **Choose button** and select the **Filters option**.

6) In Filters, we have **Supervised** and **Unsupervised data**.

7) Click on **Unsupervised data**.

8) Select the attribute **Normalize**.

9) Select the attributes **temparature, humidity** to Normalize.

10) Click on **Apply button** and then **Save**.

11) Click on the **Edit button**, it shows a new Weather Table with normalized values on Weka.

Weather Table after Normalizing TEMPARATURE, HUMIDITY:
Add -Pre-Processing Technique:
Procedure:

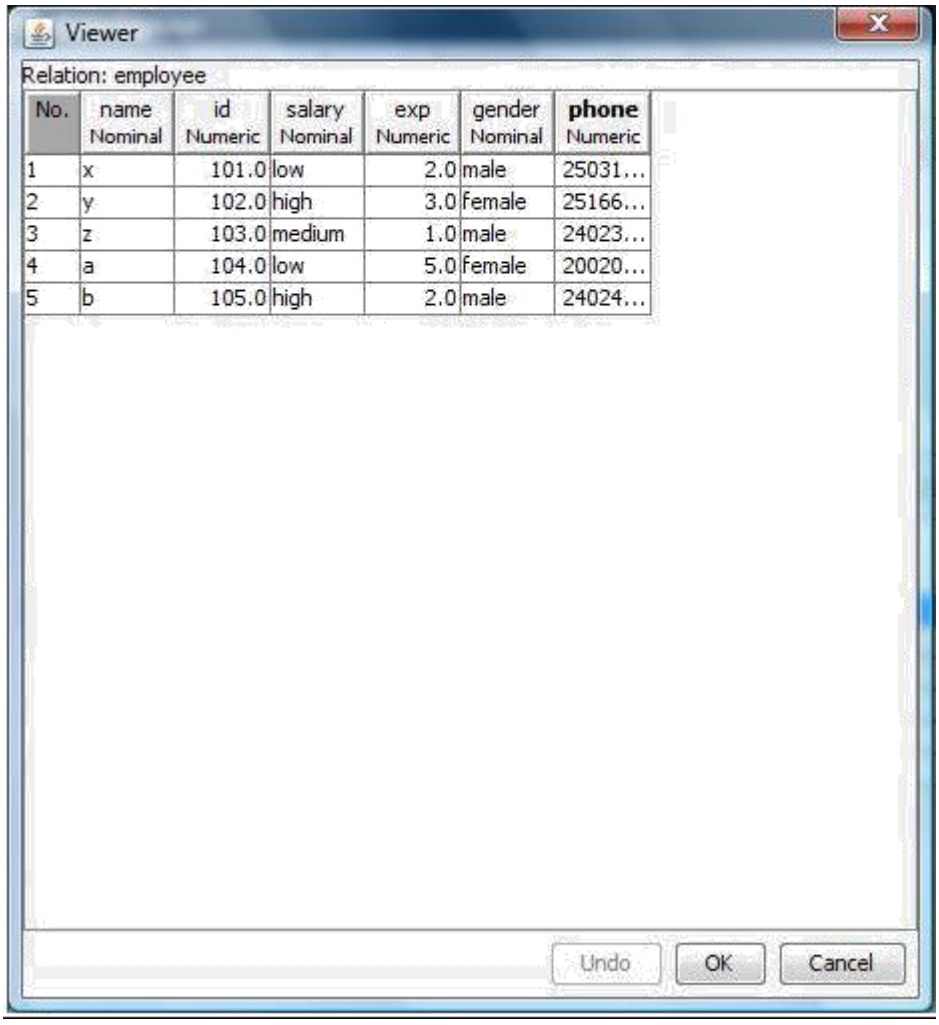
1) Start - Programs -Weka-3-4 -Weka-3-4
2) Click on **explorer.**
3) Click on **open file.**
4) Select **Weather.arff** file and click on open.
5) Click on **Choose button** and select the **Filters option**.
6) In Filters, we have **Supervised** and **Unsupervised data**.
7) Click on **Unsupervised data**.
8) Select the attribute **Add**.
9) A new window is opened.
10) In that we enter attribute index, type, data format, nominal label values for **Climate**.
11) Click on **OK**.
12) Press the **Apply button**, then a new attribute is added to the Weather Table.
13) **Save** the file.
14) Click on the **Edit button**, it shows a new Weather Table on Weka.

Weather Table after adding new attribute CLIMATE:
Add -Pre-Processing Technique:
Procedure:

1) Start - Programs - Weka-3-4 -Weka-3-4
2) Click on **explorer.**
3) Click on **open file.**
4) Select **Weather.arff** file and click on open.
5) Click on **Choose button** and select the **Filters option**.
6) In Filters, we have **Supervised** and **Unsupervised data**.
7) Click on **Unsupervised data**.
8) Select the attribute **Add**.
9) A new window is opened.
10) In that we enter attribute index, type, data format, nominal label values for **Climate**.
11) Click on **OK**.
12) Press the **Apply button**, then a new attribute is added to the Weather Table.
13) **Save** the file.
14) Click on the **Edit button**, it shows a new Weather Table on Weka.
05,high,2,male,240240

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows employee table on weka.

Training Data Set -Employee Table

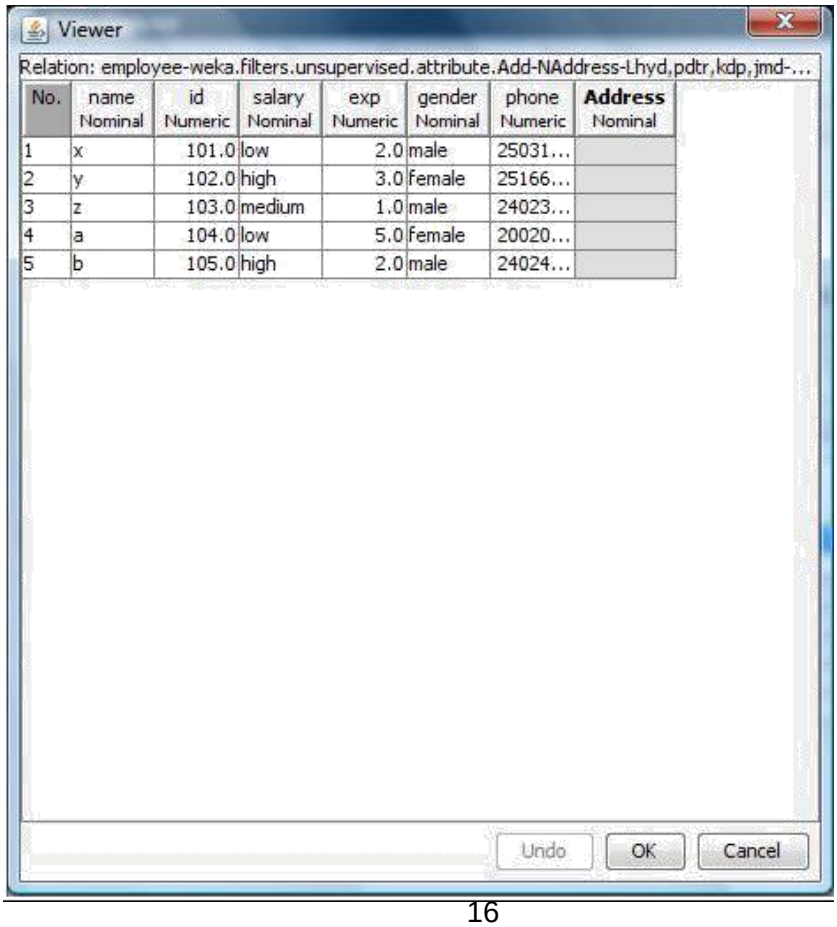


Add -Pre-Processing Technique:

Procedure:

1) Start - Programs -Weka-3-4 -Weka-3-4
2) Click on **explorer.**
3) Click on **open file.**
4) Select **Employee.arff** file and click on open.
5) Click on **Choose button** and select the **Filters option**.
6) In Filters, we have **Supervised** and **Unsupervised data**.
7) Click on **Unsupervised data**.
8) Select the attribute **Add**.
9) A new window is opened.
10) In that we enter attribute index, type, data format, nominal label values for **Address**.
11) Click on **OK**.
12) Press the **Apply button**, then a new attribute is added to the Employee Table.
13) **Save** the file.
14) Click on the **Edit button**, it shows a new Employee Table on Weka.

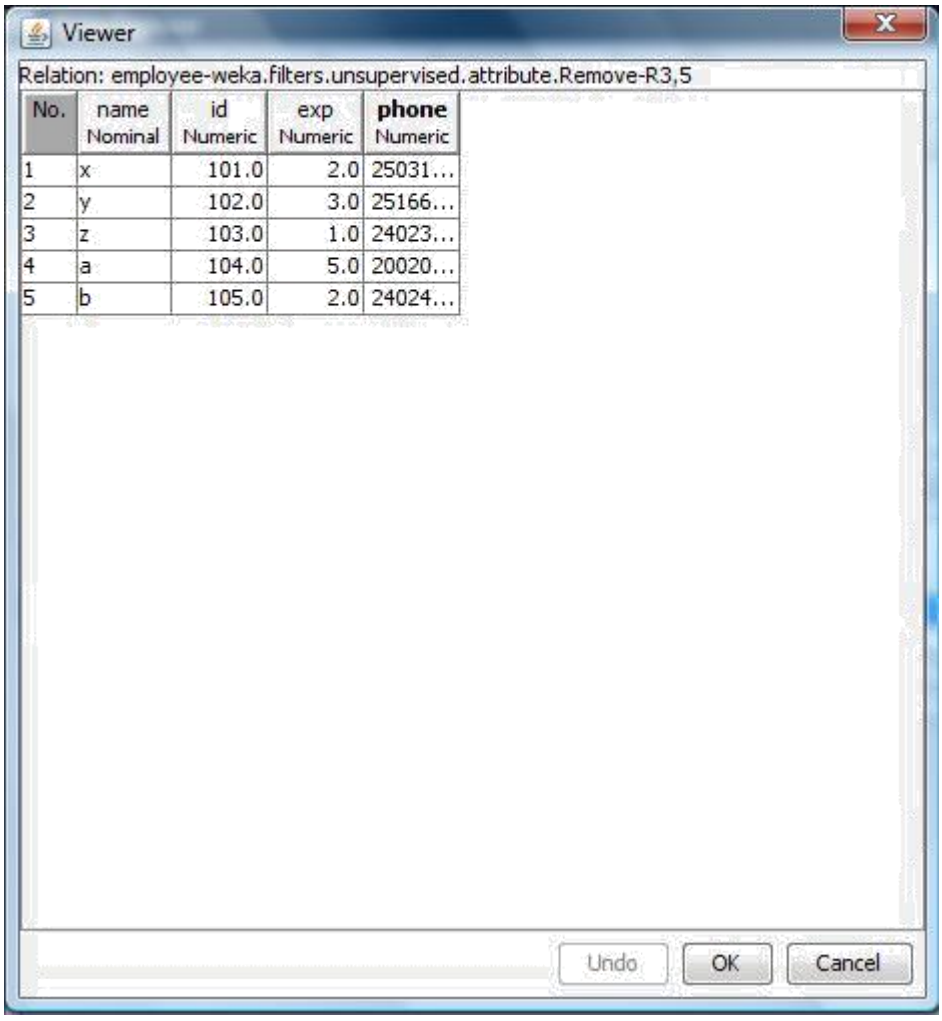
Employee Table after adding new attribute ADDRESS:



Remove -Pre-Processing Technique:
Procedure:

1) Start - Programs -Weka-3-4 -Weka-3-4
2) Click on **explorer.**
3) Click on **open file.**
4) Select **Employee.arff** file and click on open.
5) Click on **Choose button** and select the **Filters option**.
6) In Filters, we have **Supervised** and **Unsupervised data**.
7) Click on **Unsupervised data**.
8) Select the attribute **Remove**.
9) Select the attributes **salary, gender** to Remove.
10) Click **Remove button** and then **Save**.
11) Click on the **Edit button**, it shows a new Employee Table on Weka.

Employee Table after removing attributes SALARY, GENDER:



Normalize -Pre-Processing Technique:

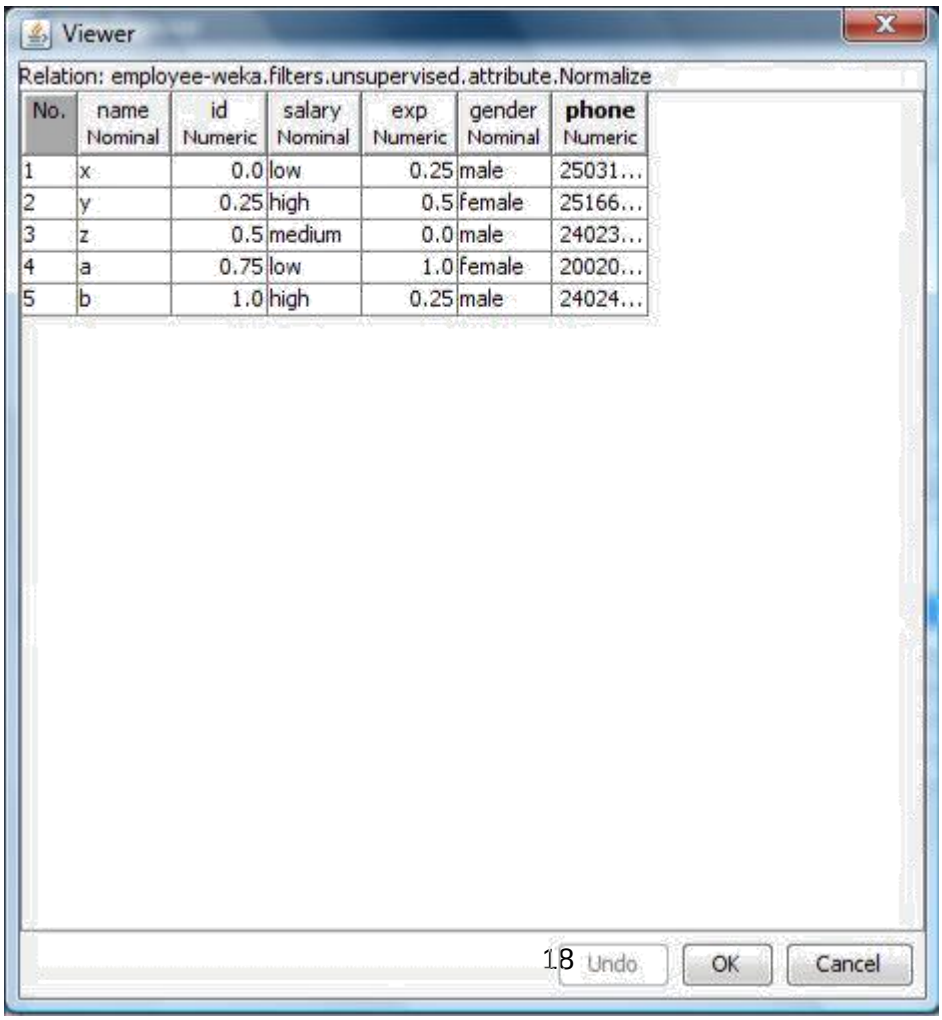
Procedure:

1) Start -Programs -Weka-3-4 -Weka-3-4
2) Click on **explorer.**
3) Click on **open file.**
4) Select **Employee.arff** file and click on open.
5) Click on **Choose button** and select the **Filters option**.
6) In Filters, we have **Supervised** and **Unsupervised data**.
7) Click on **Unsupervised data**.
8) Select the attribute **Normalize**.
9) Select the attributes **id, experience, phone** to Normalize.
10) Click on **Apply button** and then **Save**.
11) Click on the **Edit button**, it shows a new Employee Table with normalized values on Weka.

Employee Table after Normalizing ID, EXP, PHONE:

Result:

This program has been successfully executed.



WEEK-3

Aim:

Develop k-means and MST based clustering techniques

Description:

The knowledge flow provides an alternative way to the explorer as a graphical front end to WEKA's algorithm. Knowledge flow is a working progress. So, some of the functionality from explorer is not yet available. So, on the other hand there are the things that can be done in knowledge flow, but not in explorer. Knowledge flow presents a dataflow interface to WEKA. The user can select WEKA components from a toolbar placed them on a layout campus and connect them together in order to form a knowledge flow for processing and analyzing the data.

Creation of Weather Table:

Procedure:

1) Open Start -Programs -Accessories - Notepad
2) Type the following training data set with the help of Notepad for Weather Table.

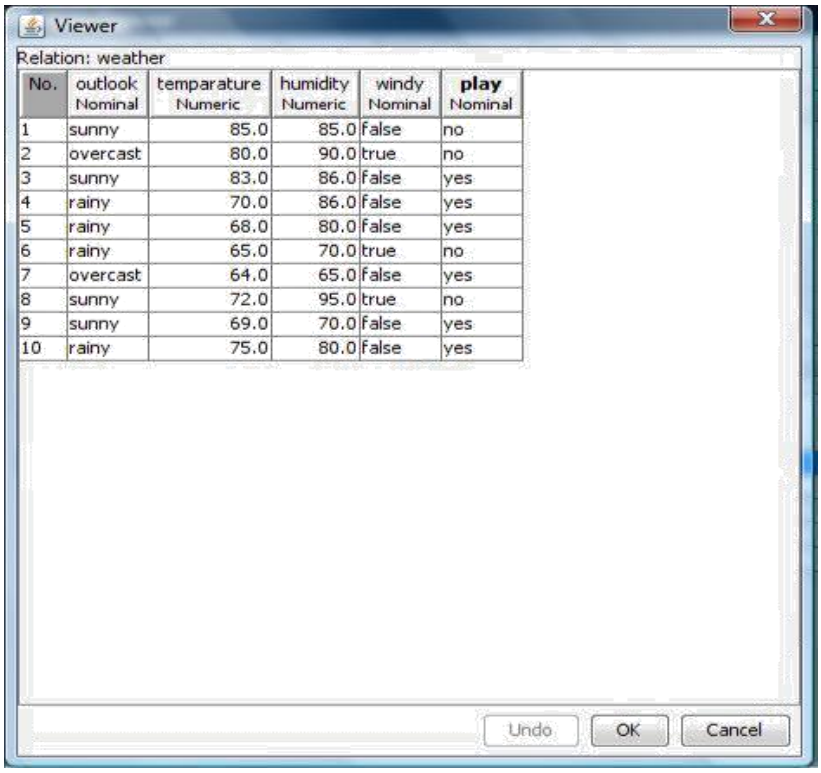
```
@relation weather
@attribute outlook {sunny,rainy,overcast}
@attribute temparature numeric
@attribute humidity numeric
@attribute windy {true,false}
@attribute play {yes,no}

@data
sunny,85.0,85.0,false,no
overcast,80.0,90.0,true,no
sunny,83.0,86.0,false,yes
rainy,70.0,86.0,false,yes
rainy,68.0,80.0,false,yes
rainy,65.0,70.0,true,no
overcast,64.0,65.0,false,yes
sunny,72.0,95.0,true,no
sunny,69.0,70.0,false,yes
rainy,75.0,80.0,false,yes
```

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows Weather table on weka.

Output:

Training Data Set -Weather Table



Procedure for Knowledge Flow:

1) Open Start → Programs → Weka-3-4 → Weka-3-4

2) Open the **Knowledge Flow**.

3) Select the **Data Source component** and **add Arff Loader** into the **knowledge layout canvas**.

4) Select the **Filters component** and **add Attribute Selection** and N**ormalize** into the knowledge layout canvas.

5) Select the **Data Sinks** component and **add Arff Saver** into the knowledge layout canvas.

6) Right click on **Arff Loader** and select **Configure option** then the new window will be opened and select **Weather.arff**

7) Right click on **Arff Loader** and select **Dataset option** then establish a link between **Arff Loader** and A**ttribute Selection**.

8) Right click on **Attribute Selection** and select **Dataset option** then establish a link between **AttributeSelection** and **Normalize**.

9) Right click on **Attribute Selection** and select **Configure option** and choose the best attribute for Weather data.

10) Right click on **Normalize** and select **Dataset option** then establish a link between **Normalize** and **Arff Saver**.

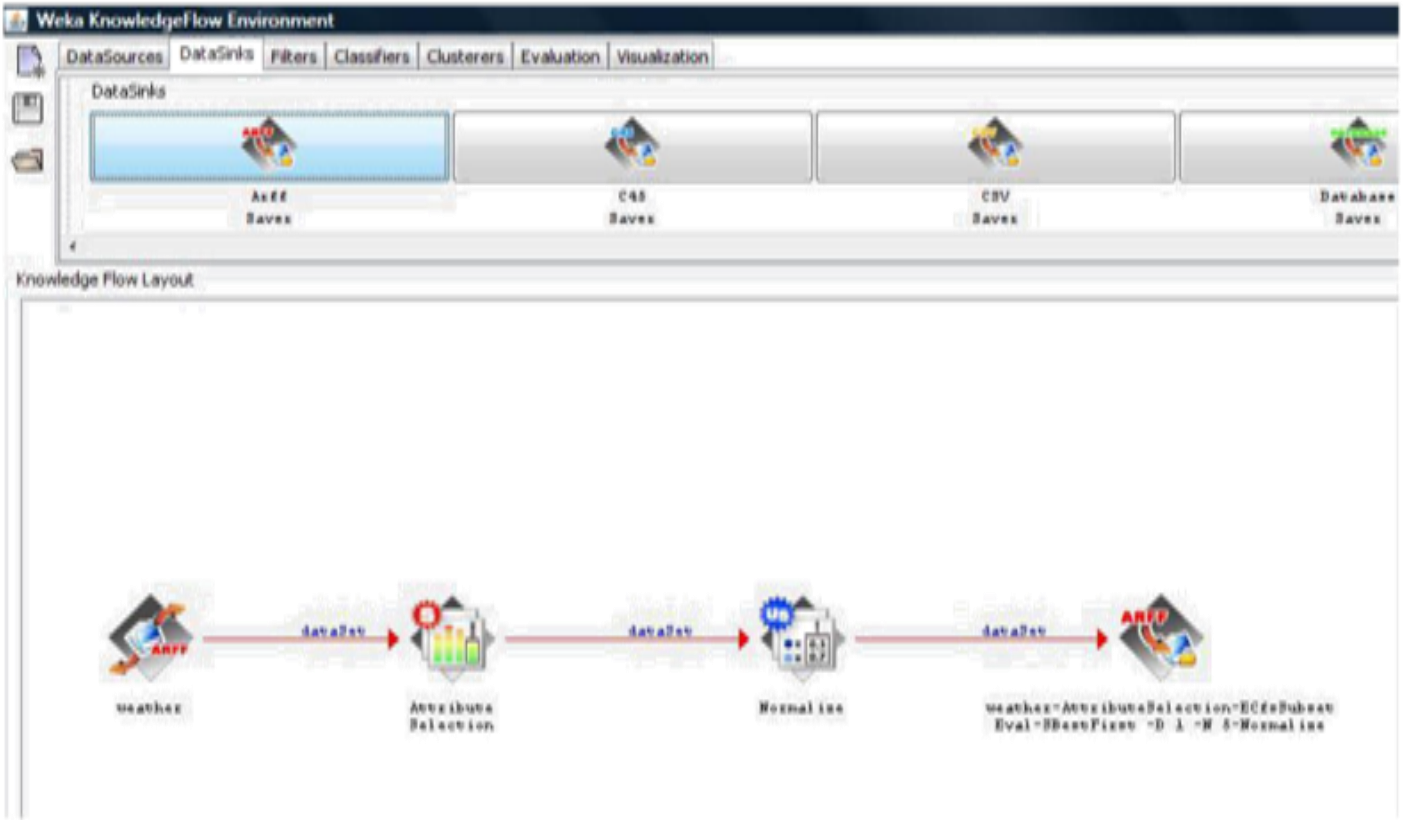
11) Right click on **Arff Saver** and select **Configure option** then new window will be opened and set the path, enter **.arff** in look in dialog box to save normalize data.

12) Right click on **Arff Loader** and click on **Start Loading option** then everything will be executed one by one.

13) Check whether output is created or not by selecting the preferred path.

14) Rename the data name as **a.arff**

15) Double click on **a.arff** then automatically the output will be opened in **MS-Excel**.



Result:

This program has been successfully executed.

Aim:

Develop the methodology for assessment of clusters for given dataset

Description:

The knowledge flow provides an alternative way to the explorer as a graphical front end to WEKA's algorithm. Knowledge flow is a working progress. So, some of the functionality from explorer is not yet available. So, on the other hand there are the things that can be done in knowledge flow, but not in explorer. Knowledge flow presents a dataflow interface to WEKA. The user can select WEKA components from a toolbar placed them on a layout campus and connect them together in order to form a knowledge flow for processing and analyzing the data.

Creation of Employee Table:

Procedure:

1) Open Start- Programs - Accessories -Notepad

2) Type the following training data set with the help of Notepad for Employee Table. @relation employee

```
@attribute eid numeric
@attribute ename {raj,ramu,anil,sunil,rajiv,sunitha,kavitha,suresh,ravi,ramana,ram,kavya,navya}
@attribute salary numeric
@attribute exp numeric
@attribute address {pdtr,kdp,nlr,gtr}
@data
101,raj,10000,4,pdtr
102,ramu,15000,5,pdtr
103,anil,12000,3,kdp
104,sunil,13000,3,kdp
105,rajiv,16000,6,kdp
106,sunitha,15000,5,nlr
107,kavitha,12000,3,nlr
108,suresh,11000,5,gtr
109,ravi,12000,3,gtr
110,ramana,11000,5,gtr
111,ram,12000,3,kdp
112,kavya,13000,4,kdp
113,navya,14000,5,kdp
```

3) After that the file is saved with **.arff** file format.

4) Minimize the arff file and then open Start → Programs → weka-3-4.

5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.

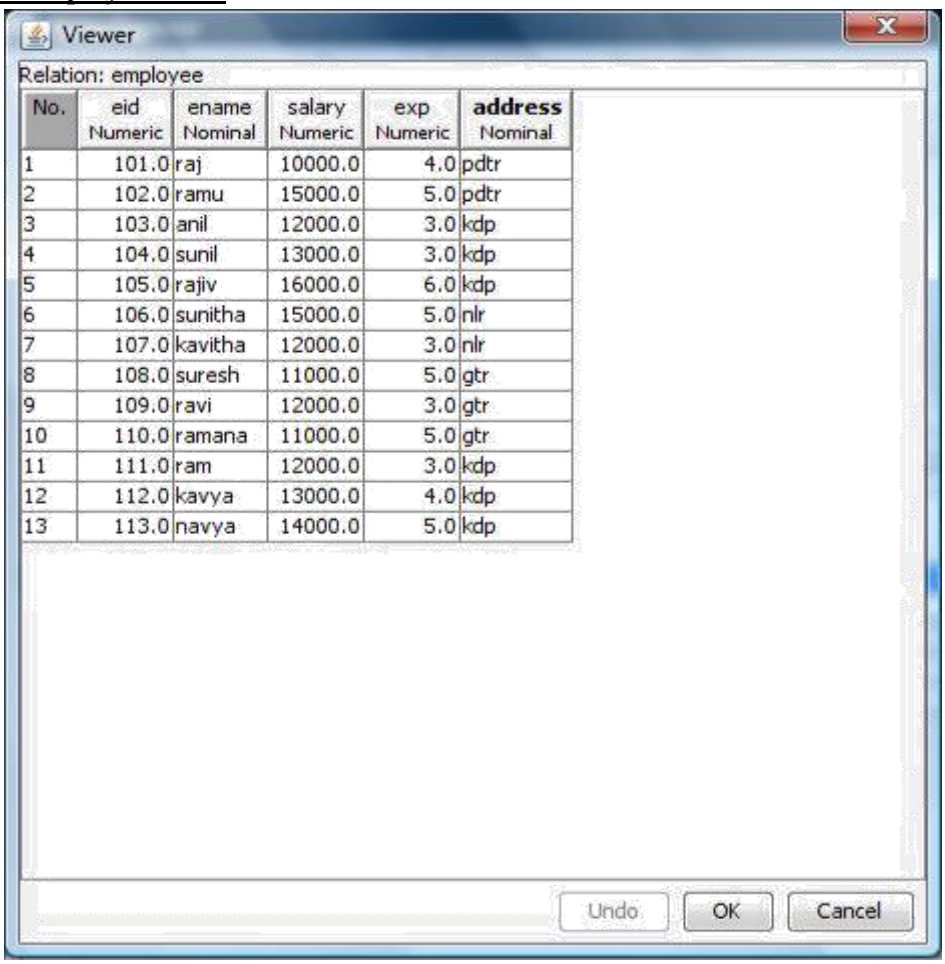
6) In that dialog box there are four modes, click on **explorer**.

7) Explorer shows many options. In that click on **'open file'** and select the arff file

8) Click on **edit button** which shows employee table on weka.

Output:

Training Data Set -Employee Table



Procedure for Knowledge Flow:

1) Open Start -Programs -Weka-3-4- Weka-3-4
2) Open the **Knowledge Flow**.
3) Select the **Data Source component** and **add Arff Loader** into the **knowledge layout canvas**.
4) Select the **Filters component** and **add Attribute Selection** and N**ormalize** into the knowledge layout canvas.
5) Select the **Data Sinks** component and **add Arff Saver** into the knowledge layout canvas.
6) Right click on **Arff Loader** and select **Configure option** then the new window will be opened and select **Employee.arff**
7) Right click on **Arff Loader** and select **Dataset option** then establish a link between **Arff Loader** and A**ttribute Selection**.
8) Right click on **Attribute Selection** and select **Dataset option** then establish a link between **AttributeSelection** and **Normalize**.
9) Right click on **Attribute Selection** and select **Configure option** and choose the best attribute for Employee data.
10) Right click on **Normalize** and select **Dataset option** then establish a link between **Normalize** and **Arff Saver**.
11) Right click on **Arff Saver** and select **Configure option** then new window will be opened and set the path, enter **.arff** in look in dialog box to save normalize data.
12) Right click on **Arff Loader** and click on **Start Loading option** then everything will be executed one by one.

13) Check whether output is created or not by selecting the preferred path.

14) Rename the data name as **a.arff**

15) Double click on **a.arff** then automatically the output will be opened in **MS-Excel**.

Result:

This program has been successfully executed.

WEEK-4

Aim: Design algorithms for association rule mining algorithms

Description:

In data mining, **associationrule learning** is a popular and well researched method for discovering interesting relations between variables in large databases. It can be described as analyzing and presenting strong rules discovered in databases using different measures of interestingness. In market basket analysis association rules are used and they are also employed in many application areas including Web usage mining, intrusion detection and bioinformatics.

Creation of Buying Table:

Procedure:

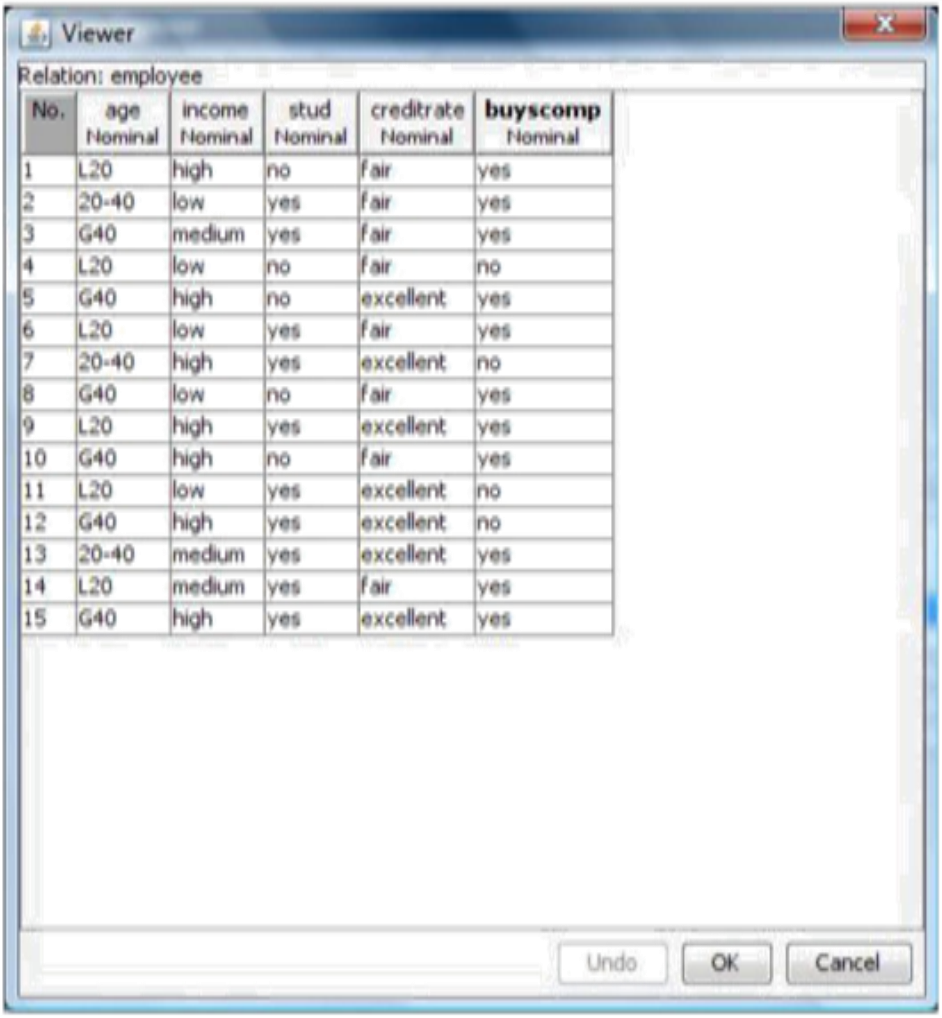
1) Open Start - Programs -Accessories Notepad
2) Type the following training data set with the help of Notepad for Buying Table. @relation buying
   @attribute age {L20,20-40,G40}
   @attribute income {high,medium,low}
   @attribute stud {yes,no} @attribute
   creditrate {fair,excellent} @attribute
   buyscomp {yes,no} @data

   L20,high,no,fair,yes
   20-40,low,yes,fair,yes
   G40,medium,yes,fair,yes
   L20,low,no,fair,no
   G40,high,no,excellent,yes
   L20,low,yes,fair,yes
   20-40,high,yes,excellent,no
   G40,low,no,fair,yes
   L20,high,yes,excellent,yes
   G40,high,no,fair,yes
   L20,low,yes,excellent,no
   G40,high,yes,excellent,no
   20-40,medium,yes,excellent,yes
   L20,medium,yes,fair,yes
   G40,high,yes,excellent,yes

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows buying table on weka.

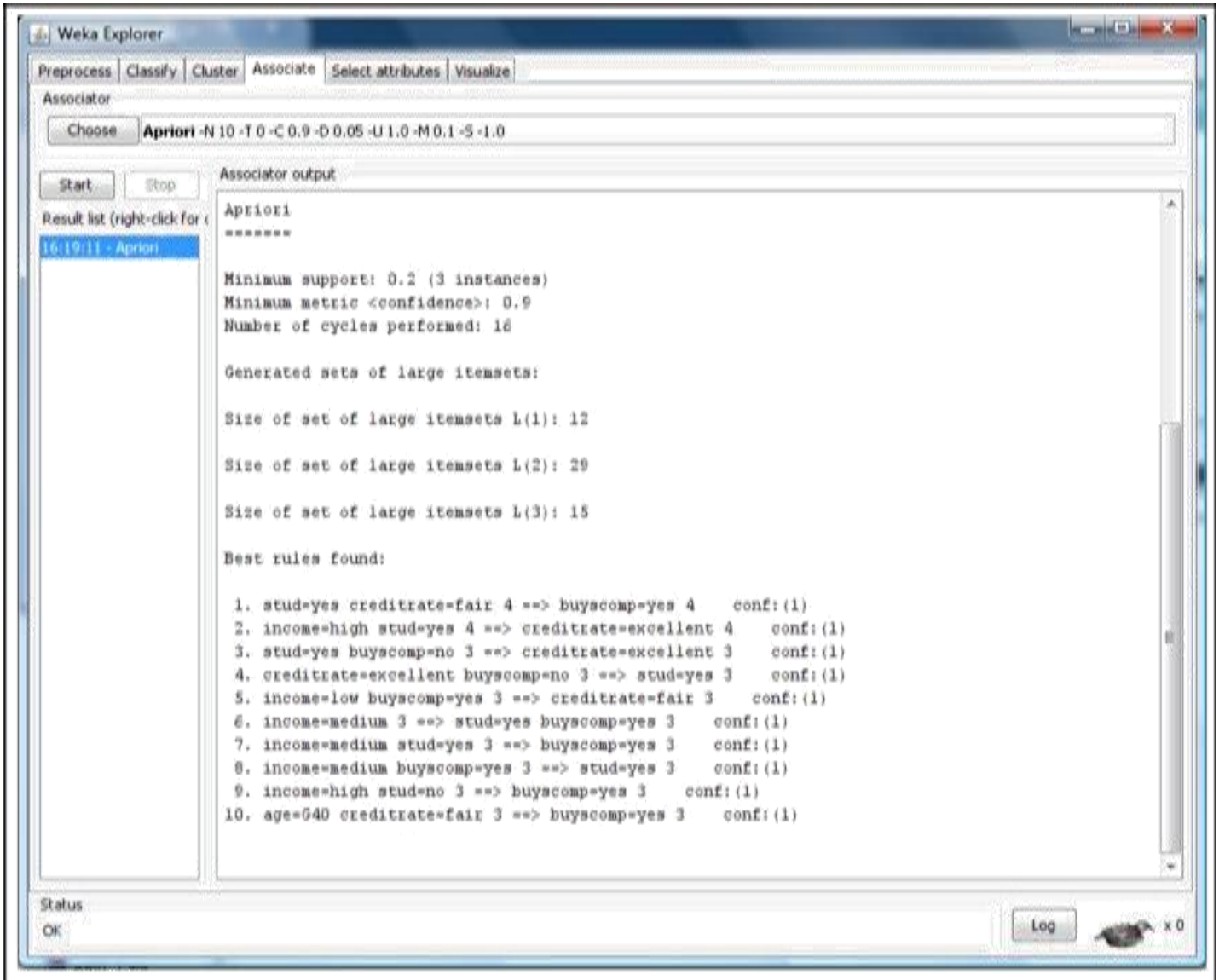
Output:

Training Data Set -Buying Table



Procedure for Association Rules:

1) Open Start -Programs - Weka-3-4 -Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **buying.arff**
4) Select **Associate option** on the top of the Menu bar.
5) Select **Choose button** and then click on **Apriori Algorithm**.
6) Click on **Start button** and output will be displayed on the **right side** of the window.



Result:

This program has been successfully executed.

WEEK-5

Aim:

Derive the hypothesis for association rules to discovery of strong association rules; Use confidence and support thresholds.

Description:

In data mining, **associationrule learning** is a popular and well researched method for discovering interesting relations between variables in large databases. It can be described as analyzing and presenting strong rules discovered in databases using different measures of interestingness. In market basket analysis association rules are used and they are also employed in many application areas including Web usage mining, intrusion detection and bioinformatics.

Creation of Banking Table:

Procedure:

1) Open Start- Programs - Accessories - Notepad
2) Type the following training data set with the help of Notepad for Banking Table. @relation bank

@attribute cust {male,female} @attribute accno

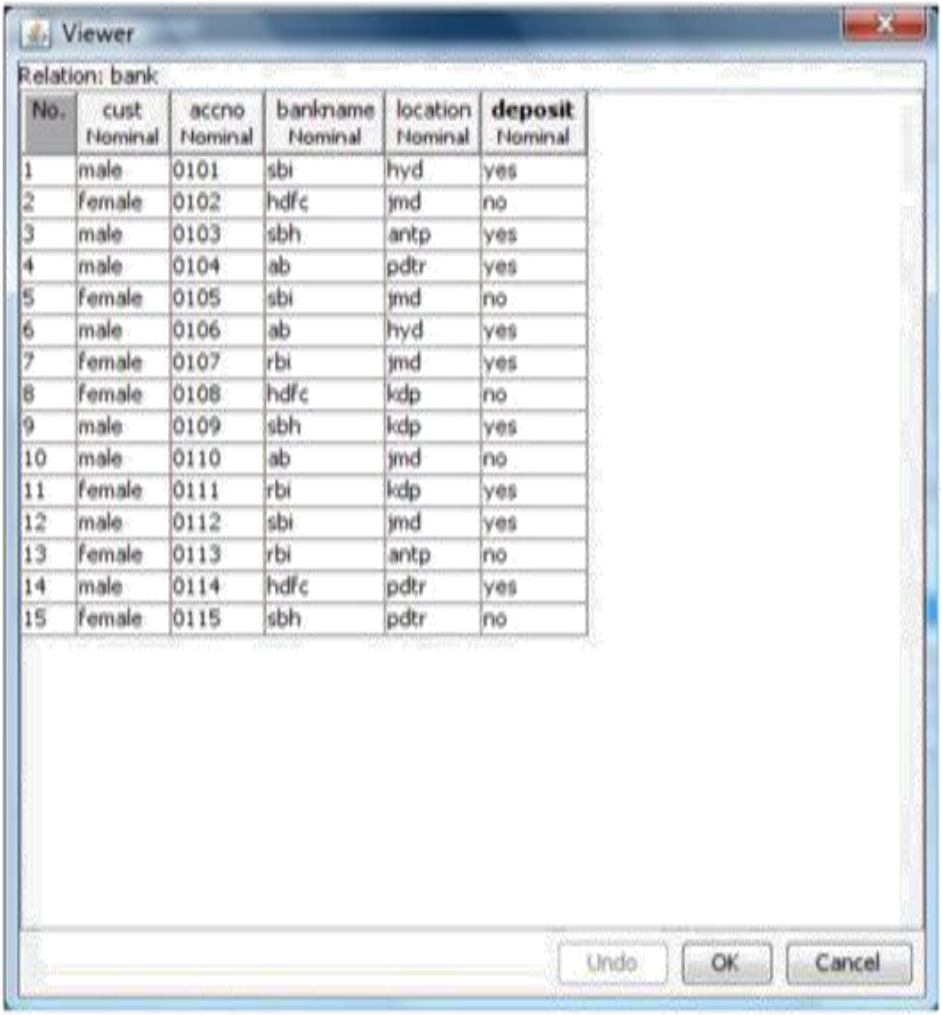
{0101,0102,0103,0104,0105,0106,0107,0108,0109,0110,0111,0112,0113,0114,0115}

@attribute bankname {sbi,hdfc,sbh,ab,rbi}

@attribute location {hyd,jmd,antp,pdtr,kdp}
@attribute deposit {yes,no}
@data
male,0101,sbi,hyd,yes
female,0102,hdfc,jmd,no
male,0103,sbh,antp,yes
male,0104,ab,pdtr,yes
female,0105,sbi,jmd,no
male,0106,ab,hyd,yes
female,0107,rbi,jmd,yes
female,0108,hdfc,kdp,no
male,0109,sbh,kdp,yes
male,0110,ab,jmd,no
female,0111,rbi,kdp,yes
male,0112,sbi,jmd,yes
female,0113,rbi,antp,no
male,0114,hdfc,pdtr,yes
female,0115,sbh,pdtr,no

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows banking table on weka.

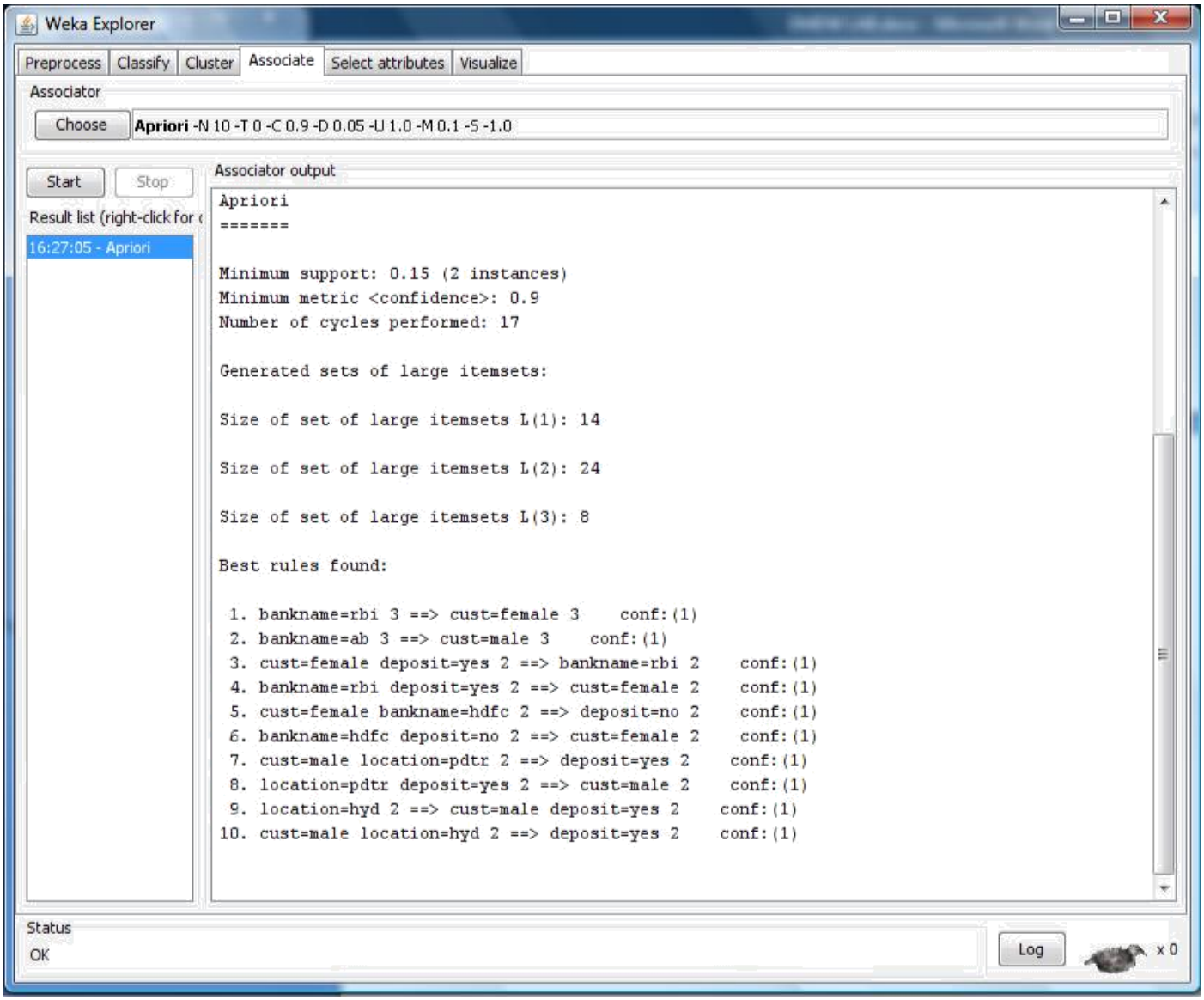
Training Data Set -Banking Table



Procedure for Association Rules:

1) Open Start -Programs -Weka-3-4- Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **bank.arff**
4) Select **Associate option** on the top of the Menu bar.
5) Select **Choose button** and then click on **Apriori Algorithm**.
6) Click on **Start button** and output will be displayed on the **right side** of the window.

Output:



Result:

This program has been successfully executed.

WEEK-6

Aim: Construct Haar wavelet transformation for numerical data.

Description:

In data mining, **associationrule learning** is a popular and well researched method for discovering interesting relations between variables in large databases. It can be described as analyzing and presenting strong rules discovered in databases using different measures of interestingness. In market basket analysis association rules are used and they are also employed in many application areas including Web usage mining, intrusion detection and bioinformatics.

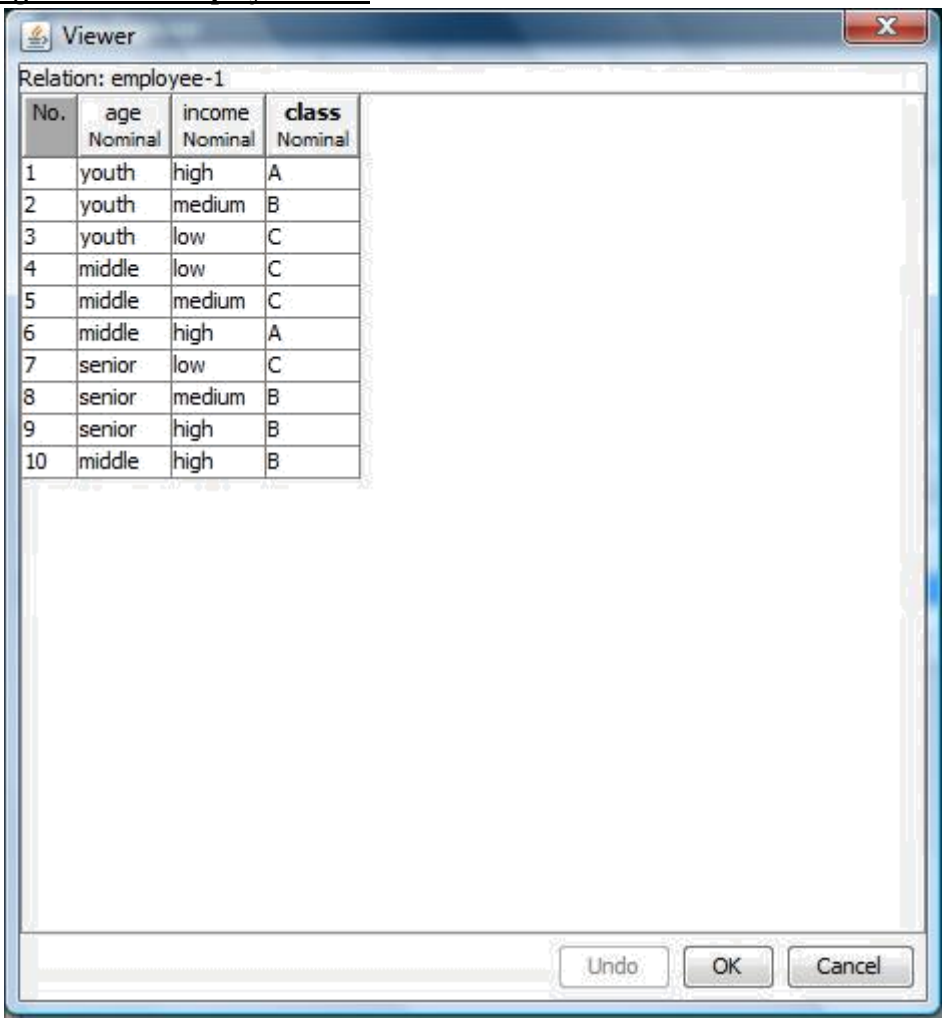
Creation of Banking Table:

Procedure:

1) Open Start -Programs - Accessories - Notepad
2) Type the following training data set with the help of Notepad for Employee Table. @relation employee-1
   @attribute age {youth, middle, senior}
   @attribute income {high, medium,
   low} @attribute class {A, B, C}

   @data
   youth, high, A
   youth,medium,B
   youth, low, C
   middle, low, C
   middle, medium, C
   middle, high, A
   senior, low, C
   senior, medium, B
   senior, high, B
   middle, high, B
3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows employee table on weka.

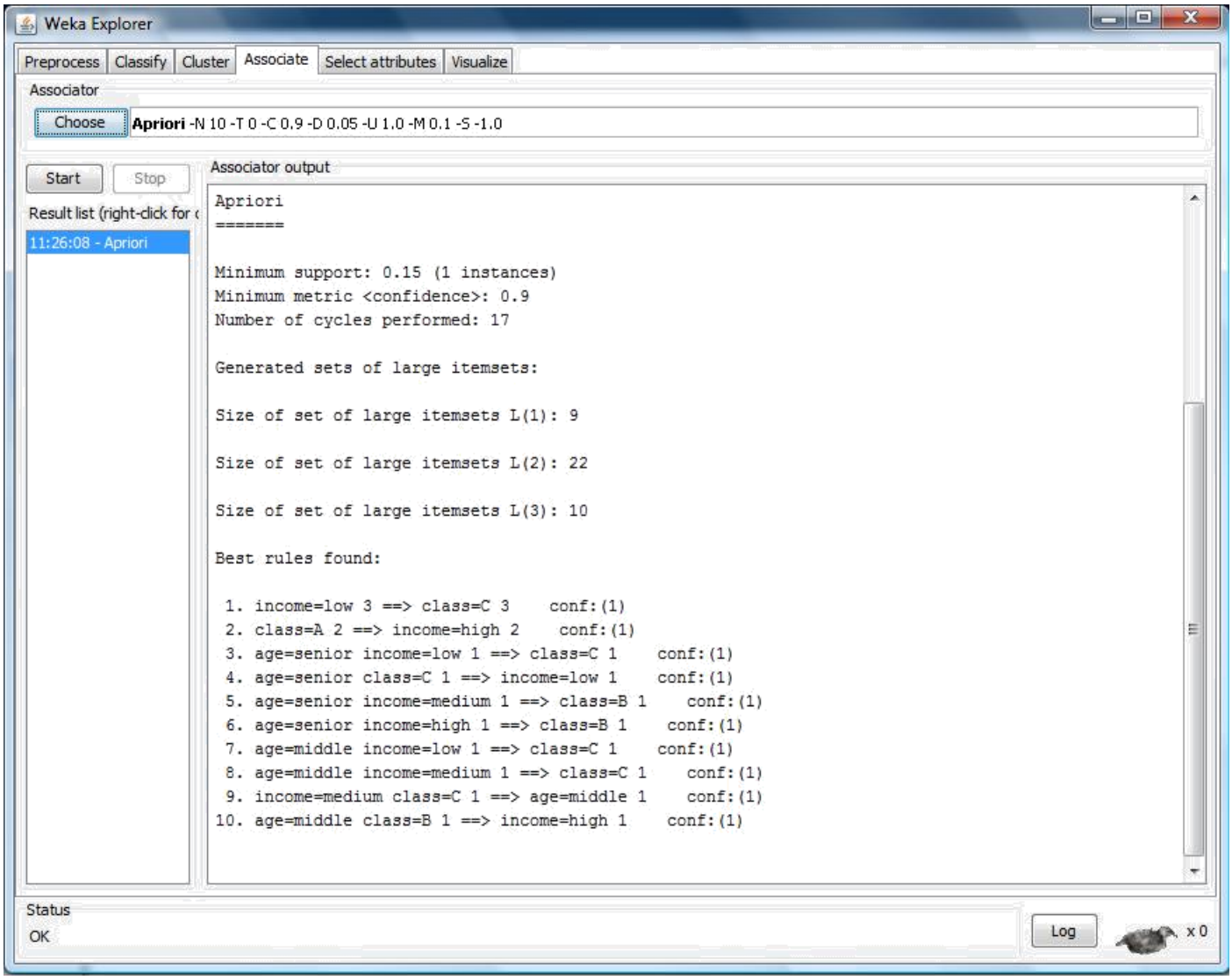
Training Data Set -Employee Table



Procedure for Association Rules:

1) Open Start- Programs - Weka-3-4 -Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **employee-1.arff**
4) Select **Associate option** on the top of the Menu bar.
5) Select **Choose button** and then click on **Apriori Algorithm**.
6) Click on **Start button** and output will be displayed on the **right side** of the window.

Output:



Result:

This program has been successfully executed.

Aim:

Construct principal component analysis (PCA) for 5 dimentional data

Description:

Classification & Prediction:

Classification is the process for finding a model that describes the data values and concepts for the purpose of Prediction.

Decision Tree:

A decision Tree is a classification scheme to generate a tree consisting of root node, internal nodes and external nodes.

Root nodes representing the attributes. Internal nodes are also the attributes. External nodes are the classes and each branch represents the values of the attributes

Decision Tree also contains set of rules for a given data set; there are two subsets in Decision Tree. One is a Training data set and second one is a Testing data set. Training data set is previously classified data. Testing data set is newly generated data.

Creation of Weather Table:

Procedure:

1) Open Start -Programs -Accessories -Notepad

2) Type the following training data set with the help of Notepad for Weather Table. @relation weather
@attribute outlook {sunny, rainy, overcast}
@attribute temperature numeric @attribute humidity numeric
@attribute windy {TRUE, FALSE} @attribute play {yes, no}

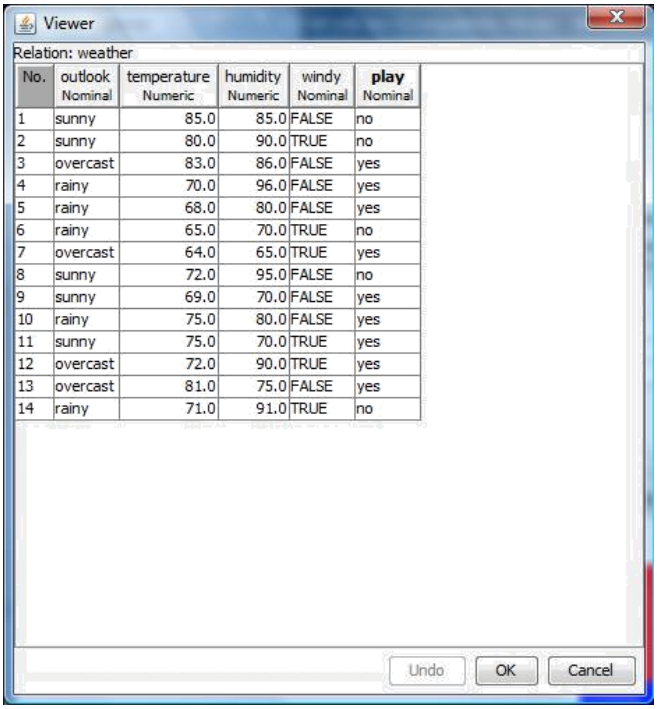
@data
sunny,85,85,FALSE,no
sunny,80,90,TRUE,no
overcast,83,86,FALSE,yes
rainy,70,96,FALSE,yes
rainy,68,80,FALSE,yes
rainy,65,70,TRUE,no
overcast,64,65,TRUE,yes
sunny,72,95,FALSE,no
sunny,69,70,FALSE,yes
rainy,75,80,FALSE,yes
sunny,75,70,TRUE,yes
overcast,72,90,TRUE,yes
overcast,81,75,FALSE,yes
rainy,71,91,TRUE,no

3) After that the file is saved with **.arff** file format.

4) Minimize the arff file and then open Start -Programs -weka-3-4.

5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows weather table on weka.

Training Data Set -Weather Table

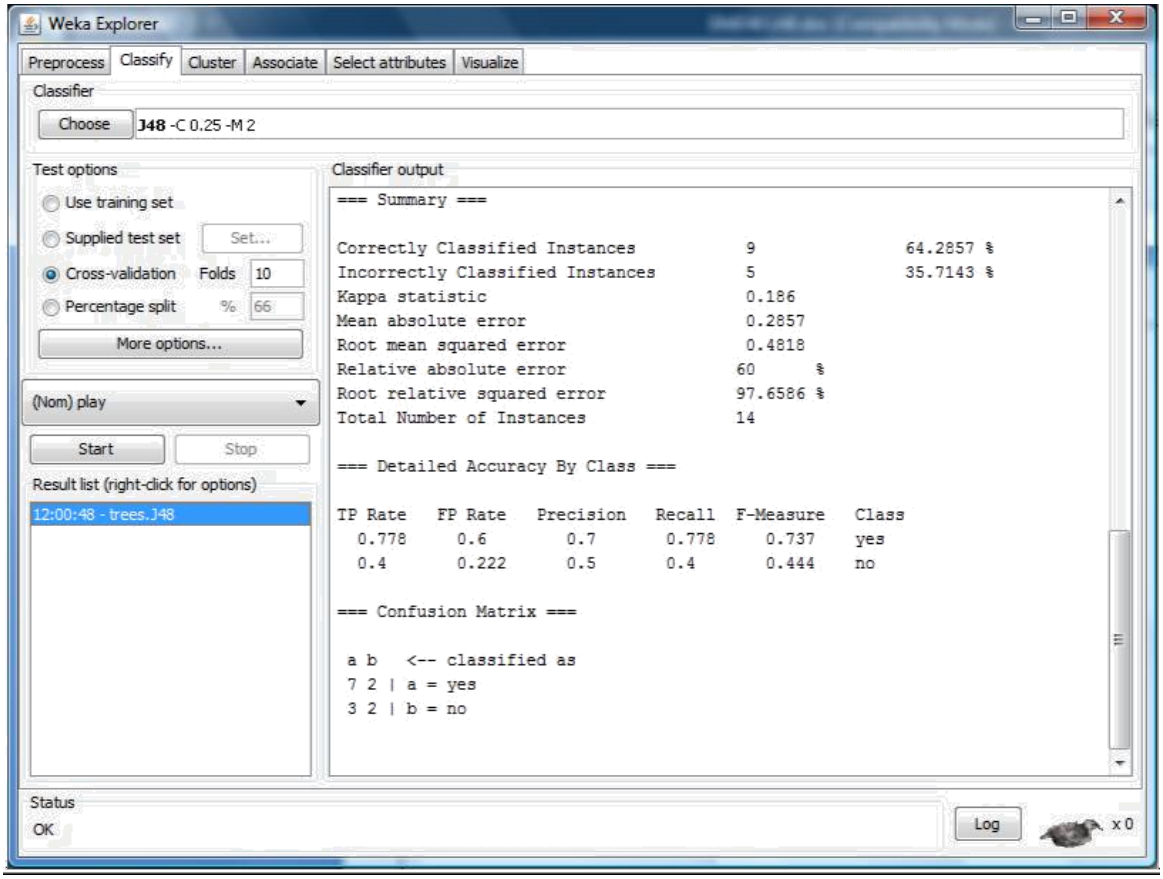


No.	outlook Nominal	temperature Numeric	humidity Numeric	windy Nominal	play Nominal
1	sunny	85.0	85.0	FALSE	no
2	sunny	80.0	90.0	TRUE	no
3	overcast	83.0	86.0	FALSE	yes
4	rainy	70.0	96.0	FALSE	yes
5	rainy	68.0	80.0	FALSE	yes
6	rainy	65.0	70.0	TRUE	no
7	overcast	64.0	65.0	TRUE	yes
8	sunny	72.0	95.0	FALSE	no
9	sunny	69.0	70.0	FALSE	yes
10	rainy	75.0	80.0	FALSE	yes
11	sunny	75.0	70.0	TRUE	yes
12	overcast	72.0	90.0	TRUE	yes
13	overcast	81.0	75.0	FALSE	yes
14	rainy	71.0	91.0	TRUE	no

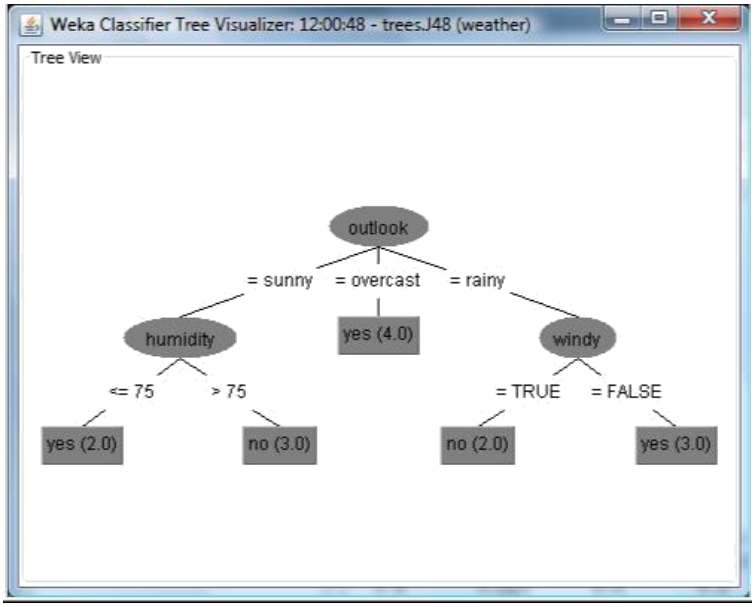
Procedure for Decision Trees:

1) Open Start -Programs -Weka-3-4 - Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **weather.arff**
4) Select **Classifier option** on the top of the Menu bar.
5) Select **Choose button** and click on **Tree option**.
6) Click on **J48.**
7) Click on **Start button** and output will be displayed on the **right side** of the window.
8) Select the **result list** and **right click** on result list and select **Visualize Tree option**.
9) Then **Decision Tree** will be displayed on **new window**.

Output:



Decision Tree:



Result: This program has been successfully executed.

WEEK-7

Aim:

Implement binning visualizations for any real time dataset, Implement linear regression techniques

Description:

Classification & Prediction:

Classification is the process for finding a model that describes the data values and concepts for the purpose of Prediction.

Decision Tree:

A decision Tree is a classification scheme to generate a tree consisting of root node, internal nodes and external nodes.

Root nodes representing the attributes. Internal nodes are also the attributes. External nodes are the classes and each branch represents the values of the attributes

Decision Tree also contains set of rules for a given data set; there are two subsets in Decision Tree. One is a Training data set and second one is a Testing data set. Training data set is previously classified data. Testing data set is newly generated data.

Creation of Customer Table:

Procedure:

1) Open Start- Programs- Accessories -Notepad

2) Type the following training data set with the help of Notepad for Customer Table. @relation customer

```
@attribute name {x,y,z,u,v,l,w,q,r,n}
@attribute age {youth,middle,senior}
@attribute income {high,medium,low}
@attribute class {A,B}

@data
x,youth,high,A
y,youth,low,B
z,middle,high,A
u,middle,low,B
v,senior,high,A
l,senior,low,B
w,youth,high,A
q,youth,low,B
r,middle,high,A
n,senior,high,A
```

3) After that the file is saved with **.arff** file format.

4) Minimize the arff file and then open Start → Programs → weka-3-4.

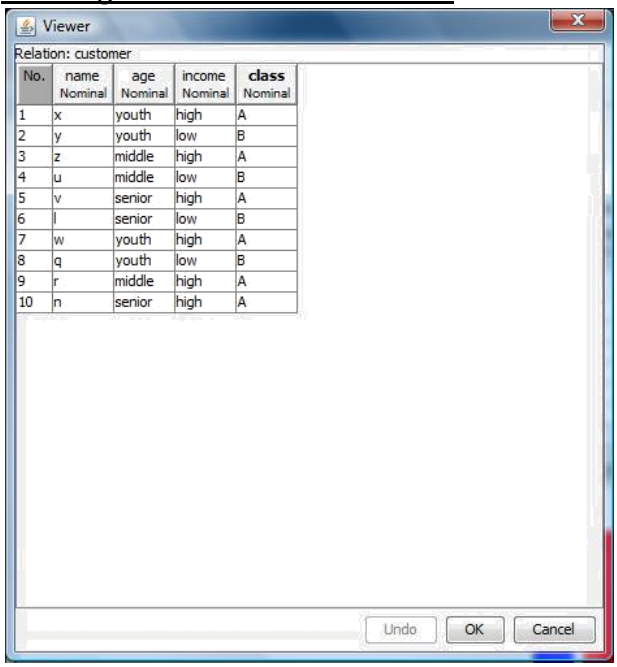
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.

6) In that dialog box there are four modes, click on **explorer**.

7) Explorer shows many options. In that click on **'open file'** and select the arff file

8) Click on **edit button** which shows customer table of weka.

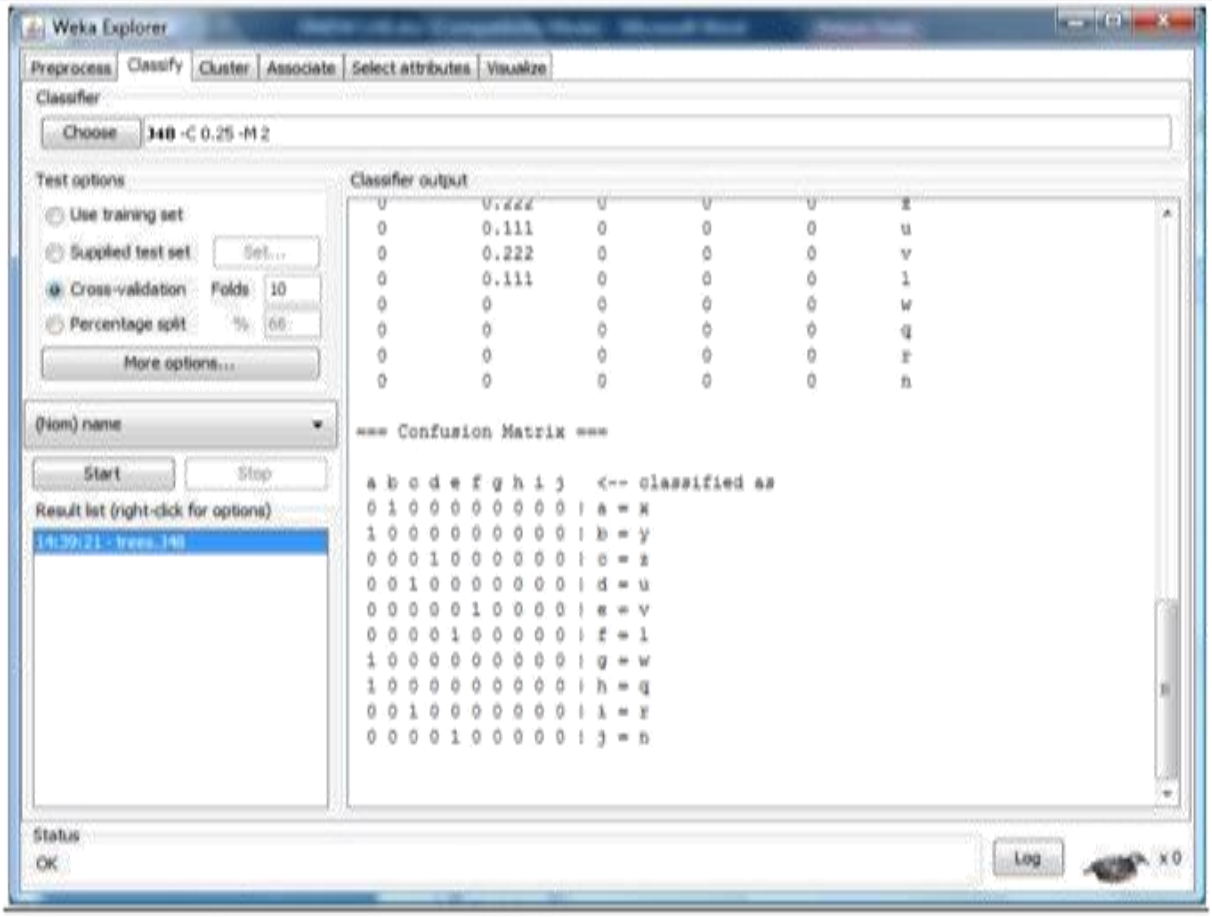
Training Data Set -Customer Table



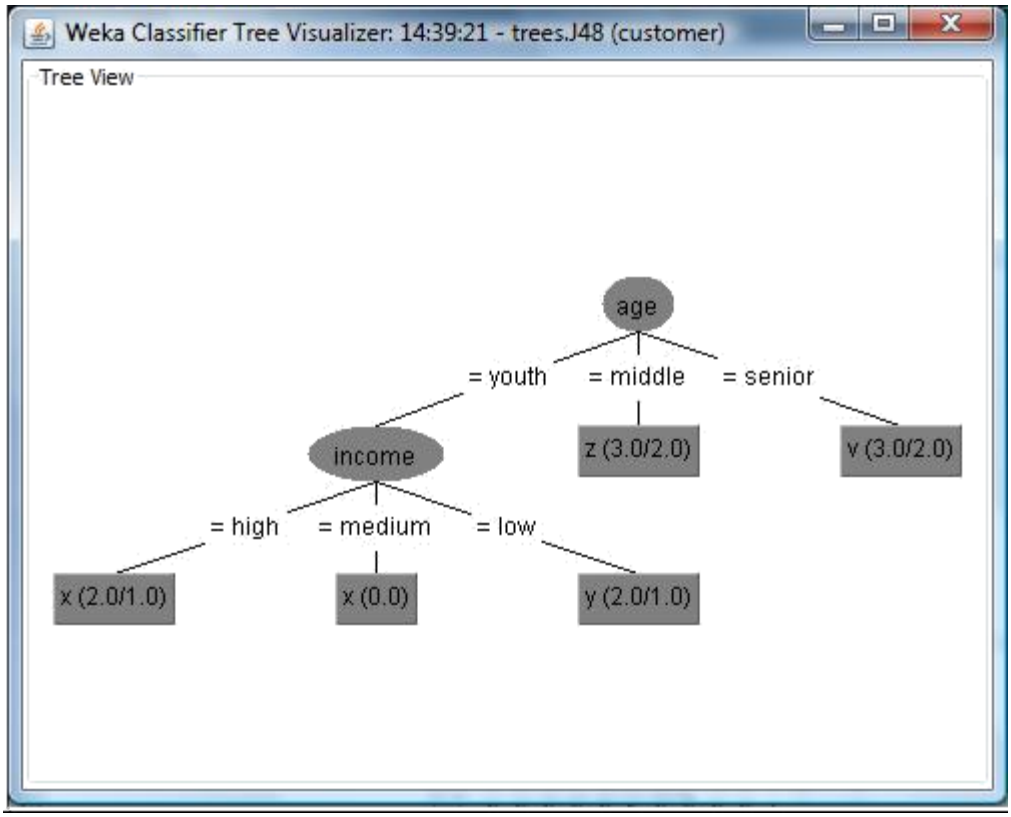
Procedure for Decision Trees:

1) Open Start - Programs -Weka-3-4- Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **customer.arff**
4) Select **Classifier option** on the top of the Menu bar.
5) Select **Choose button** and click on **Tree option**.
6) Click on **J48.**
7) Click on **Start button** and output will be displayed on the **right side** of the window.
8) Select the **result list** and **right click** on result list and select **Visualize Tree option**.
9) Then **Decision Tree** will be displayed on **new window**.

Output:



Decision Tree:



Result: This program has been successfully executed.

WEEK-8

im:

Visualize the clusters for any synthetic dataset,Implement the program for converting the clusters into histograms

Description:

Classification & Prediction:

Classification is the process for finding a model that describes the data values and concepts for the purpose of Prediction.

Decision Tree:

A decision Tree is a classification scheme to generate a tree consisting of root node, internal nodes and external nodes.

Root nodes representing the attributes. Internal nodes are also the attributes. External nodes are the classes and each branch represents the values of the attributes

Decision Tree also contains set of rules for a given data set; there are two subsets in Decision Tree. One is a Training data set and second one is a Testing data set. Training data set is previously classified data. Testing data set is newly generated data.

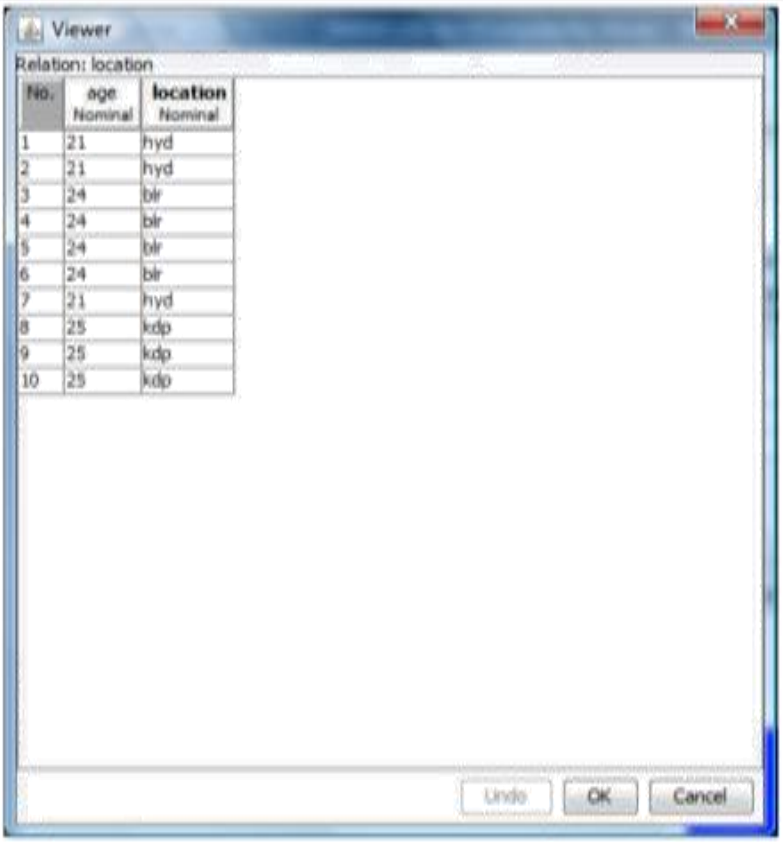
Creation of Weather Table:

Procedure:

1) Open Start - Programs - Accessories -Notepad
2) Type the following training data set with the help of Notepad for Location Table. @relation location
   @attribute age {21,24,25}
   @attribute location {hyd,blr,kdp}

   @data
   21,hyd
   21,hyd
   24,blr
   24,blr
   24,blr
   24,blr
   21,hyd
   25,kdp
   25,kdp
   25,kdp
3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows location table on weka.

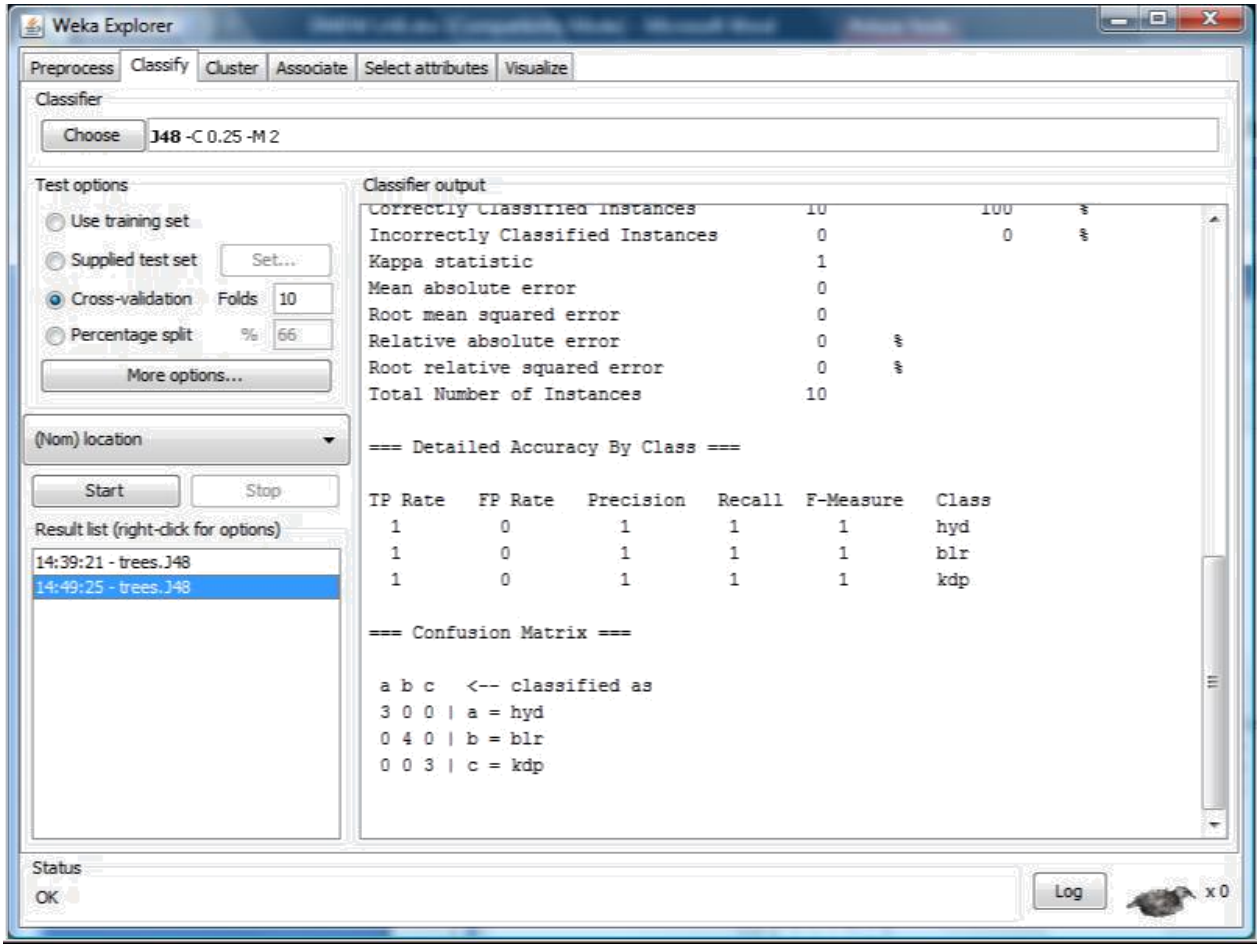
Training Data Set -Location Table



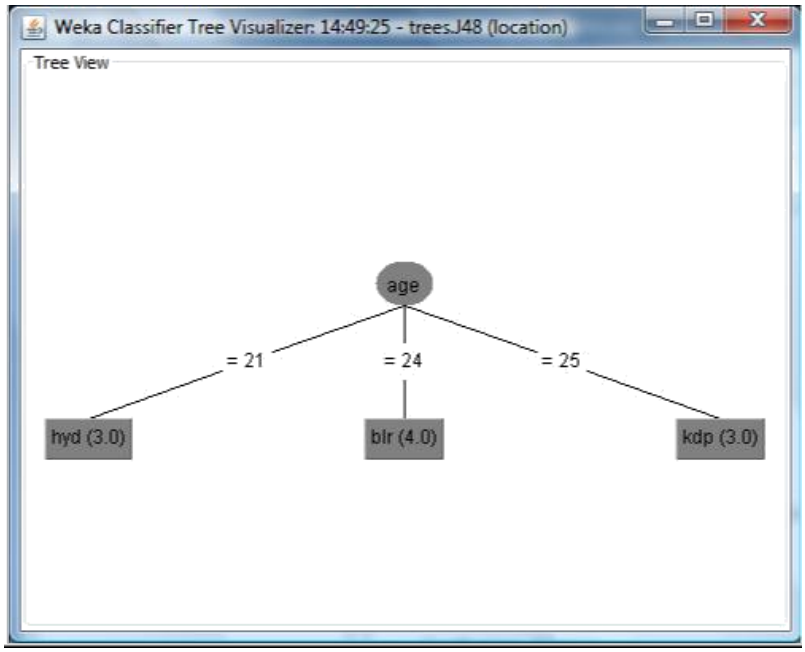
Procedure for Decision Trees:

1) Open Start - Programs - Weka-3-4 - Weka-3-4
2) Open **explorer**.
3) Click on **open file** and select **location.arff**
4) Select **Classifier option** on the top of the Menu bar.
5) Select **Choose button** and click on **Tree option**.
6) Click on **J48.**
7) Click on **Start button** and output will be displayed on the **right side** of the window.
8) Select the **result list** and **right click** on result list and select **Visualize Tree option**.
9) Then **Decision Tree** will be displayed on **new window**.

Output:



Decision Tree:



Result:

This program has been successfully executed.

WEEK-9

Aim:

Write a program to implement agglomerative clustering technique ,Write a program to implement divisive hierarchical clustering technique

Description:

This program calculates and has comparisons on the data set selection of attributes and methods of manipulations have been chosen. The Visualization can be shown in a 2-D representation of the information.

Creation of Weather Table:

Procedure:

1) Open Start -Programs- Accessories - Notepad
2) Type the following training data set with the help of Notepad for Weather Table. @relation weather
   @attribute outlook {sunny, rainy, overcast}
   @attribute temperature numeric @attribute humidity numeric
   @attribute windy {TRUE, FALSE} @attribute play {yes, no}

   @data
   sunny,85,85,FALSE,no
   sunny,80,90,TRUE,no
   overcast,83,86,FALSE,yes
   rainy,70,96,FALSE,yes
   rainy,68,80,FALSE,yes
   rainy,65,70,TRUE,no
   overcast,64,65,TRUE,yes
   sunny,72,95,FALSE,no
   sunny,69,70,FALSE,yes
   rainy,75,80,FALSE,yes
   sunny,75,70,TRUE,yes
   overcast,72,90,TRUE,yes
   overcast,81,75,FALSE,yes
   rainy,71,91,TRUE,no

3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows weather table on weka.

Training Data Set -Weather Table

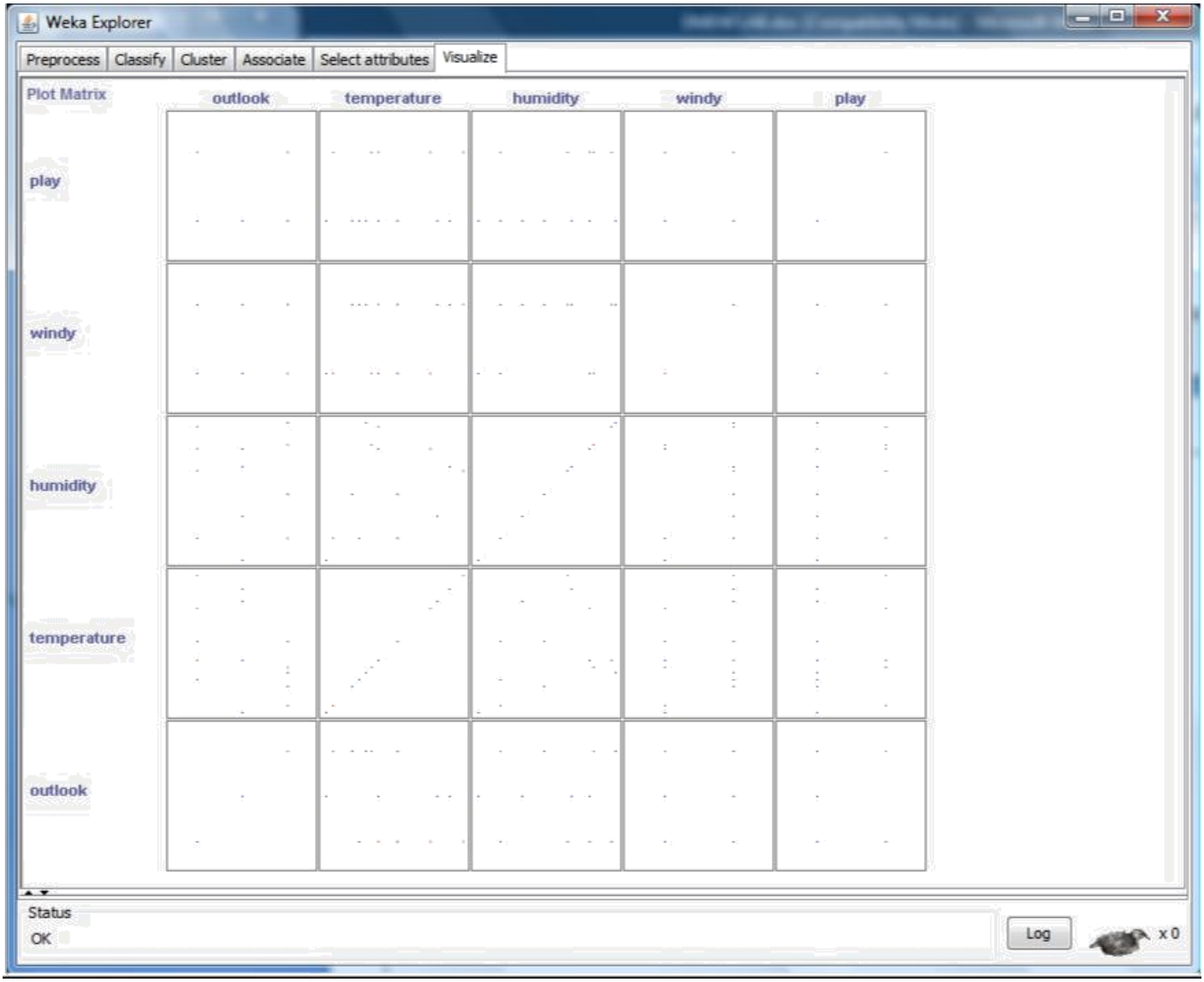
Viewer

Relation: weather

No.	outlook Nominal	temperature Numeric	humidity Numeric	windy Nominal	play Nominal
1	sunny	85.0	85.0	FALSE	no
2	sunny	80.0	90.0	TRUE	no
3	overcast	83.0	86.0	FALSE	yes
4	rainy	70.0	96.0	FALSE	yes
5	rainy	68.0	80.0	FALSE	yes
6	rainy	65.0	70.0	TRUE	no
7	overcast	64.0	65.0	TRUE	yes
8	sunny	72.0	95.0	FALSE	no
9	sunny	69.0	70.0	FALSE	yes
10	rainy	75.0	80.0	FALSE	yes
11	sunny	75.0	70.0	TRUE	yes
12	overcast	72.0	90.0	TRUE	yes
13	overcast	81.0	75.0	FALSE	yes
14	rainy	71.0	91.0	TRUE	no

Undo OK Cancel

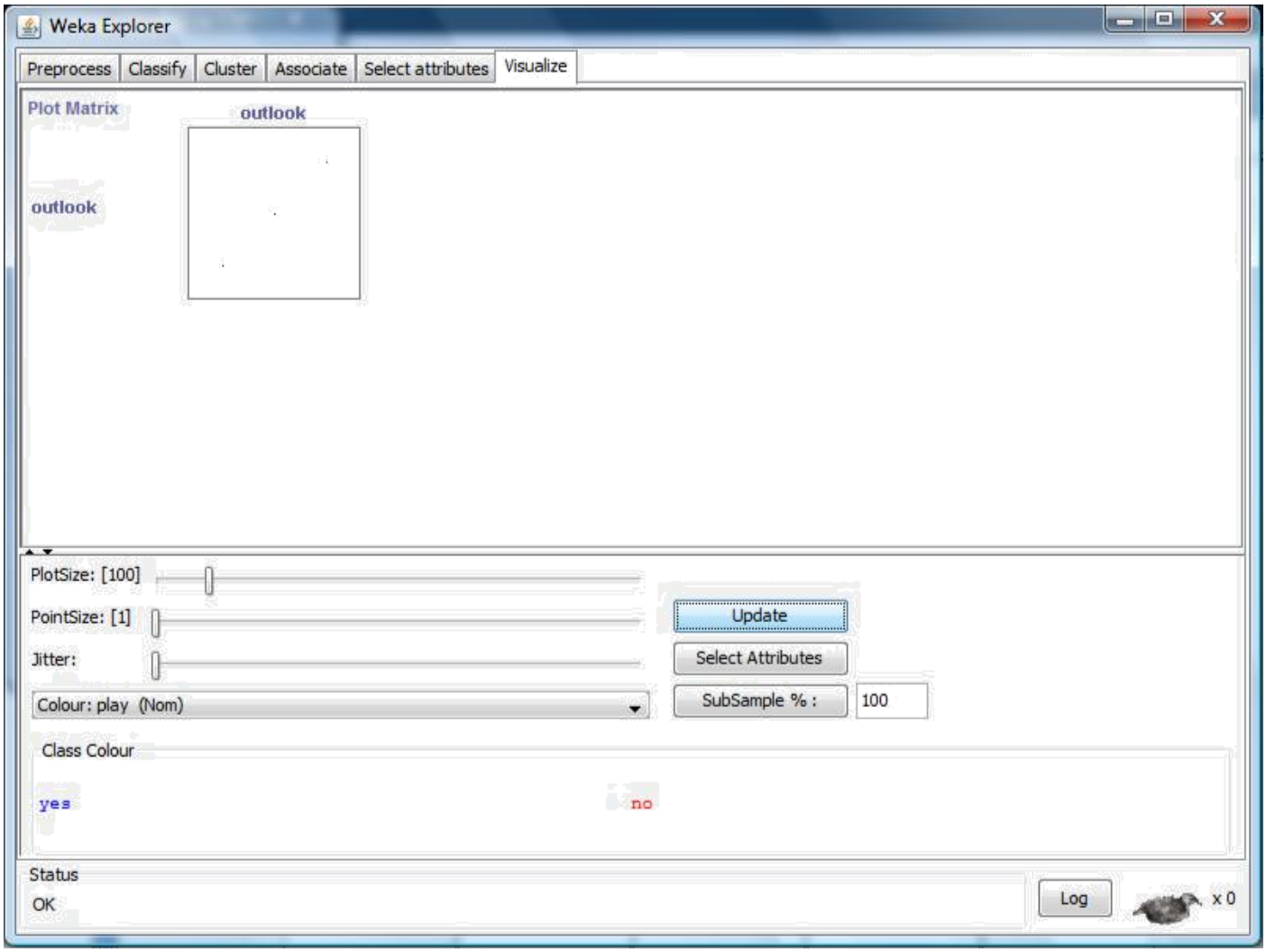
2-D Plot Matrix:



Procedure:

1) Open Start -Programs -Weka-3-4 - Weka-3-4
2) Open the explorer and click on **Preprocess**, then a new window will appear. In that window select **weather.arff**file then the data will be displayed.
3) After that click on the **Visualize tab** on the top of the Menu bar.
4) When we select **Visualize tab** then **Plot Matrix** is displayed on the screen.

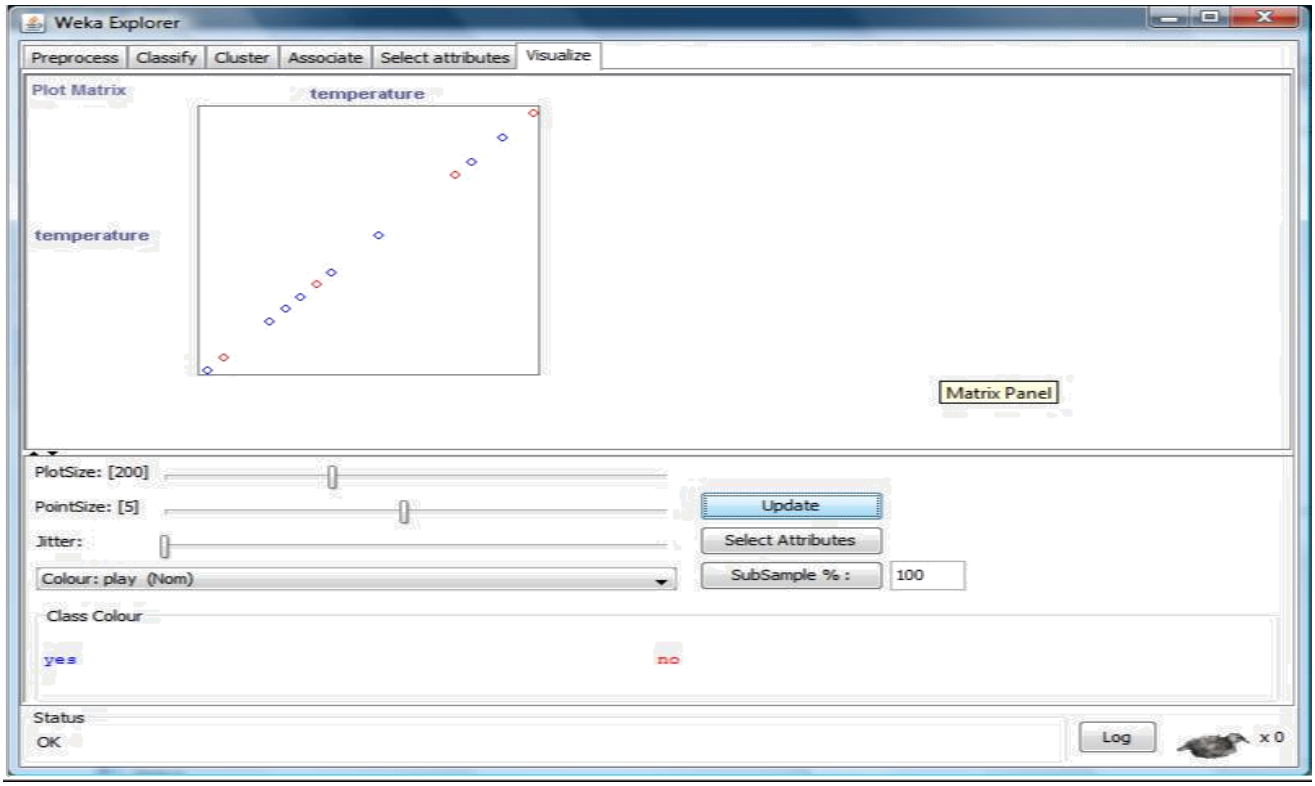
Output:



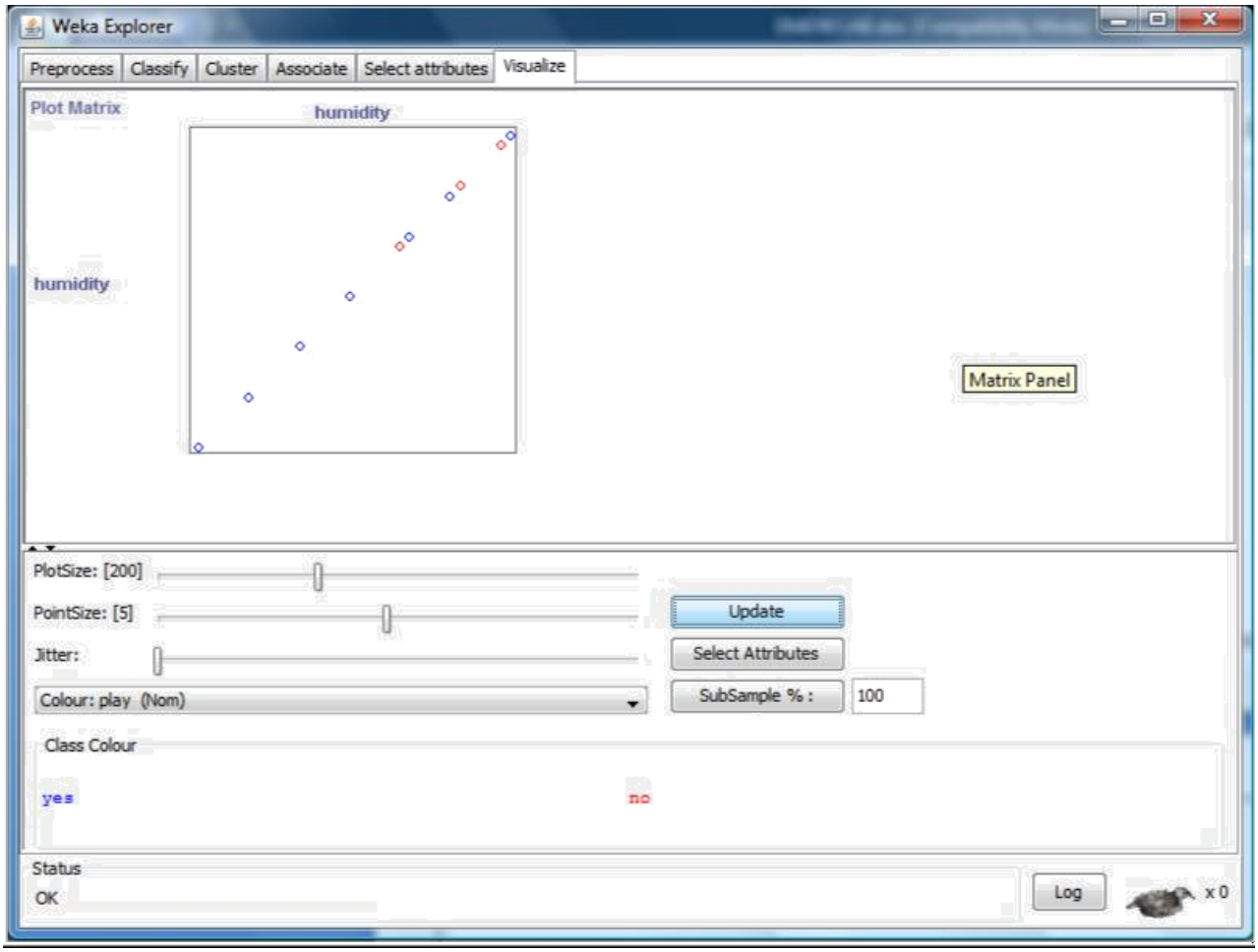
5) After that we select the **Select Attribute button**, then select **Outlook attribute** and clock OK.
6) Click on the **Update button** to display the output.
7) After that select the **Select Attribute button** and select **Temperature attribute** and then click OK.
8) **Increase** the **Plot Size** and **Point Size**.
9) Click on the **Update button** to display the output.
10) After that we select the **Select Attribute button**, then select **Humidity attribute** and clock OK.
11) Click on the **Update button** to display the output.
12) After that select the **Select Attribute button** and select **Windy attribute** and then click OK.
13) **Increase** the **Jitter Size**.
14) Click on the **Update button** to display the output.
15) After that we select the **Select Attribute button**, then select **Play attribute** and clock OK.

16) Click on the **Update button** to display the output.

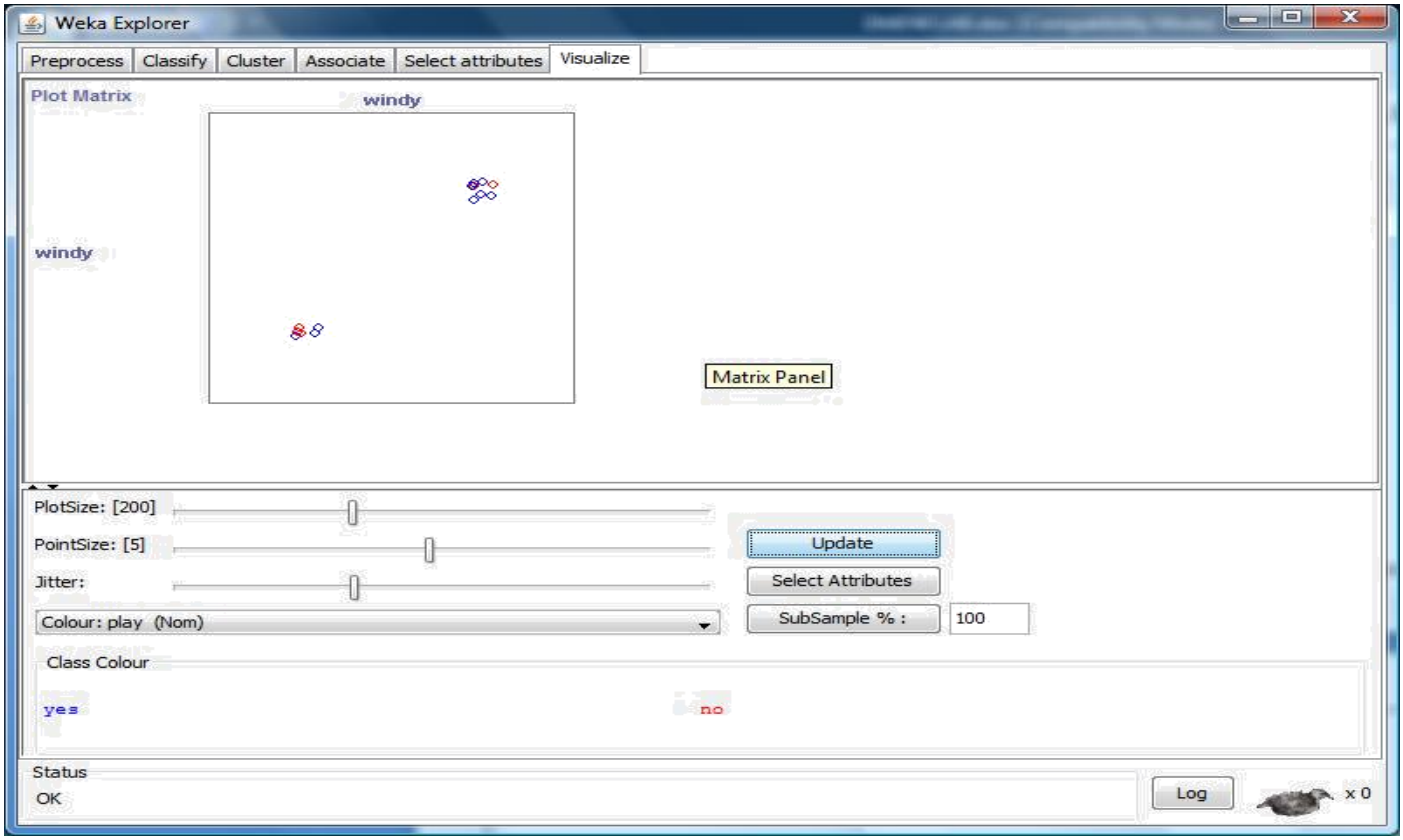
Output:



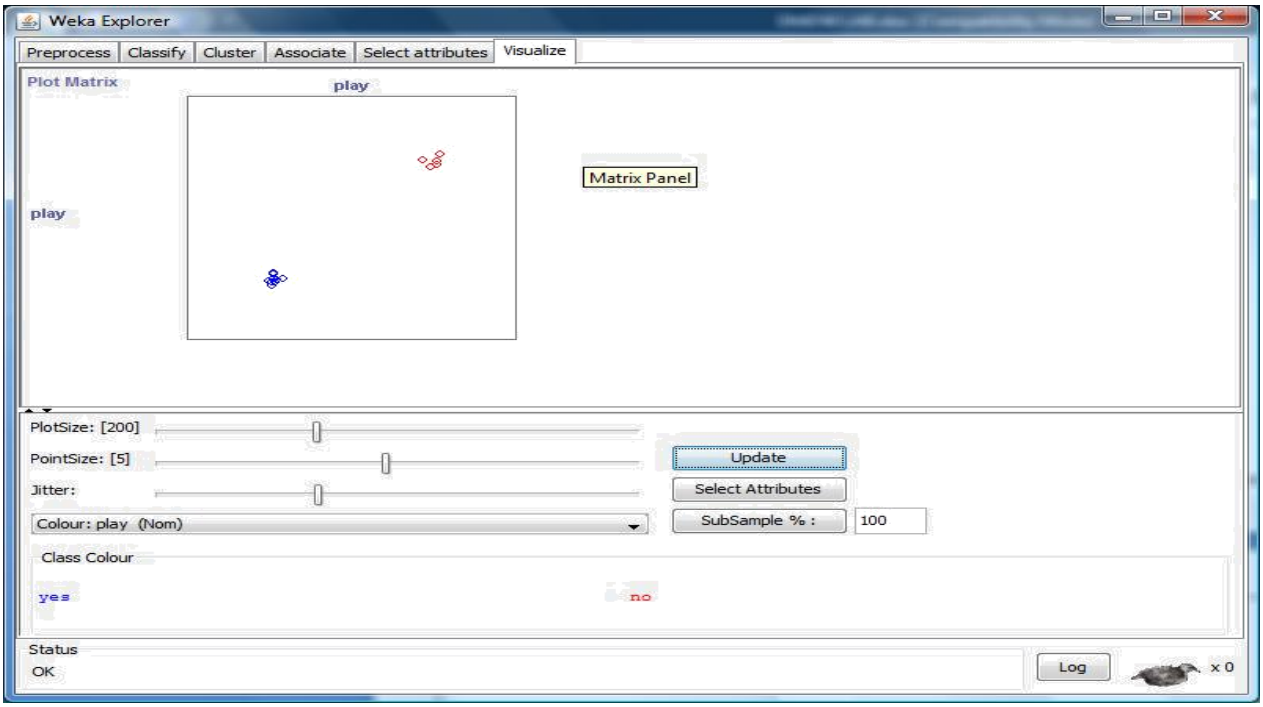
Output:



Output:



Output:



Result:

This program has been successfully executed.

WEEK-10

Aim:

Develop scalable clustering algorithms ,Develop scalable a priori algorithm

Description:

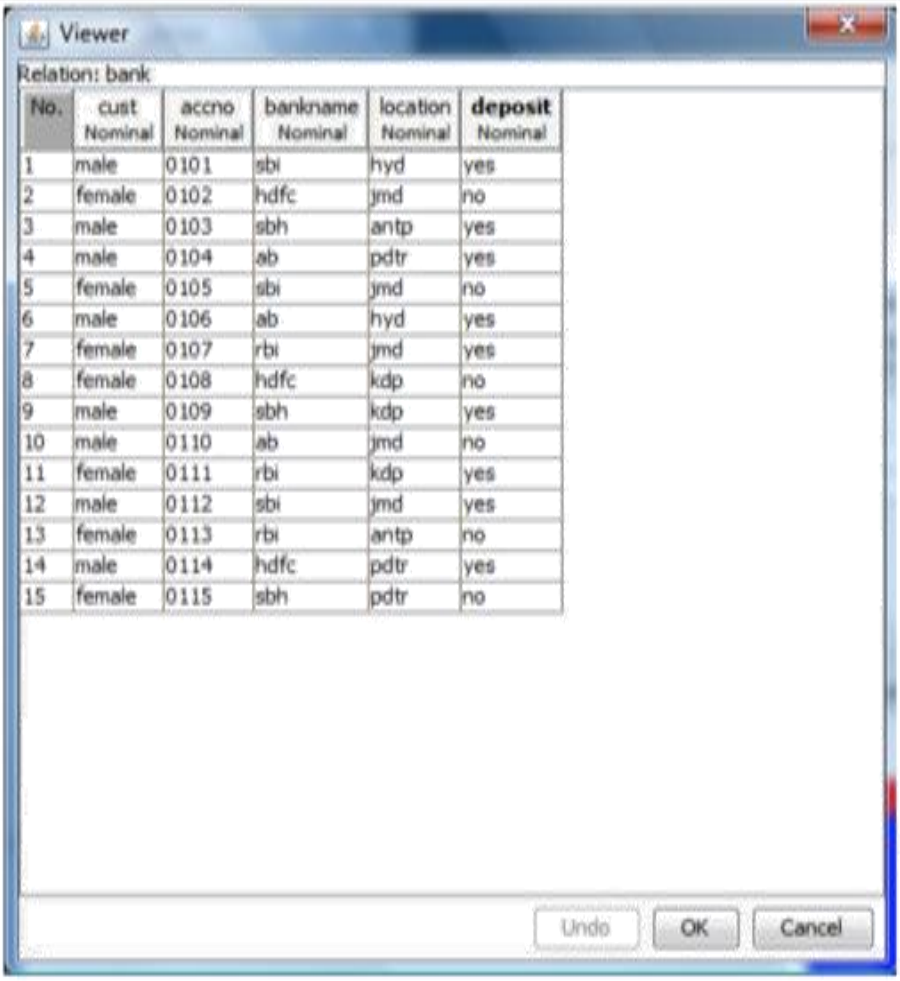
This program calculates and has comparisons on the data set selection of attributes and methods of manipulations have been chosen. The Visualization can be shown in a 2-D representation of the information.

Creation of Banking Table:

Procedure:

1) Open Start -Programs -Accessories- Notepad
2) Type the following training data set with the help of Notepad for Banking Table. @relation bank
   @attribute cust {male,female} @attribute accno
   {0101,0102,0103,0104,0105,0106,0107,0108,0109,0110,0111,0112,0113,0114,0115}
   @attribute bankname {sbi,hdfc,sbh,ab,rbi}
   @attribute location {hyd,jmd,antp,pdtr,kdp}
   @attribute deposit {yes,no}
   @data
   male,0101,sbi,hyd,yes
   female,0102,hdfc,jmd,no
   male,0103,sbh,antp,yes
   male,0104,ab,pdtr,yes
   female,0105,sbi,jmd,no
   male,0106,ab,hyd,yes
   female,0107,rbi,jmd,yes
   female,0108,hdfc,kdp,no
   male,0109,sbh,kdp,yes
   male,0110,ab,jmd,no
   female,0111,rbi,kdp,yes
   male,0112,sbi,jmd,yes
   female,0113,rbi,antp,no
   male,0114,hdfc,pdtr,yes
   female,0115,sbh,pdtr,no
3) After that the file is saved with **.arff** file format.
4) Minimize the arff file and then open Start → Programs → weka-3-4.
5) Click on **weka-3-4**, then Weka dialog box is displayed on the screen.
6) In that dialog box there are four modes, click on **explorer**.
7) Explorer shows many options. In that click on **'open file'** and select the arff file
8) Click on **edit button** which shows Banking table on weka.

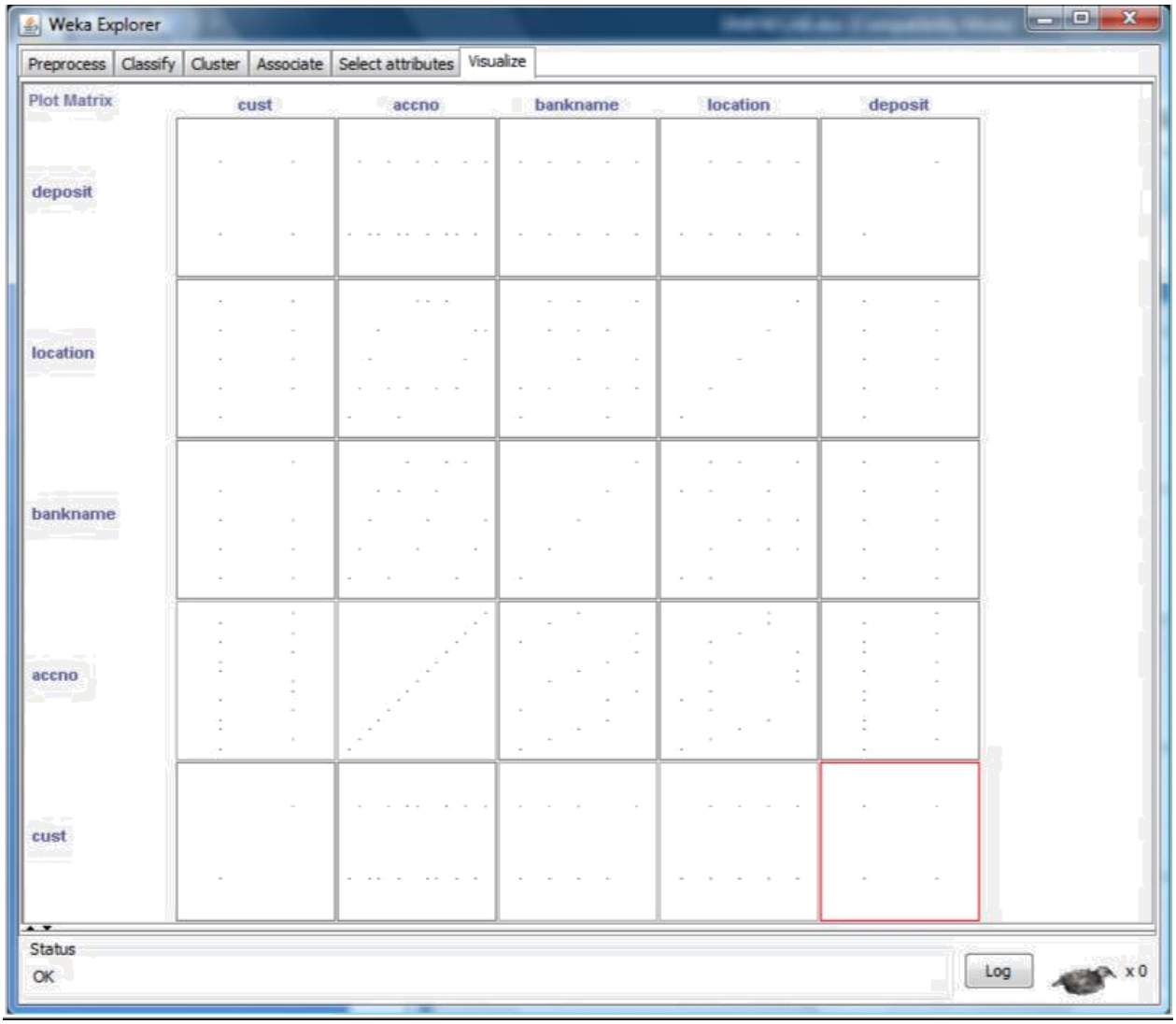
Training Data Set -Banking Table



Procedure:

1) Open Start - Programs -Weka-3-4 - Weka-3-4
2) Open the explorer and click on **Preprocess**, then a new window will appear. In that window select **bank.arff** file then the data will be displayed.
3) After that click on the **Visualize tab** on the top of the Menu bar.
4) When we select **Visualize tab** then **Plot Matrix** is displayed on the screen.

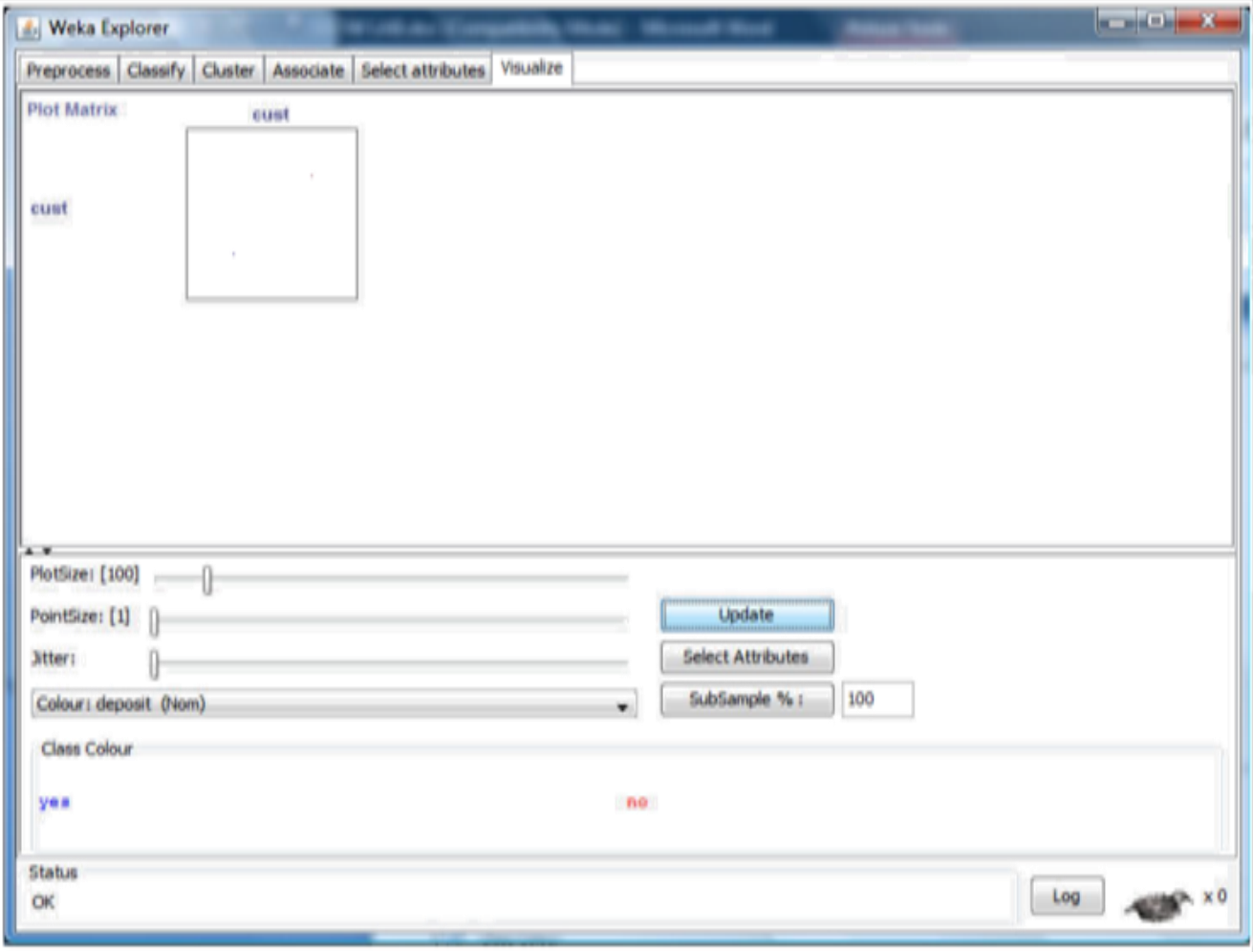
2-D Plot Matrix:



5) After that we select the **Select Attribute button**, then select **Cust attribute** and clock OK.

6) Click on the **Update button** to display the output.

7) **Output:**

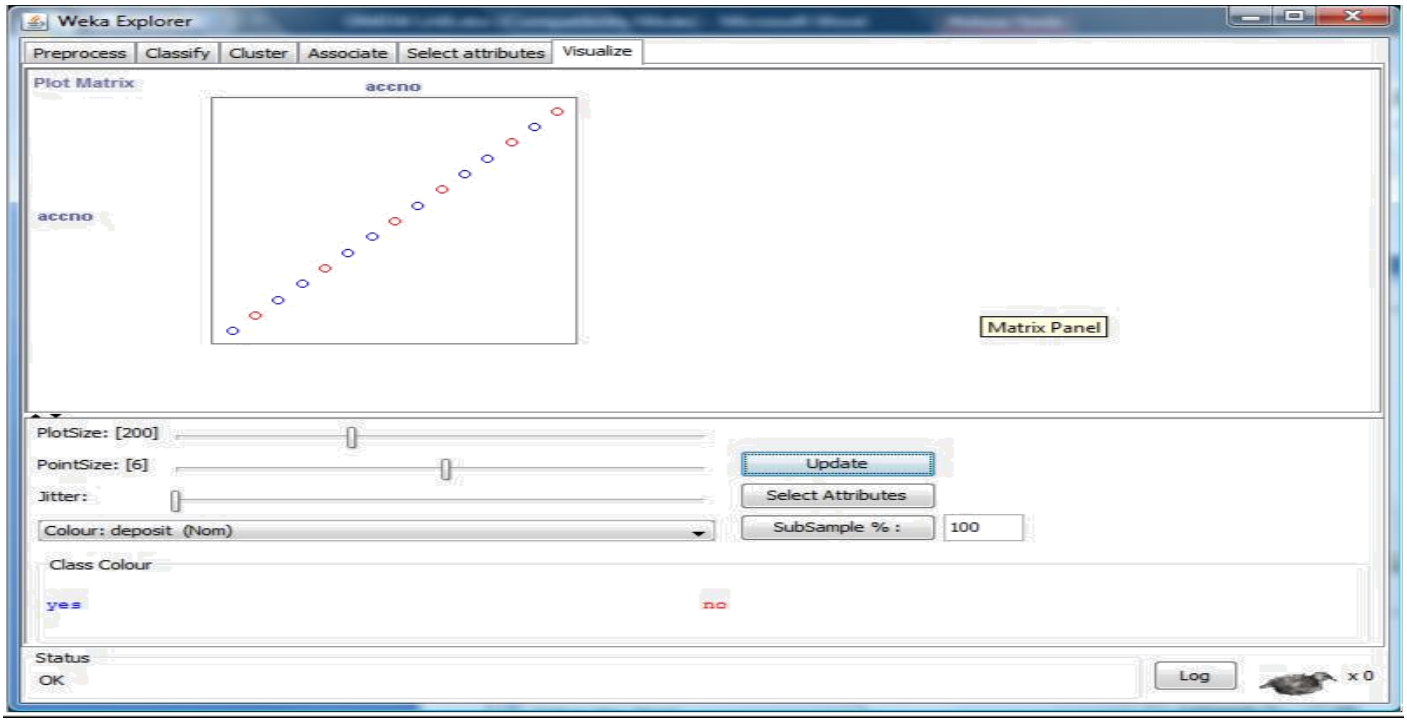


8) After that select the **Select Attribute button** and select **Accno attribute** and then click OK.

9) **Increase** the **Plot Size** and **Point Size**.

10) Click on the **Update button** to display the output.

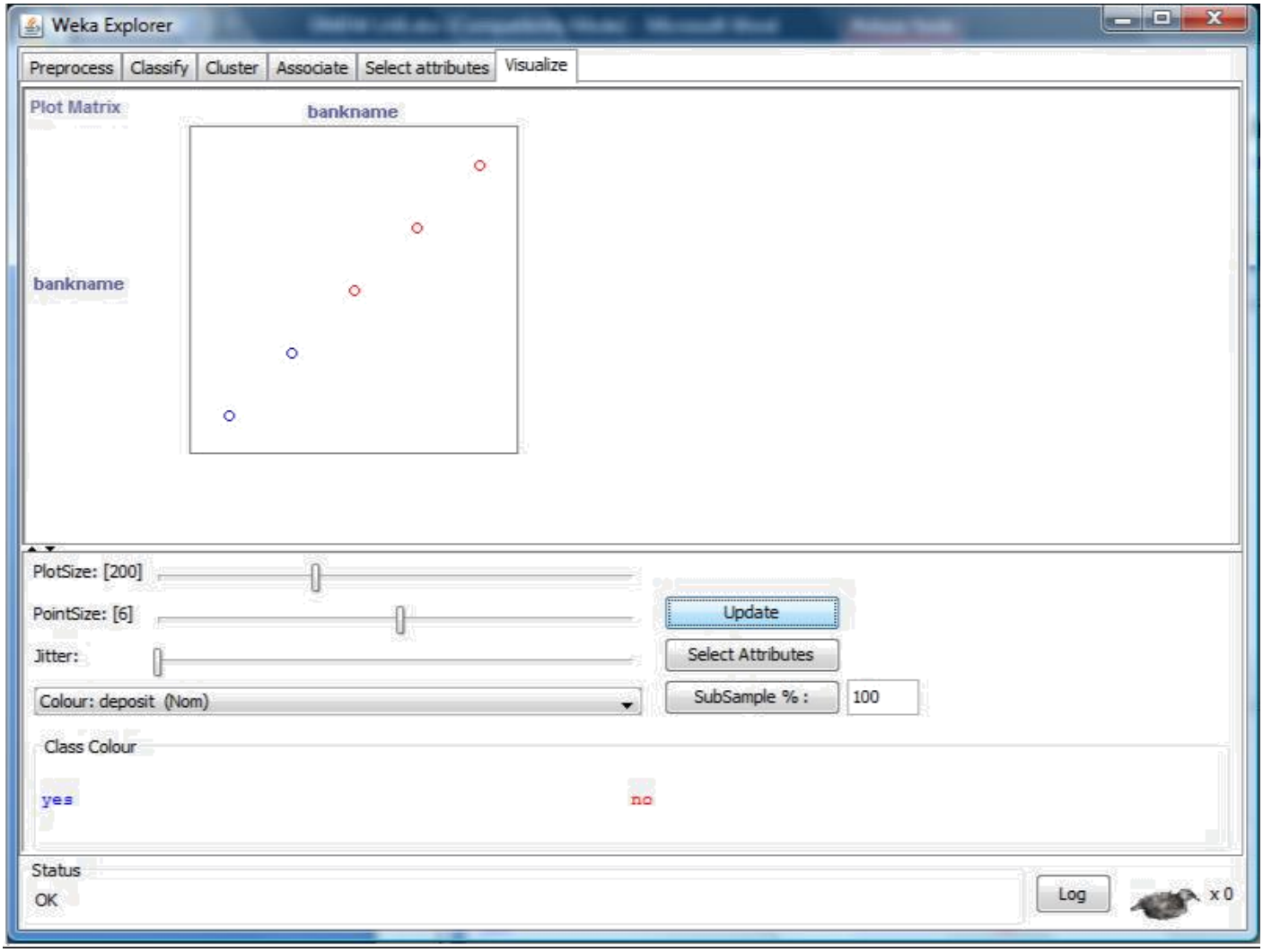
Output:



11) After that we select the **Select Attribute button**, then select**Bankname attribute** and clock OK.

12) Click on the **Update button** to display the output.

Output:

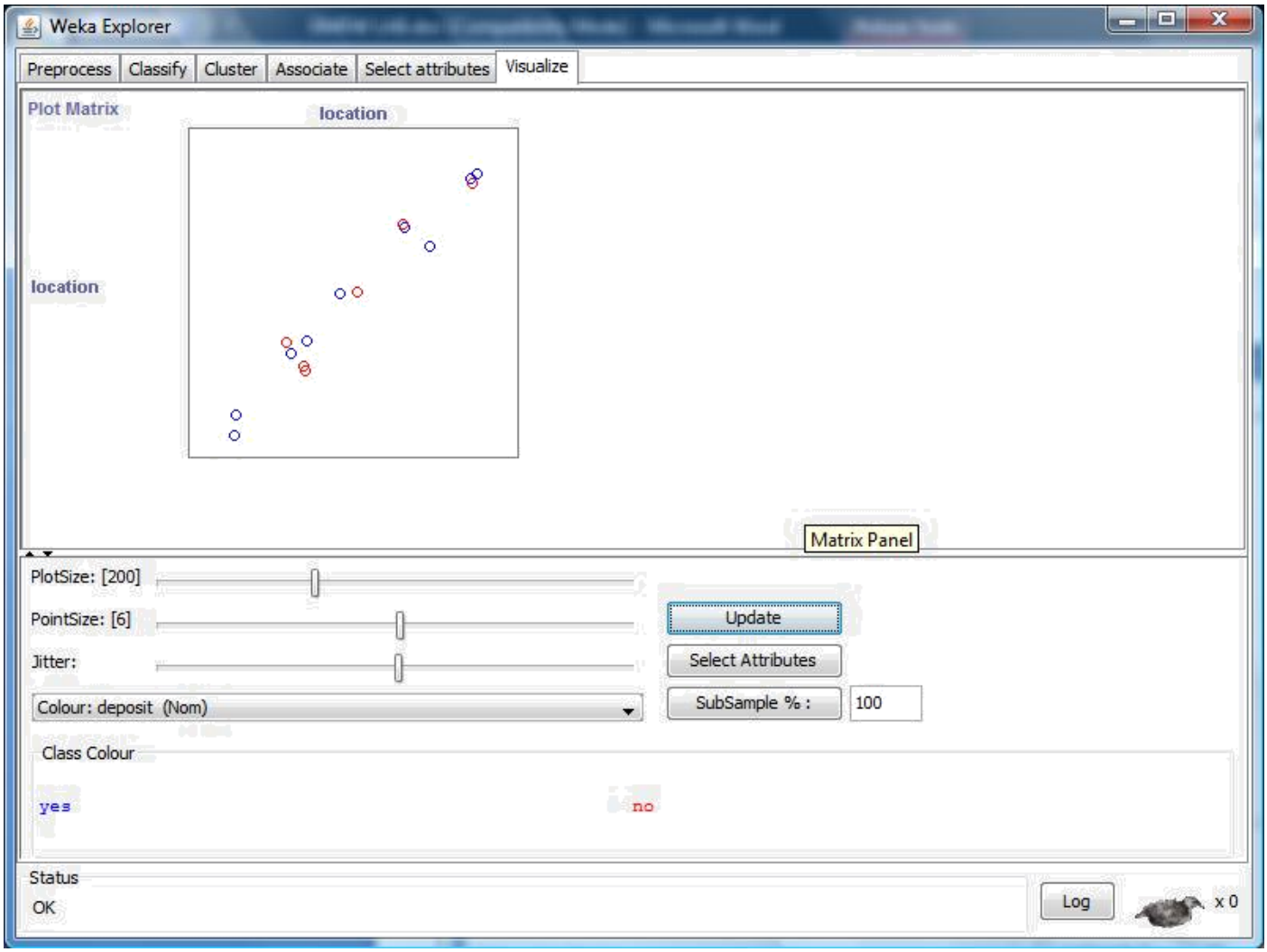


13)After that select the **Select Attribute button** and select **location attribute** and then click OK.

14)Increasethe **Jitter Size**.

15)Click on the **Update button** to display the output.

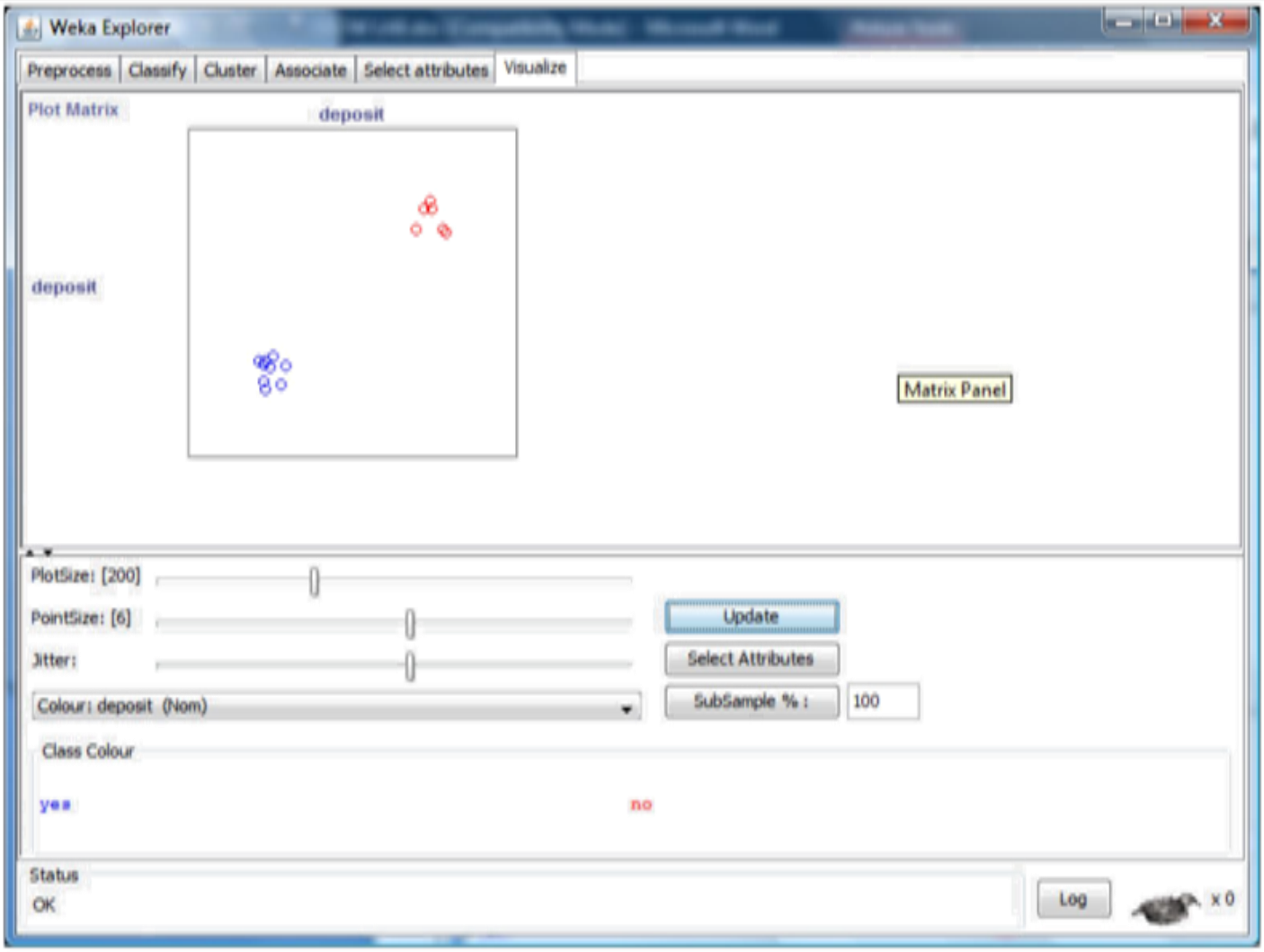
Output:



16)After that we select the **Select Attribute button**, then select **Deposit attribute** and clock OK.

17) Click on the **Update button** to display the output.

Output:



Result:

This program has been successfully executed.