RAGHU ENGINEERING COLLEGE

(Autonomous)

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DEPT OF COMPUTER SCIENCE & ENGINEERING

B.TECH III YR II SEM

AR-20

COURSE CODE: 20CS6133

DATA WAREHOUSING AND MINING LAB MANUAL

Prepared By:

Dr. B S Panda, Professor, Dept. of CSE

DATA WARE HOUSING AND MINING LAB

III Year-II Semester

L T P C
0 0 3 1.5

Course Code: 20CS6133
Credits: 1.5

Internal Marks: 15
External Marks: 35

System/Software Requirements:

- **Intel based desktop PC**
- **WEKA TOOL**

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm.
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm.
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee. arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee. arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris. arff using simple k-means
10. Demonstration of clustering rule process on dataset student. arff using simple k- means.

Lab Projects:

1. Data mining for weather prediction and climate change studies.
2. Knowledge /information extraction from decision trees using data mining.
3. Mining of government data for getting valuable information. Sensex data
4. Mining of excess sheet data.
5. Mining of customer behaviour of any retail shop.
6. Crime/fraud detection using data mining.
7. Market basket analysis (Apriori algorithm) for mining association rule

COURSE OBJECTIVES:

The aim of this course is,

- Practical exposure on implementation of well-known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

COURSE OUTCOMES:

By the end of this course, the student is able to,

- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as association mining, classification and prediction.
- The principle algorithms and techniques used in data mining, such as clustering.

CO-PO & PSO Co-relation matrix:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	3	3	3	2	-	-	-	-	-	-	2	1	2	-
CO-2	3	3	3	3	2	-	-	-	-	-	-	2	2	2	-
CO-3	2	2	2	2	2	-	-	-	-	-	-	2	1	2	-
Avg	2.3	2.3	2.3	2.3	2	-	-	-	-	-	-	2	1.3	2	-

LAB INFORMATION SHEET (SCHEME OF EVALUATION)

DATA WARE HOUSING AND MINING LAB

AR20- B.Tech. CSE
III- B.Tech., II-Semester

The Evaluation consists of Internal and External Evaluation

- Internal Evaluation: 15 Marks
- External Evaluation: 35 Marks

LAB EVALUATION			
INTERNAL	Daily Evaluation	05	15 Marks
	Exam	05	
	Lab Project	05	
EXTERNAL	End Exam	25	35 Marks
	Viva	10	
TOTAL:			50 Marks

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3.	Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm		
4.	Demonstration of Association rule process on dataset test.arff using apriori algorithm		
5.	Demonstration of classification rule process on dataset student.arff using j48 algorithm		
6.	Demonstration of classification rule process on dataset employee.arff using j48 algorithm		
7.	Demonstration of classification rule process on dataset employee.arff using id3 algorithm		
8.	Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm		
9.	Demonstration of clustering rule process on dataset iris.arff using simple k-means		
10.	Demonstration of clustering rule process on dataset student.arff using simple k-means		

1. Demonstration of preprocessing on dataset student.arff

Aim: This experiment illustrates some of the basic data preprocessing operations that can be performed using WEKA-Explorer. The sample dataset used for this example is the student data available in arff format.

Step1: Loading the data. We can load the dataset into weka by clicking on open button in preprocessing interface and selecting the appropriate file.

Step2: Once the data is loaded, weka will recognize the attributes and during the scan of the data weka will compute some basic strategies on each attribute. The left panel in the above figure shows the list of recognized attributes while the top panel indicates the names of the base relation or table and the current working relation (which are same initially).

Step3:Clicking on an attribute in the left panel will show the basic statistics on the attributes for the categorical attributes the frequency of each attribute value is shown, while for continuous attributes we can obtain min, max, mean, standard deviation and deviation etc.,

Step4:The visualization in the right button panel in the form of cross-tabulation across two attributes.

Note:we can select another attribute using the dropdown list.

Step5:Selecting or filtering attributes

Removing an attribute-When we need to remove an attribute,we can do this by using the attribute filters in weka. In the filter model panel,click on choose button,This will show a popup window with a list of available filters.

Scroll down the list and select the "weka.filters.unsupervised.attribute.remove" filters.

Step 6:a)Next click the textbox immediately to the right of the choose button. In the resulting dialog box enter the index of the attribute to be filtered out.

b) Make sure that invert selection option is set to false.The click OK now in the filter box. you will see "Remove-R-7".

c) Click the apply button to apply filter to this data. This will remove the attribute and create new working relation.

d) Save the new working relation as an arff file by clicking save button on the top (button)panel.(student.arff)

Discretization

1) Sometimes association rule mining can only be performed on categorical data.This requires performing discretization on numeric or continuous attributes.In the following example let us discretize age attribute.

ÆLet us divide the values of age attribute into three bins(intervals).

ÆFirst load the dataset into weka(student.arff)

ÆSelect the age attribute.

ÆActivate filter-dialog box and select "WEKA. filters. unsupervised. attribute. discretize" from the list.

ÆTo change the defaults for the filters,click on the box immediately to the right of the choose button.

ÆWe enter the index for the attribute to be discretized. In this case the attribute is age. So we must enter '1' corresponding to the age attribute.

ÆEnter '3' as the number of bins. Leave the remaining field values as they are.

ÆClick OK button.

ÆClick apply in the filter panel. This will result in a new working relation with the selected attribute partition into 3 bins.

ÆSave the new working relation in a file called student-data-discretized.arff

Dataset student .arff

@relation student

@attribute age {<30,30-40,>40}

@attribute income {low, medium, high}

@attribute student {yes, no}

@attribute credit-rating {fair, excellent}

@attribute buyspc {yes, no}

@data

%

<30, high, no, fair, no

<30, high, no, excellent, no

30-40, high, no, fair, yes

>40, medium, no, fair, yes

>40, low, yes, fair, yes

>40, low, yes, excellent, no

30-40, low, yes, excellent, yes

<30, medium, no, fair, no

<30, low, yes, fair, no

>40, medium, yes, fair, yes

<30, medium, yes, excellent, yes

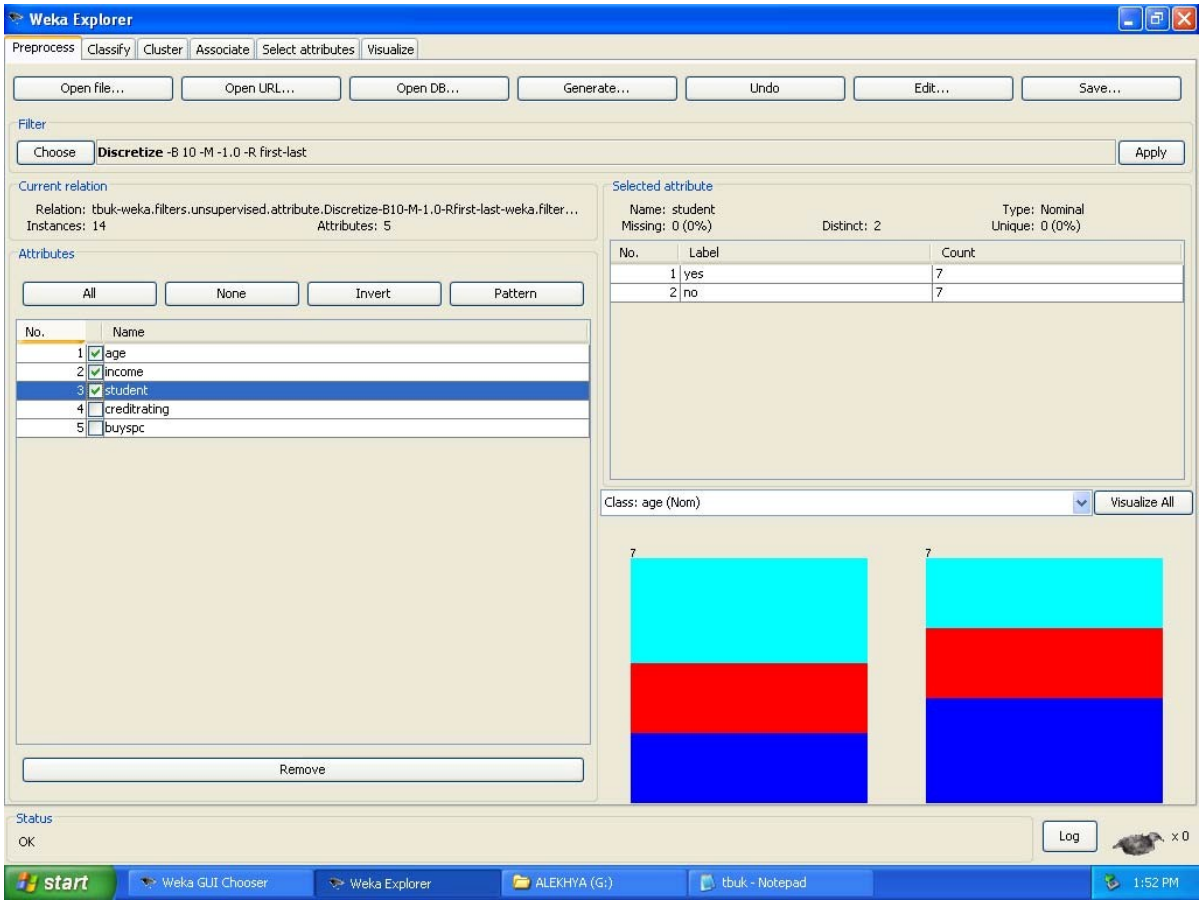
30-40, medium, no, excellent, yes

30-40, high, yes, fair, yes

>40, medium, no, excellent, no

%

The following screenshot shows the effect of discretization.



2. Demonstration of preprocessing on dataset labor.arff

Aim: This experiment illustrates some of the basic data preprocessing operations that can be performed using WEKA-Explorer. The sample dataset used for this example is the labor data available in arff format.

Step1:Loading the data. We can load the dataset into weka by clicking on open button in preprocessing interface and selecting the appropriate file.

Step2:Once the data is loaded, weka will recognize the attributes and during the scan of the data weka will compute some basic strategies on each attribute. The left panel in the above figure shows the list of recognized attributes while the top panel indicates the names of the base relation or table and the current working relation (which are same initially).

Step3:Clicking on an attribute in the left panel will show the basic statistics on the attributes for the categorical attributes the frequency of each attribute value is shown, while for continuous attributes we can obtain min, max, mean, standard deviation and deviation etc.,

Step4:The visualization in the right button panel in the form of cross-tabulation across two attributes.

Note:we can select another attribute using the dropdown list.

Step5:Selecting or filtering attributes

Removing an attribute-When we need to remove an attribute,we can do this by using the attribute filters in weka.In the filter model panel,click on choose button,This will show a popup window with a list of available filters.

Scroll down the list and select the "weka.filters.unsupervised.attribute.remove" filters.

Step 6:a)Next click the textbox immediately to the right of the choose button.In the resulting dialog box enter the index of the attribute to be filtered out.

b)Make sure that invert selection option is set to false.The click OK now in the filter box.you will see "Remove-R-7".

c)Click the apply button to apply filter to this data.This will remove the attribute and create new working relation.

d)Save the new working relation as an arff file by clicking save button on the top(button)panel.(labor.arff)

Discretization

1)Sometimes association rule mining can only be performed on categorical data.This requires performing discretization on numeric or continuous attributes.In the following example let us discretize duration attribute.

ÆLet us divide the values of duration attribute into three bins(intervals).

ÆFirst load the dataset into weka(labor.arff)

ÆSelect the duration attribute.

ÆActivate filter-dialog box and select "WEKA.filters.unsupervised.attribute.discretize"from the list.

ÆTo change the defaults for the filters,click on the box immediately to the right of the choose button.

ÆWe enter the index for the attribute to be discretized.In this case the attribute is duration So we must enter '1' corresponding to the duration attribute.

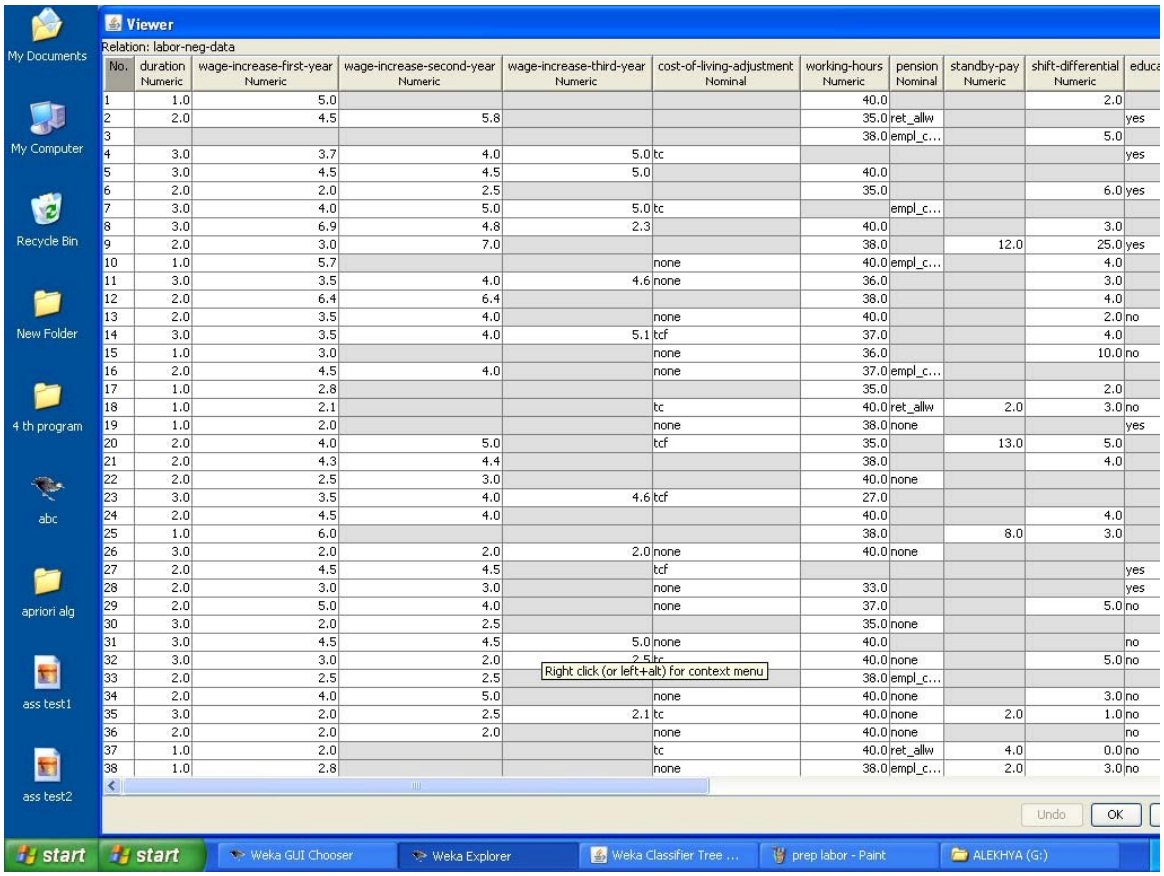
ÆEnter '1' as the number of bins.Leave the remaining field values as they are.

ÆClick OK button.

ÆClick apply in the filter panel.This will result in a new working relation with the selected attribute partition into 1 bin.

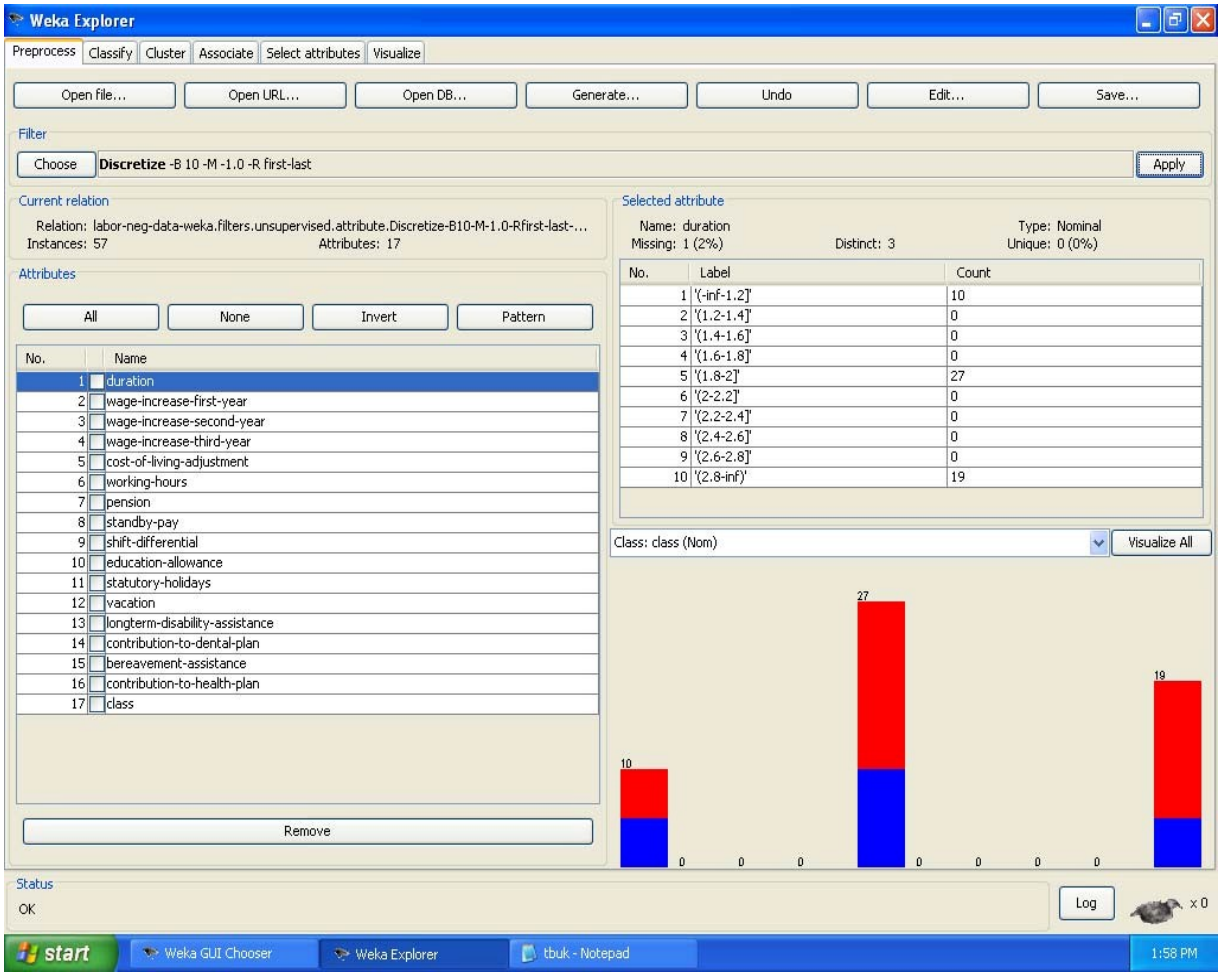
ÆSave the new working relation in a file called labor-data-discretized.arff

Dataset labor.arff



No.	duration Numeric	wage-increase-first-year Numeric	wage-increase-second-year Numeric	wage-increase-third-year Numeric	cost-of-living-adjustment Nominal	working-hours Numeric	pension Nominal	standby-pay Numeric	shift-differential Numeric	educa
1	1.0	5.0				40.0			2.0	
2	2.0	4.5	5.8			35.0	ret_allw			yes
3						38.0	empl_c...		5.0	
4	3.0	3.7	4.0	5.0	tc					yes
5	3.0	4.5	4.5	5.0		40.0				
6	2.0	2.0	2.5			35.0			6.0	yes
7	3.0	4.0	5.0	5.0	tc		empl_c...			
8	3.0	6.9	4.8	2.3		40.0			3.0	
9	2.0	3.0	7.0			38.0		12.0	25.0	yes
10	1.0	5.7			none	40.0	empl_c...		4.0	
11	3.0	3.5	4.0	4.6	none	36.0			3.0	
12	2.0	6.4	6.4			38.0			4.0	
13	2.0	3.5	4.0		none	40.0			2.0	no
14	3.0	3.5	4.0	5.1	tcf	37.0			4.0	
15	1.0	3.0			none	36.0			10.0	no
16	2.0	4.5	4.0		none	37.0	empl_c...			
17	1.0	2.8				35.0			2.0	
18	1.0	2.1			tc	40.0	ret_allw	2.0	3.0	no
19	1.0	2.0			none	38.0	none			yes
20	2.0	4.0	5.0		tcf	35.0		13.0	5.0	
21	2.0	4.3	4.4			38.0			4.0	
22	2.0	2.5	3.0			40.0	none			
23	3.0	3.5	4.0	4.6	tcf	27.0				
24	2.0	4.5	4.0			40.0			4.0	
25	1.0	6.0				38.0		8.0	3.0	
26	3.0	2.0	2.0	2.0	none	40.0	none			
27	2.0	4.5	4.5		tcf					yes
28	2.0	3.0	3.0		none	33.0				yes
29	2.0	5.0	4.0		none	37.0			5.0	no
30	3.0	2.0	2.5			35.0	none			
31	3.0	4.5	4.5	5.0	none	40.0				no
32	3.0	3.0	2.0	2.5	tc	40.0	none		5.0	no
33	2.0	2.5	2.5			38.0	empl_c...			
34	2.0	4.0	5.0		none	40.0	none		3.0	no
35	3.0	2.0	2.5	2.1	tc	40.0	none	2.0	1.0	no
36	2.0	2.0	2.0		none	40.0	none			no
37	1.0	2.0			tc	40.0	ret_allw	4.0	0.0	no
38	1.0	2.8			none	38.0	empl_c...	2.0	3.0	no

The following screenshot shows the effect of discretization



3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

Aim: This experiment illustrates some of the basic elements of asscociation rule mining using WEKA. The sample dataset used for this example is contactlenses.arff

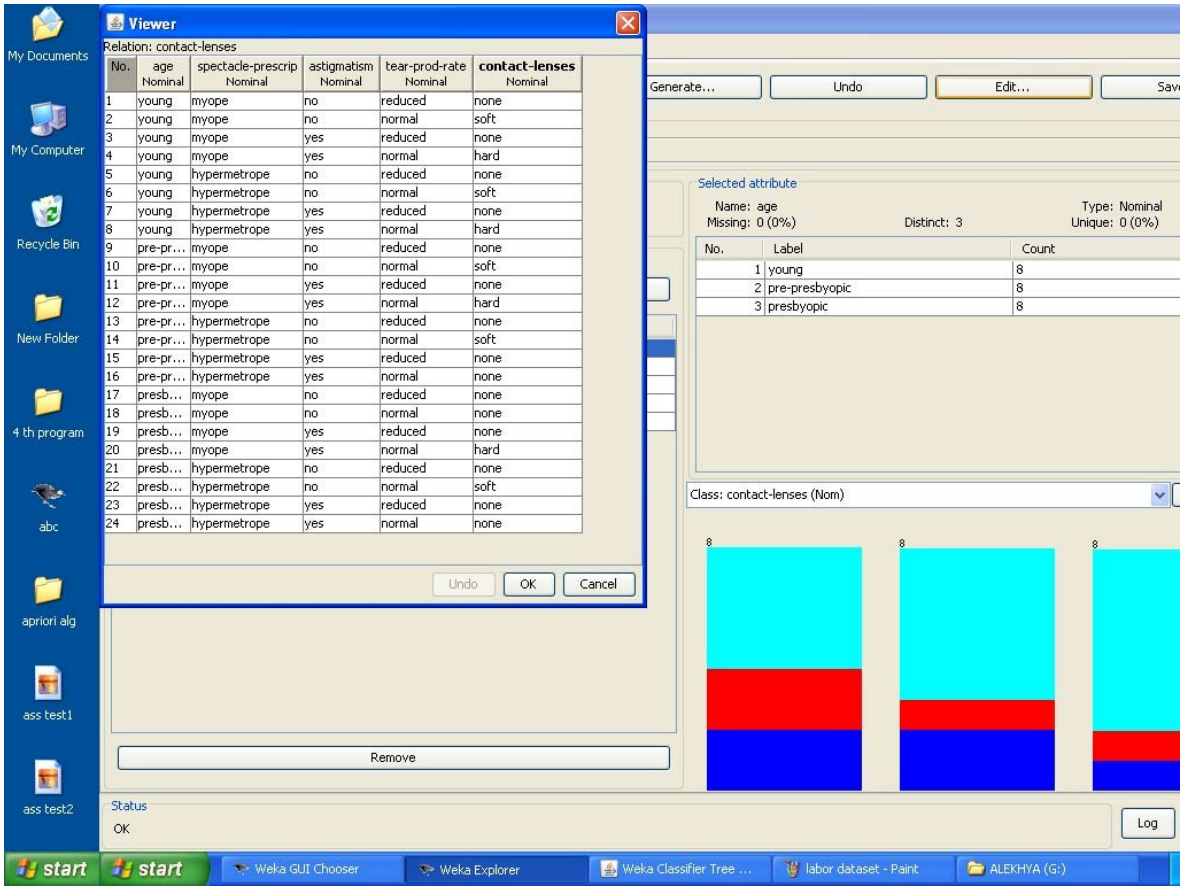
Step1: Open the data file in Weka Explorer. It is presumed that the required data fields have been discretized. In this example it is age attribute.

Step2: Clicking on the associate tab will bring up the interface for association rule algorithm.

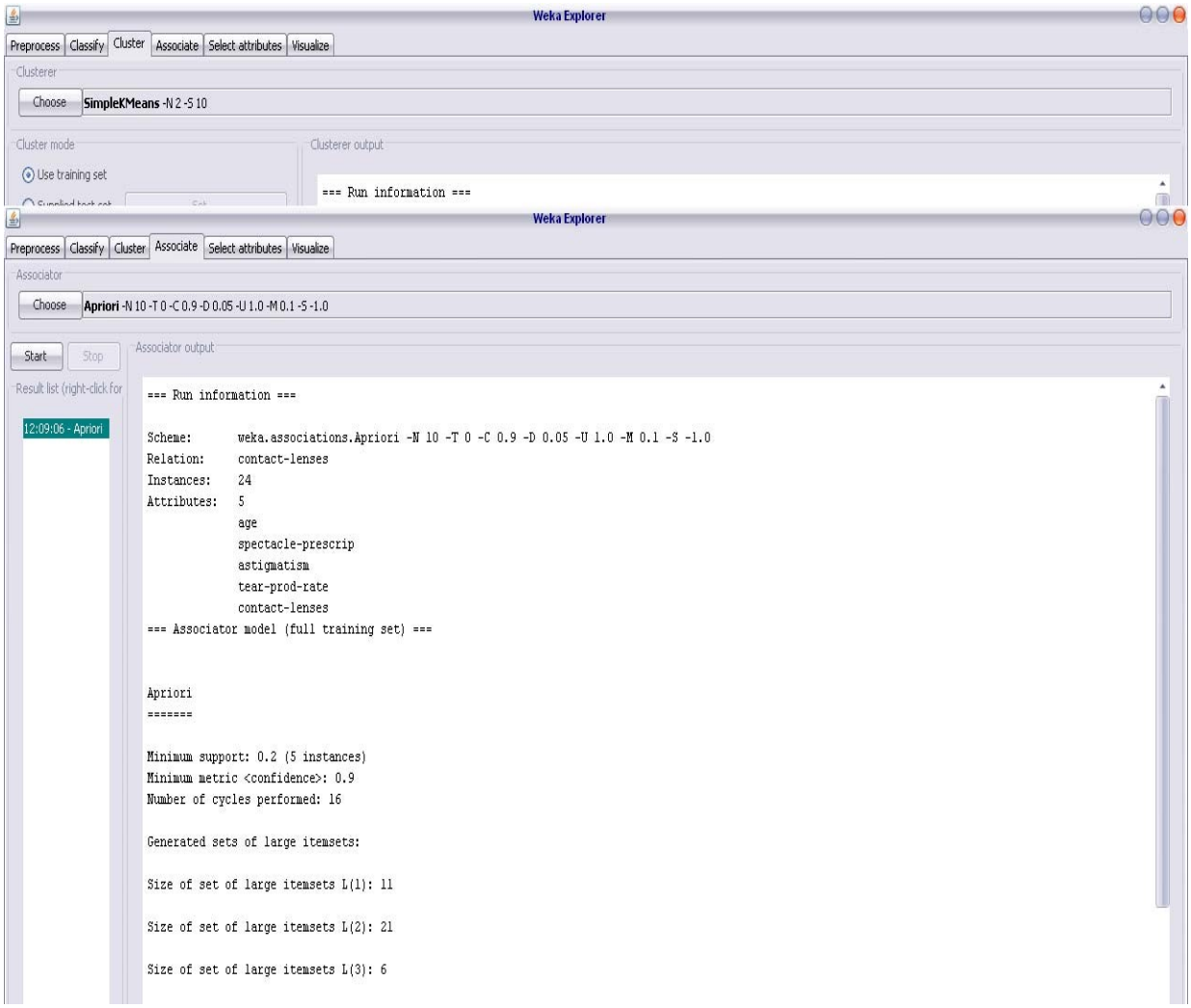
Step3: We will use apriori algorithm. This is the default algorithm.

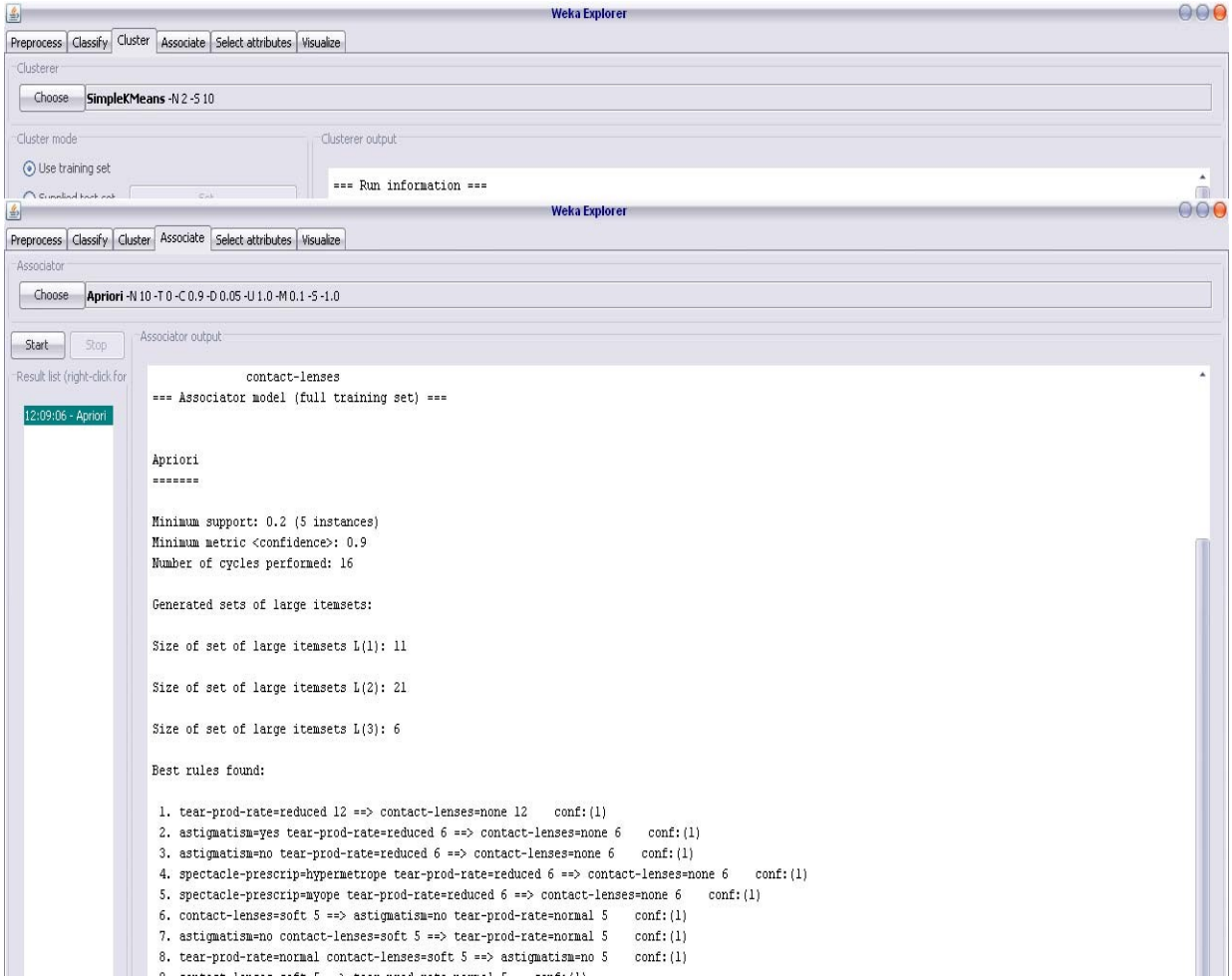
Step4: Inorder to change the parameters for the run (example support, confidence etc) we click on the text box immediately to the right of the choose button.

Dataset contactlenses.arff



The following screenshot shows the association rules that were generated when apriori algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
SimpleKMeans -N 2 -S 10
Cluster mode
Use training set
Clusterer output
=== Run information ===
Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Associator
Choose
Apriori -N 10 -T 0 -C 0.9 -D 0.05 -U 1.0 -M 0.1 -S -1.0
Start
Stop
Result list (right-click for
12:09:06 - Apriori
Associator output
contact-lenses
=== Associator model (full training set) ===
Apriori
=======
Minimum support: 0.2 (5 instances)
Minimum metric <confidence>: 0.9
Number of cycles performed: 16
Generated sets of large itemsets:
Size of set of large itemsets L(1): 11
Size of set of large itemsets L(2): 21
Size of set of large itemsets L(3): 6
Best rules found:
1. tear-prod-rate=reduced 12 ==> contact-lenses=none 12 conf:(1)
2. astigmatism=yes tear-prod-rate=reduced 6 ==> contact-lenses=none 6 conf:(1)
3. astigmatism=no tear-prod-rate=reduced 6 ==> contact-lenses=none 6 conf:(1)
4. spectacle-prescrip=hypermetrope tear-prod-rate=reduced 6 ==> contact-lenses=none 6 conf:(1)
5. spectacle-prescrip=myope tear-prod-rate=reduced 6 ==> contact-lenses=none 6 conf:(1)
6. contact-lenses=soft 5 ==> astigmatism=no tear-prod-rate=normal 5 conf:(1)
7. astigmatism=no contact-lenses=soft 5 ==> tear-prod-rate=normal 5 conf:(1)
8. tear-prod-rate=normal contact-lenses=soft 5 ==> astigmatism=no 5 conf:(1)

4. Demonstration of Association rule process on dataset test.arff using apriori algorithm

Aim: This experiment illustrates some of the basic elements of asscociation rule mining using WEKA. The sample dataset used for this example is test.arff

Step1: Open the data file in Weka Explorer. It is presumed that the required data fields have been discretized. In this example it is age attribute.

Step2: Clicking on the associate tab will bring up the interface for association rule algorithm.

Step3: We will use apriori algorithm. This is the default algorithm.

Step4: Inorder to change the parameters for the run (example support, confidence etc) we click on the text box immediately to the right of the choose button.

Dataset test.arff

@relation test

@attribute admissionyear {2005,2006,2007,2008,2009,2010}

@attribute course {cse,mech,it,ece}

@data

%

2005, cse

2005, it

2005, cse

2006, mech

2006, it

2006, ece

2007, it

2007, cse

2008, it

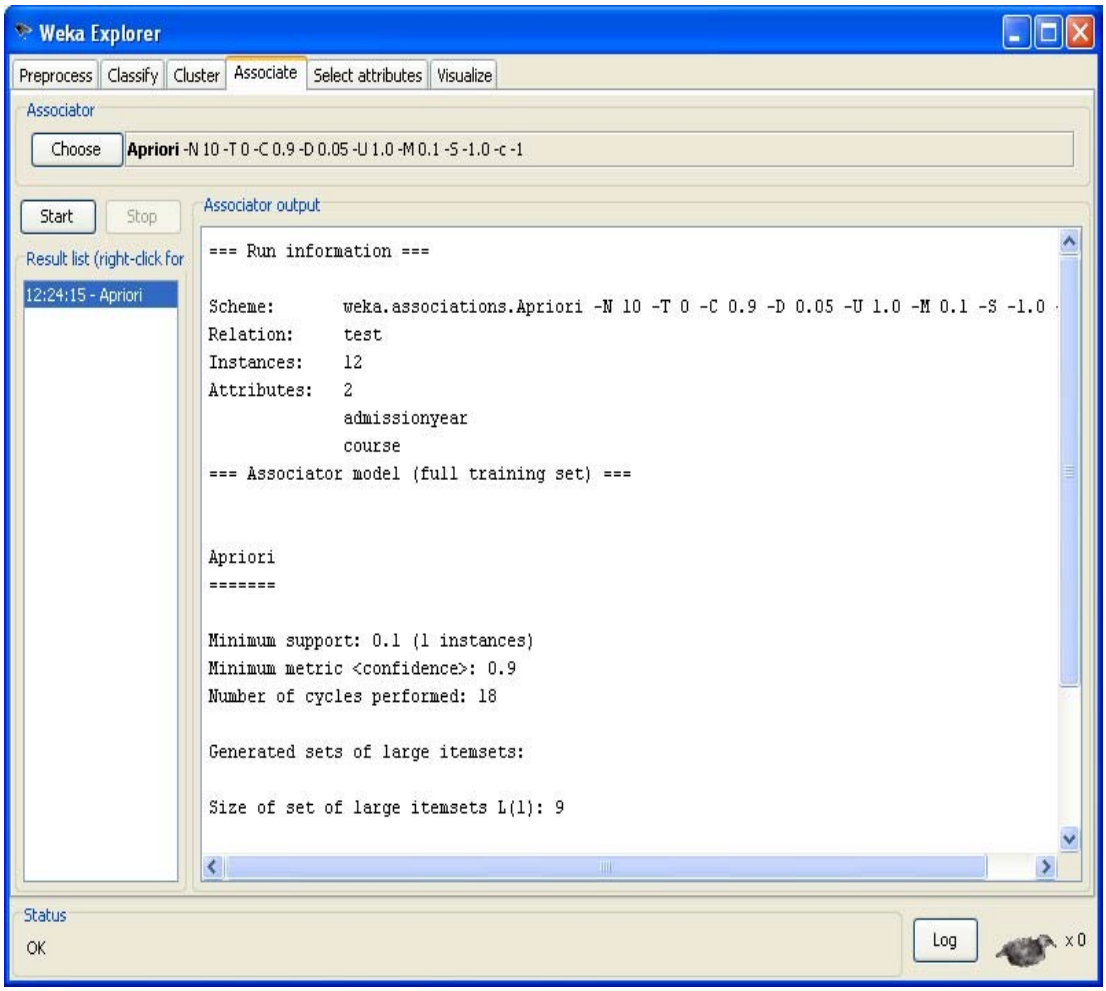
2008, cse

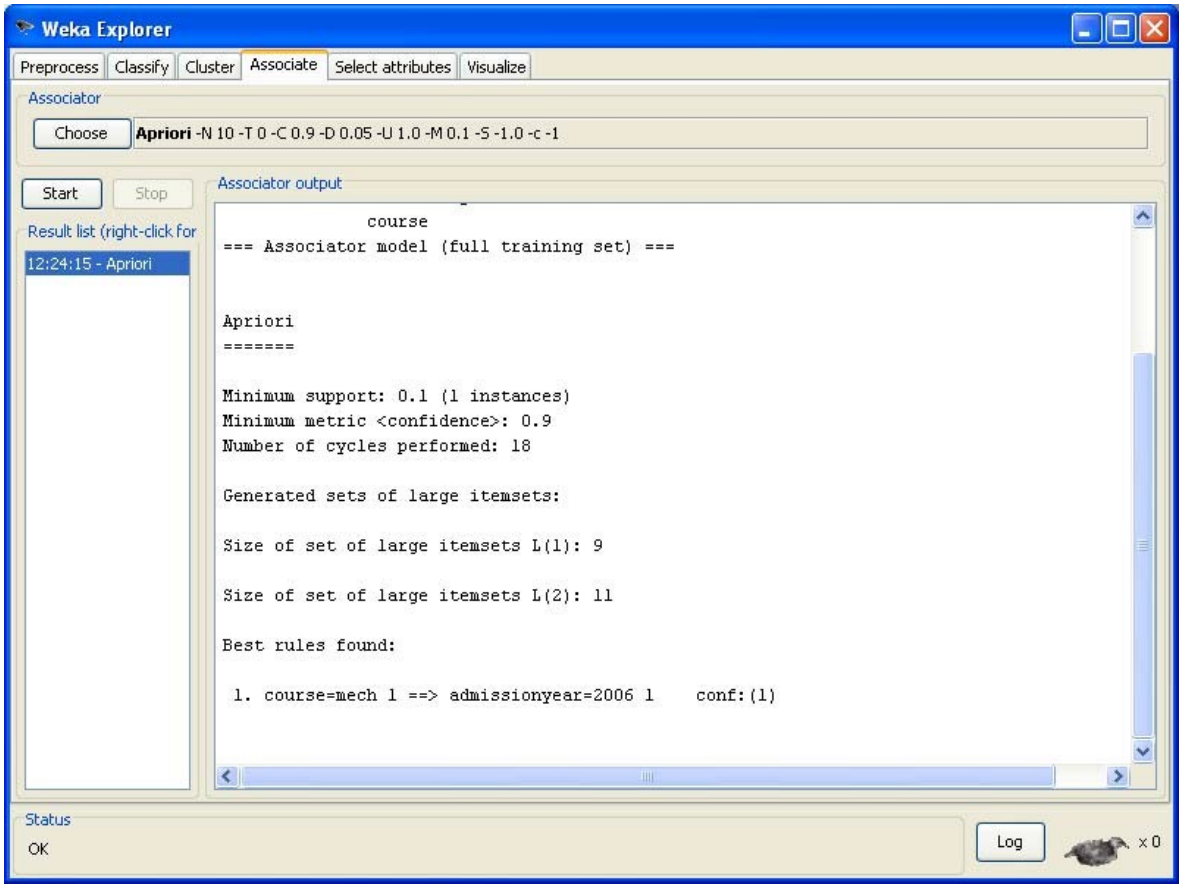
2009, it

2009, ece

%

The following screenshot shows the association rules that were generated when apriori algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Associator
Choose
Apriori -N 10 -T 0 -C 0.9 -D 0.05 -U 1.0 -M 0.1 -S -1.0 -c -1
Start
Stop
Result list (right-click for
12:24:15 - Apriori
Associator output
course
=== Associator model (full training set) ===
Apriori
=======
Minimum support: 0.1 (1 instances)
Minimum metric <confidence>: 0.9
Number of cycles performed: 18
Generated sets of large itemsets:
Size of set of large itemsets L(1): 9
Size of set of large itemsets L(2): 11
Best rules found:
1. course=mech 1 ==> admissionyear=2006 1 conf:(1)
Status
OK
Log
x 0

5. Demonstration of classification rule process on dataset student.arff using j48 algorithm

Aim: This experiment illustrates the use of j-48 classifier in weka. The sample data set used in this experiment is "student" data available at arff format. This document assumes that appropriate data pre processing has been performed.

Steps involved in this experiment:

Step-1: We begin the experiment by loading the data (student.arff)into weka.

Step2: Next we select the "classify" tab and click "choose" button t o select the "j48"classifier.

Step3: Now we specify the various parameters. These can be specified by clicking in the text box to the right of the chose button. In this example, we accept the default values. The default version does perform some pruning but does not perform error pruning.

Step4: Under the "text" options in the main panel. We select the 10-fold cross validation as our evaluation approach. Since we don't have separate evaluation data set, this is necessary to get a reasonable idea of accuracy of generated model.

Step-5: We now click "start" to generate the model .the Ascii version of the tree as well as evaluation statistic will appear in the right panel when the model construction is complete.

Step-6: Note that the classification accuracy of model is about 69%.this indicates that we may find more work. (Either in preprocessing or in selecting current parameters for the classification)

Step-7: Now weka also lets us a view a graphical version of the classification tree. This can be done by right clicking the last result set and selecting "visualize tree" from the pop-up menu.

Step-8: We will use our model to classify the new instances.

Step-9: In the main panel under "text" options click the "supplied test set" radio button and then click the "set" button. This wills pop-up a window which will allow you to open the file containing test instances.

Dataset student .arff

@relation student

@attribute age {<30,30-40,>40}

@attribute income {low, medium, high}

@attribute student {yes, no}

@attribute credit-rating {fair, excellent}

@attribute buyspc {yes, no}

@data

%

<30, high, no, fair, no

<30, high, no, excellent, no

30-40, high, no, fair, yes

>40, medium, no, fair, yes

>40, low, yes, fair, yes

>40, low, yes, excellent, no

30-40, low, yes, excellent, yes

<30, medium, no, fair, no

<30, low, yes, fair, no

>40, medium, yes, fair, yes

<30, medium, yes, excellent, yes

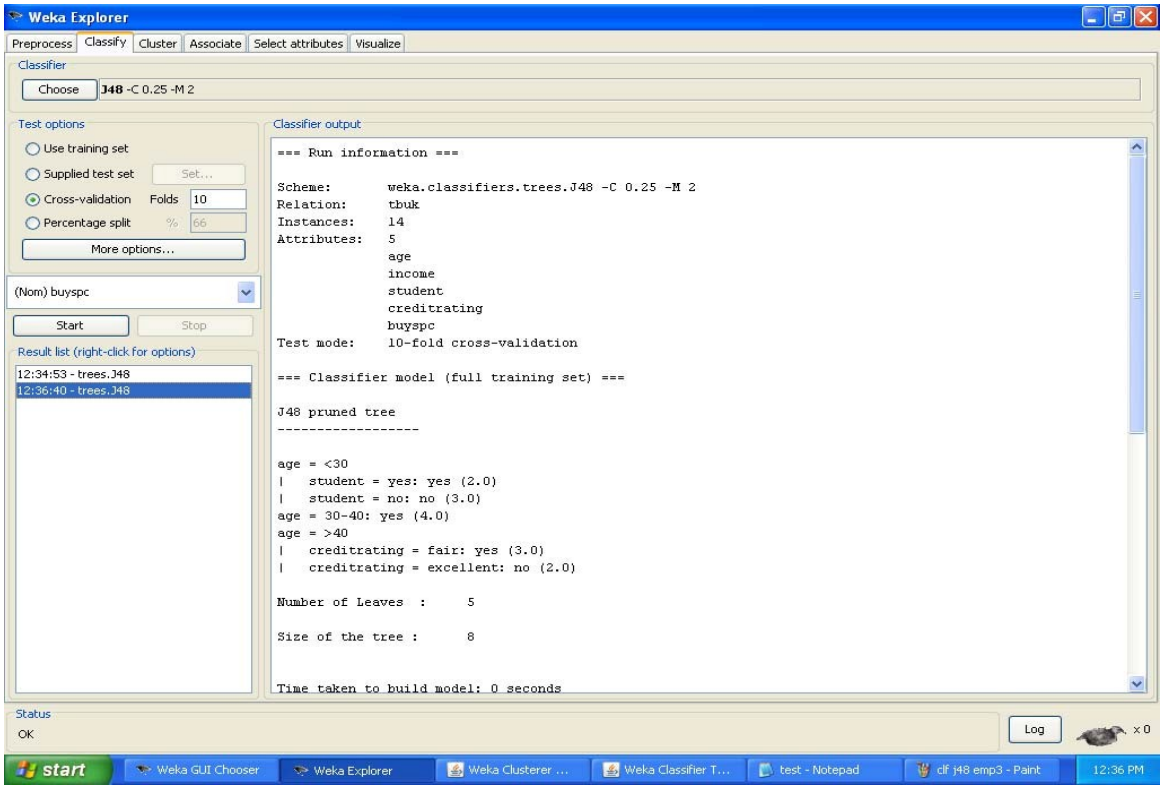
30-40, medium, no, excellent, yes

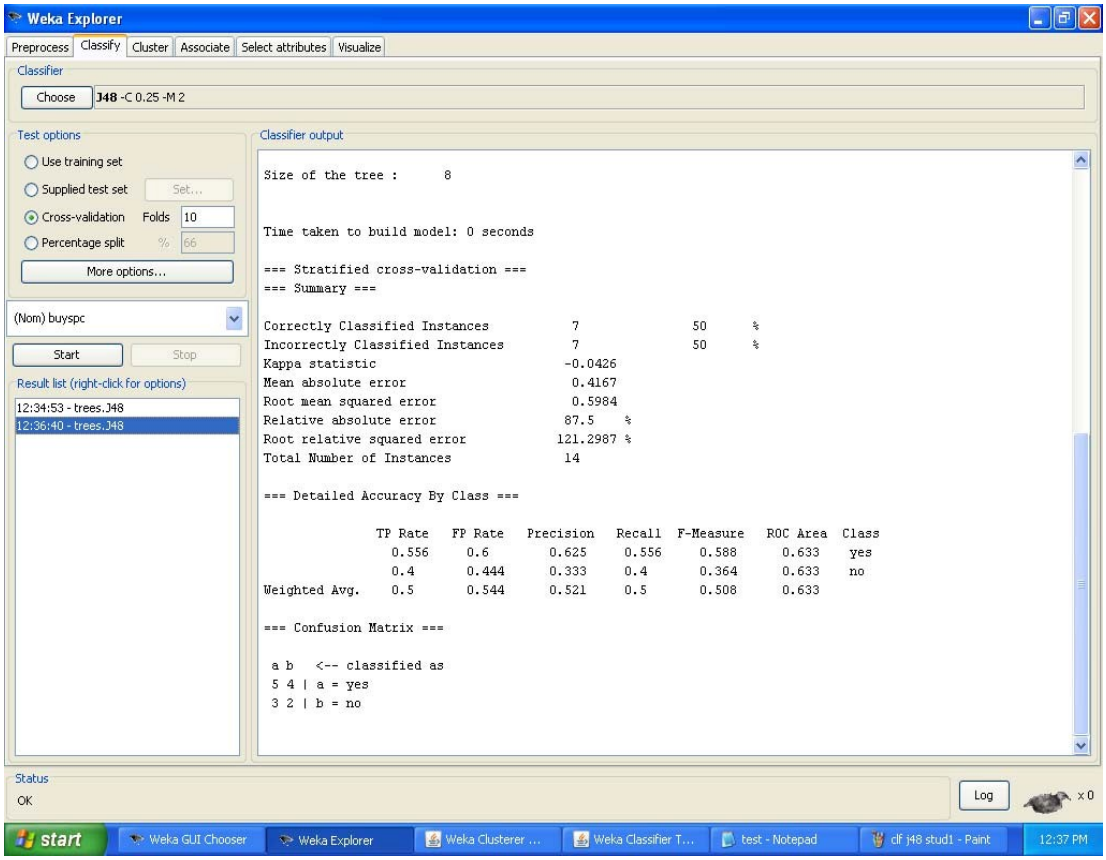
30-40, high, yes, fair, yes

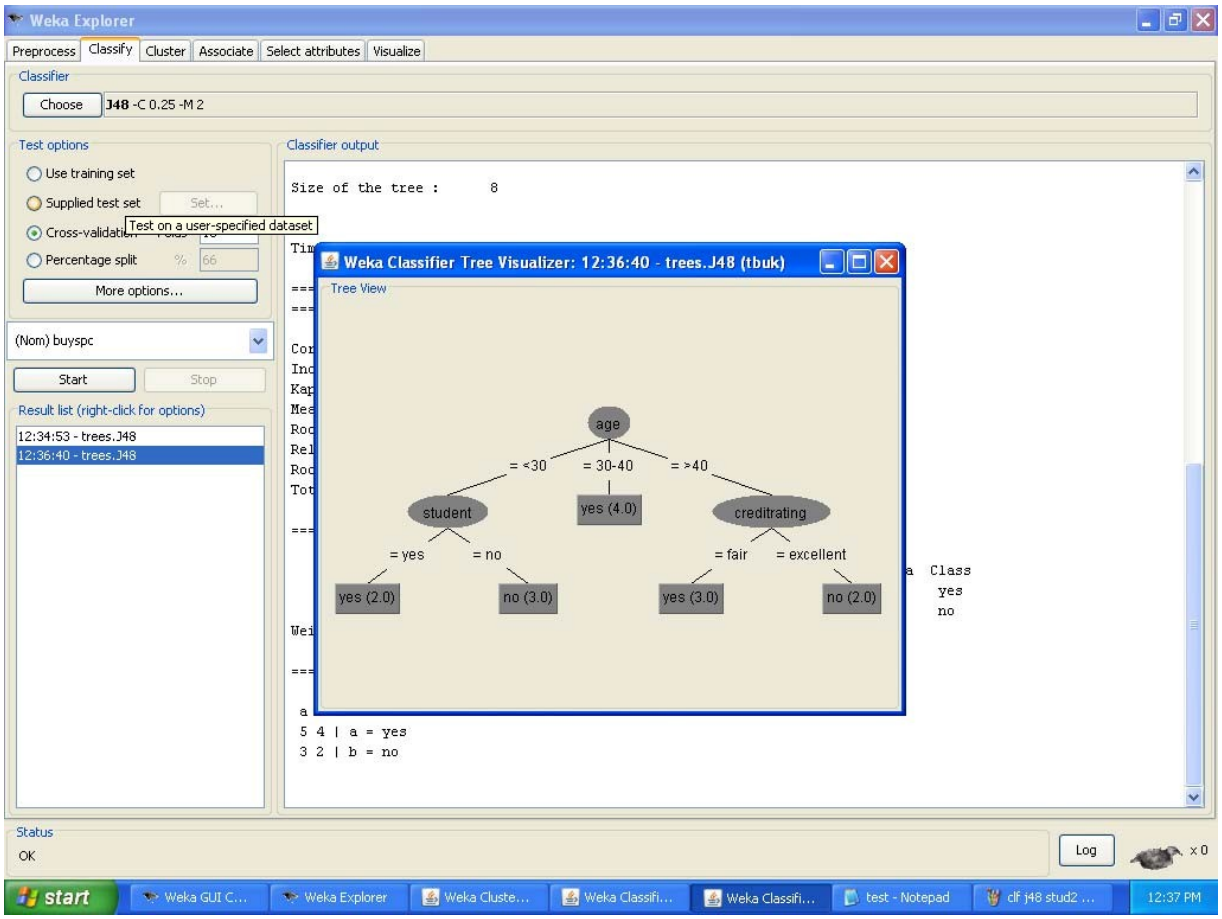
>40, medium, no, excellent, no

%

The following screenshot shows the classification rules that were generated when j48 algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
J48 -C 0.25 -M 2
Test options
Use training set
Supplied test set
Set...
Cross-validation
Folds
10
Percentage split
%
66
More options...
(Nom) buyspc
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
12:36:40 - trees.J48
Classifier output
Size of the tree : 8
Time taken to build model: 0 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances 7 50 %
Incorrectly Classified Instances 7 50 %
Kappa statistic -0.0426
Mean absolute error 0.4167
Root mean squared error 0.5984
Relative absolute error 87.5 %
Root relative squared error 121.2987 %
Total Number of Instances 14
=== Detailed Accuracy By Class ===
TP Rate FP Rate Precision Recall F-Measure ROC Area Class
0.556 0.6 0.625 0.556 0.588 0.633 yes
0.4 0.444 0.333 0.4 0.364 0.633 no
Weighted Avg. 0.5 0.544 0.521 0.5 0.508 0.633
=== Confusion Matrix ===
a b <-- classified as
5 4 | a = yes
3 2 | b = no
Status
OK
Log
x 0
start
Weka GUI Chooser
Weka Explorer
Weka Clusterer ...
Weka Classifier T...
test - Notepad
clf j48 stud1 - Paint
12:37 PM


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
J48 -C 0.25 -M 2
Test options
Use training set
Supplied test set
Set...
Test on a user-specified dataset
Cross-validation
Percentage split
%
66
More options...
Classifier output
Size of the tree : 8
(Nom) buyspc
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
12:36:40 - trees.J48
Weka Classifier Tree Visualizer: 12:36:40 - trees.J48 (tbuk)
Tree View
age
= <30
= 30-40
= >40
student
yes (4.0)
creditrating
= yes
= no
= fair
= excellent
yes (2.0)
no (3.0)
yes (3.0)
no (2.0)
a Class
yes
no
5 4 | a = yes
3 2 | b = no
Status
OK
Log
x 0
start
Weka GUI C...
Weka Explorer
Weka Cluste...
Weka Classifi...
Weka Classifi...
test - Notepad
clf j48 stud2 ...
12:37 PM

6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm

Aim: This experiment illustrates the use of j-48 classifier in weka.the sample data set used in this experiment is "employee"data available at arff format. This document assumes that appropriate data pre processing has been performed.

Steps involved in this experiment:

Step 1: We begin the experiment by loading the data (employee.arff) into weka.

Step2: Next we select the "classify" tab and click "choose" button to select the "j48"classifier.

Step3: Now we specify the various parameters. These can be specified by clicking in the text box to the right of the chose button. In this example, we accept the default values the default version does perform some pruning but does not perform error pruning.

Step4: Under the "text "options in the main panel. We select the 10-fold cross validation as our evaluation approach. Since we don't have separate evaluation data set, this is necessary to get a reasonable idea of accuracy of generated model.

Step-5: We now click "start" to generate the model .the ASCII version of the tree as well as evaluation statistic will appear in the right panel when the model construction is complete.

Step-6: Note that the classification accuracy of model is about 69%.this indicates that we may find more work. (Either in preprocessing or in selecting current parameters for the classification)

Step-7: Now weka also lets us a view a graphical version of the classification tree. This can be done by right clicking the last result set and selecting "visualize tree" from the pop-up menu.

Step-8: We will use our model to classify the new instances.

Step-9: In the main panel under "text "options click the "supplied test set" radio button and then click the "set" button. This wills pop-up a window which will allow you to open the file containing test instances.

Data set employee.arff:

@relation employee

@attribute age {25, 27, 28, 29, 30, 35, 48}

@attribute salary{10k,15k,17k,20k,25k,30k,35k,32k}

@attribute performance {good, avg, poor}

@data

%

25, 10k, poor

27, 15k, poor

27, 17k, poor

28, 17k, poor

29, 20k, avg

30, 25k, avg

29, 25k, avg

30, 20k, avg

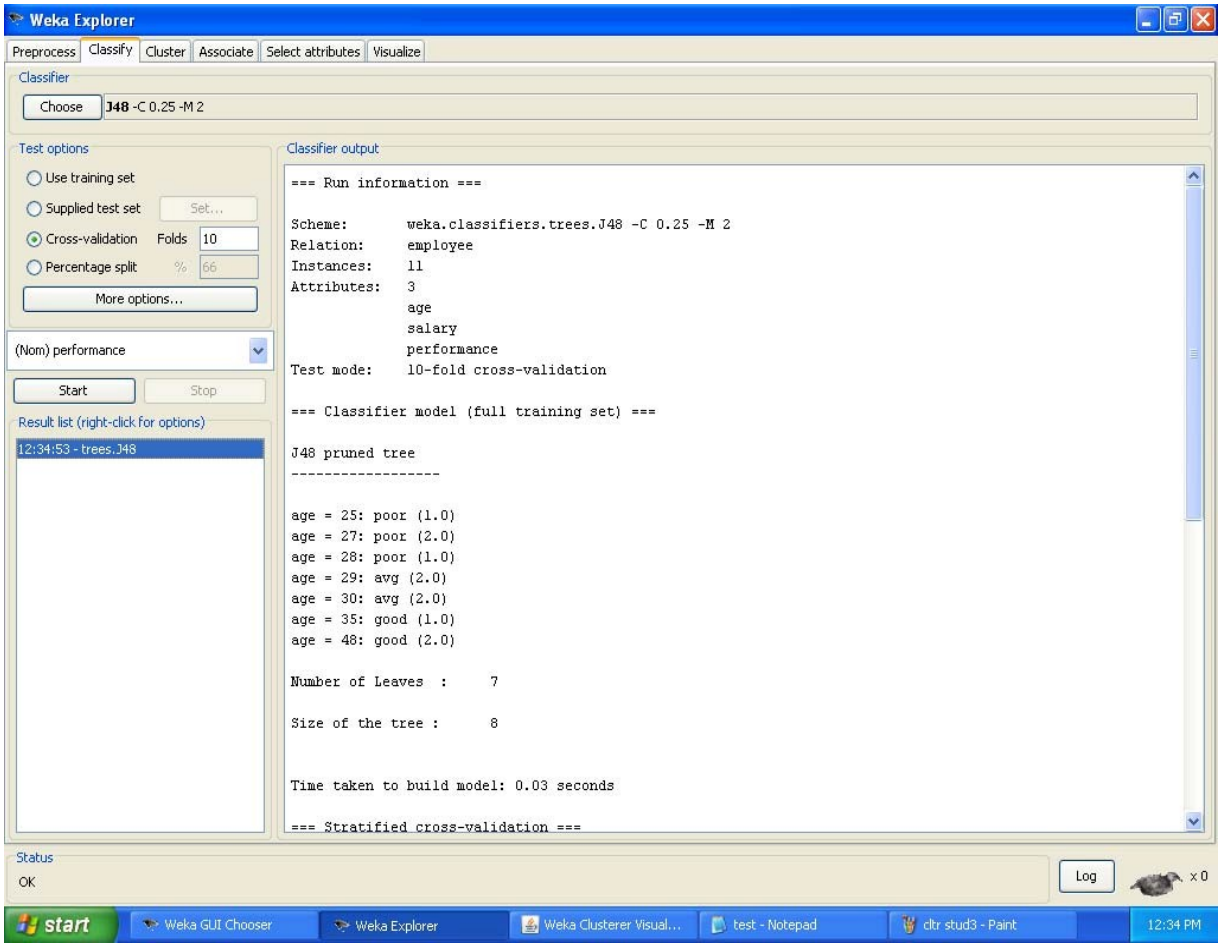
35, 32k, good

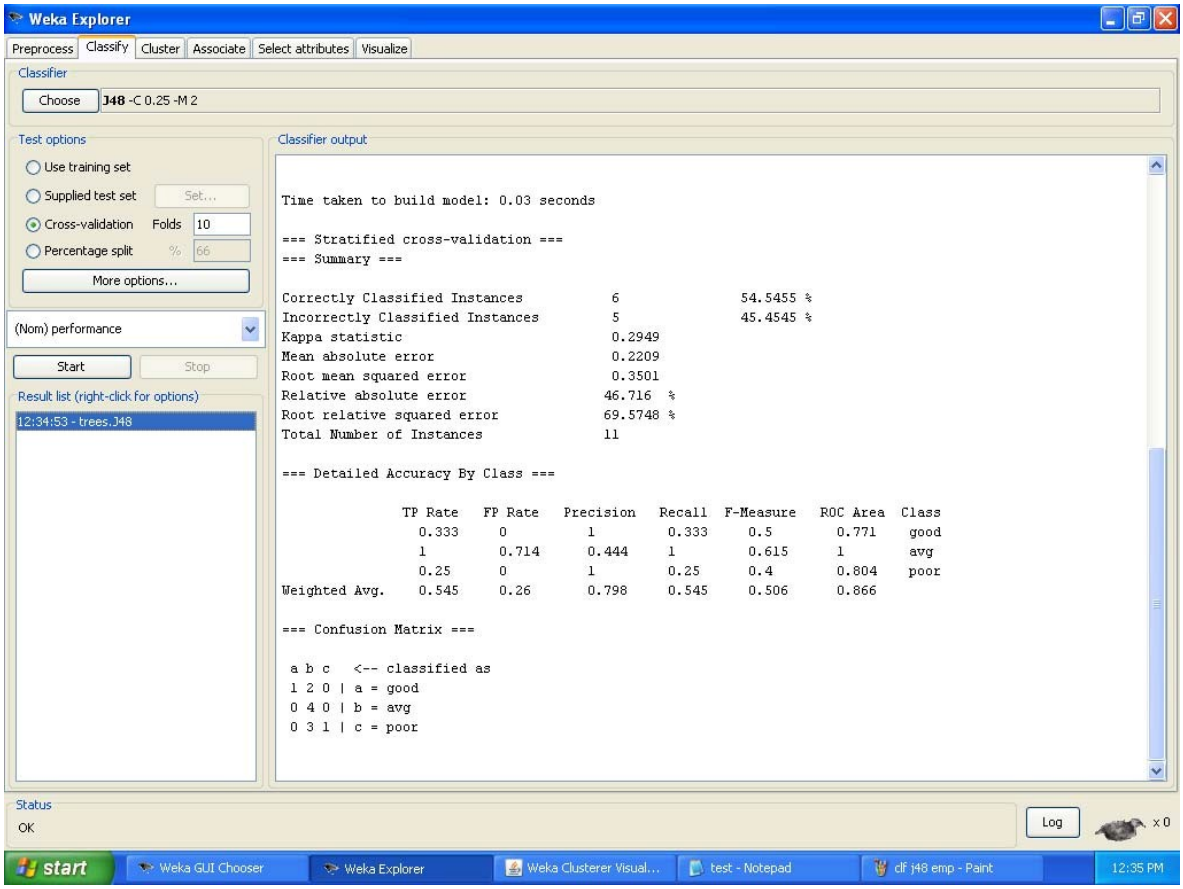
48, 34k, good

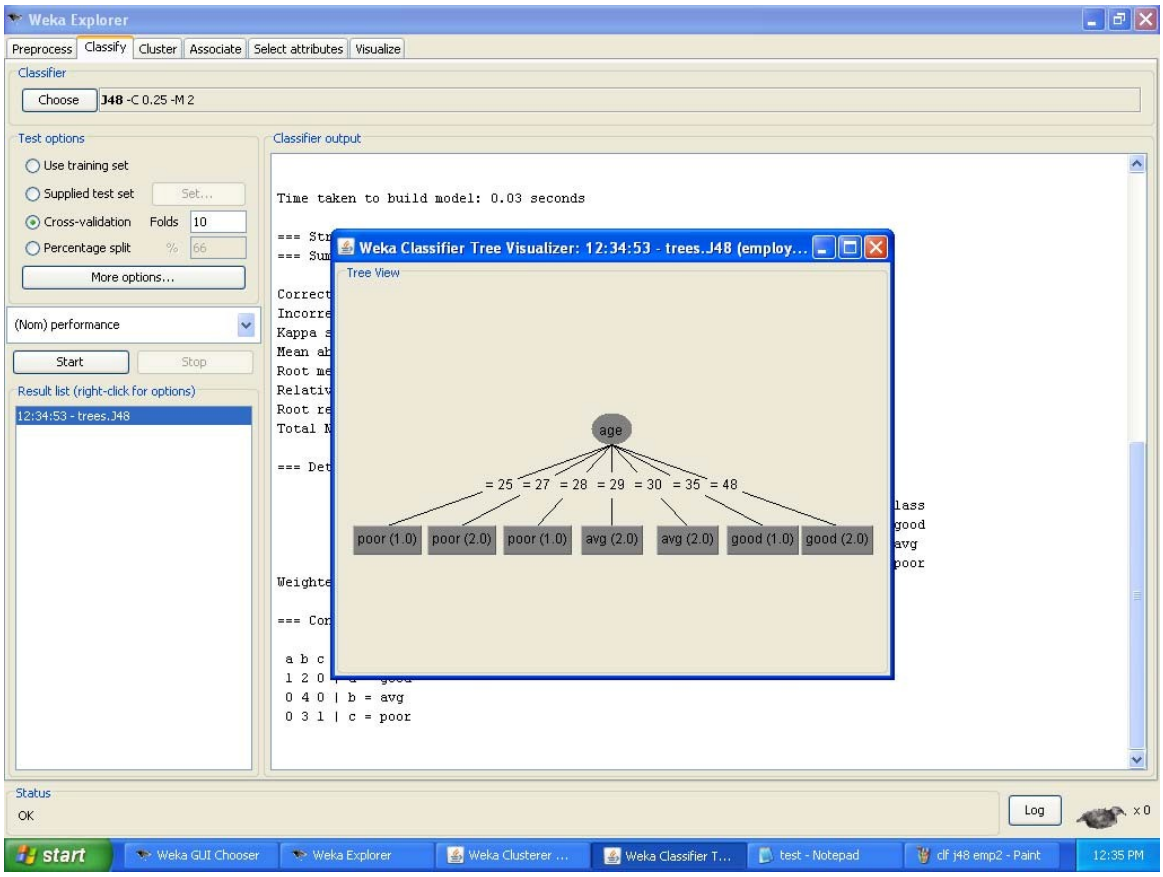
48, 32k,good

%

The following screenshot shows the classification rules that were generated whenj48 algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
J48 -C 0.25 -M 2
Test options
Use training set
Supplied test set
Set...
Cross-validation
Folds
10
Percentage split
%
66
More options...
(Nom) performance
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
Classifier output
Time taken to build model: 0.03 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances 6 54.5455 %
Incorrectly Classified Instances 5 45.4545 %
Kappa statistic 0.2949
Mean absolute error 0.2209
Root mean squared error 0.3501
Relative absolute error 46.716 %
Root relative squared error 69.5748 %
Total Number of Instances 11
=== Detailed Accuracy By Class ===
TP Rate FP Rate Precision Recall F-Measure ROC Area Class
0.333 0 1 0.333 0.5 0.771 good
1 0.714 0.444 1 0.615 1 avg
0.25 0 1 0.25 0.4 0.804 poor
Weighted Avg. 0.545 0.26 0.798 0.545 0.506 0.866
=== Confusion Matrix ===
a b c <-- classified as
1 2 0 | a = good
0 4 0 | b = avg
0 3 1 | c = poor
Status
OK
Log
x 0
start
Weka GUI Chooser
Weka Explorer
Weka Clusterer Visual...
test - Notepad
clf j48 emp - Paint
12:35 PM


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
J48 -C 0.25 -M 2
Test options
Use training set
Supplied test set
Set...
Cross-validation
Folds
10
Percentage split
%
66
More options...
Classifier output
Time taken to build model: 0.03 seconds
(Nom) performance
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
Weka Classifier Tree Visualizer: 12:34:53 - trees.J48 (employ...
Tree View
age
= 25
= 27
= 28
= 29
= 30
= 35
= 48
poor (1.0)
poor (2.0)
poor (1.0)
avg (2.0)
avg (2.0)
good (1.0)
good (2.0)
a b c
1 2 0 | a = good
0 4 0 | b = avg
0 3 1 | c = poor
Status
OK
Log
x 0
start
Weka GUI Chooser
Weka Explorer
Weka Clusterer ...
Weka Classifier T...
test - Notepad
clf j48 emp2 - Paint
12:35 PM

7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm

Aim: This experiment illustrates the use of id3 classifier in weka. The sample data set used in this experiment is "employee"data available at arff format. This document assumes that appropriate data pre processing has been performed.

Steps involved in this experiment:

1. We begin the experiment by loading the data (employee.arff) into weka.

Step2: next we select the "classify" tab and click "choose" button to select the "id3"classifier.

Step3: now we specify the various parameters. These can be specified by clicking in the text box to the right of the chose button. In this example, we accept the default values his default version does perform some pruning but does not perform error pruning.

Step4: under the "text "options in the main panel. We select the 10-fold cross validation as our evaluation approach. Since we don't have separate evaluation data set, this is necessary to get a reasonable idea of accuracy of generated model.

Step-5: we now click"start"to generate the model .the ASCII version of the tree as well as evaluation statistic will appear in the right panel when the model construction is complete.

Step-6: note that the classification accuracy of model is about 69%.this indicates that we may find more work. (Either in preprocessing or in selecting current parameters for the classification)

Step-7: now weka also lets us a view a graphical version of the classification tree. This can be done by right clicking the last result set and selecting "visualize tree" from the pop-up menu.

Step-8: we will use our model to classify the new instances.

Step-9: In the main panel under "text "options click the "supplied test set" radio button and then click the "set" button. This will show pop-up window which will allow you to open the file containing test instances.

Data set employee.arff:

@relation employee

@attribute age {25, 27, 28, 29, 30, 35, 48}

@attribute salary{10k,15k,17k,20k,25k,30k,35k,32k}

@attribute performance {good, avg, poor}

@data

%

25, 10k, poor

27, 15k, poor

27, 17k, poor

28, 17k, poor

29, 20k, avg

30, 25k, avg

29, 25k, avg

30, 20k, avg

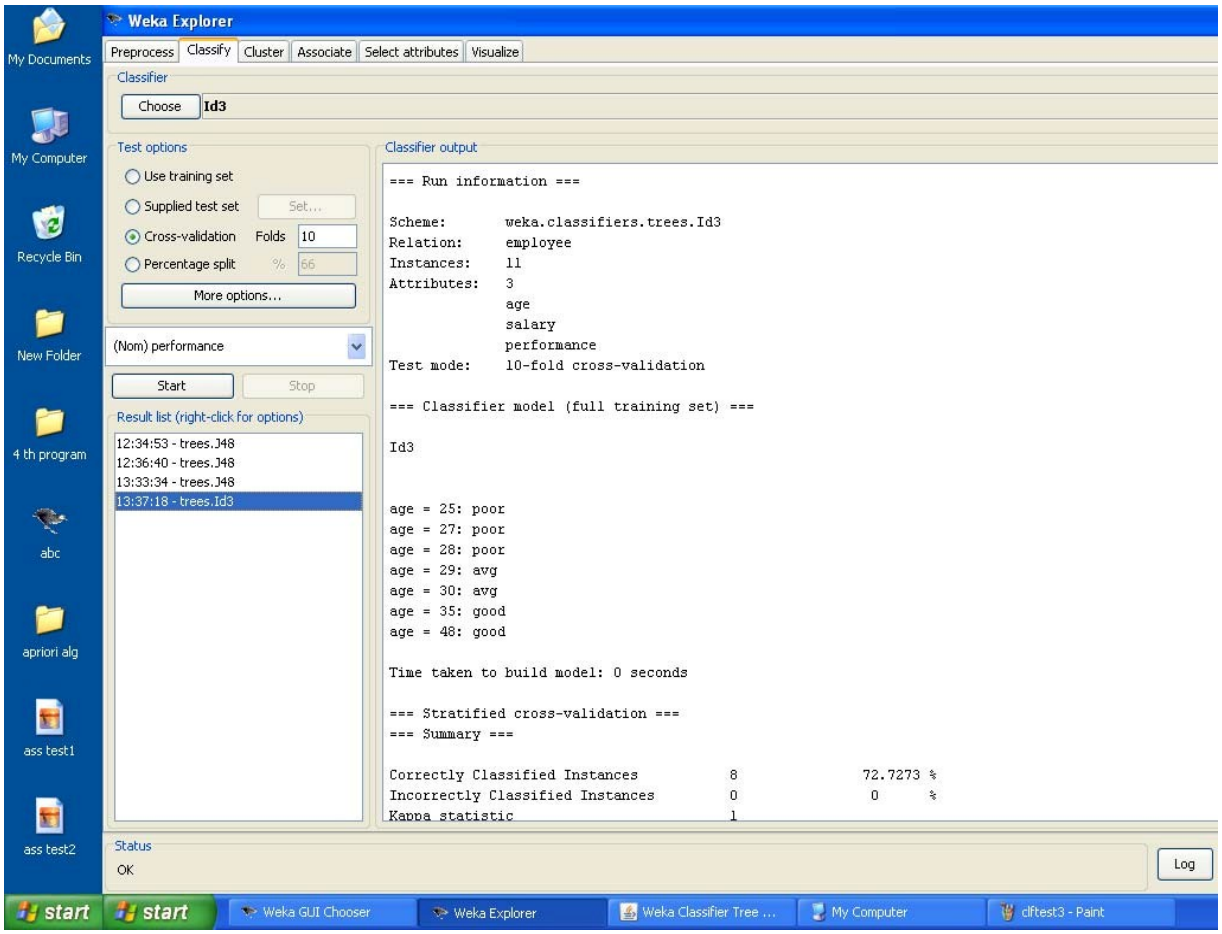
35, 32k, good

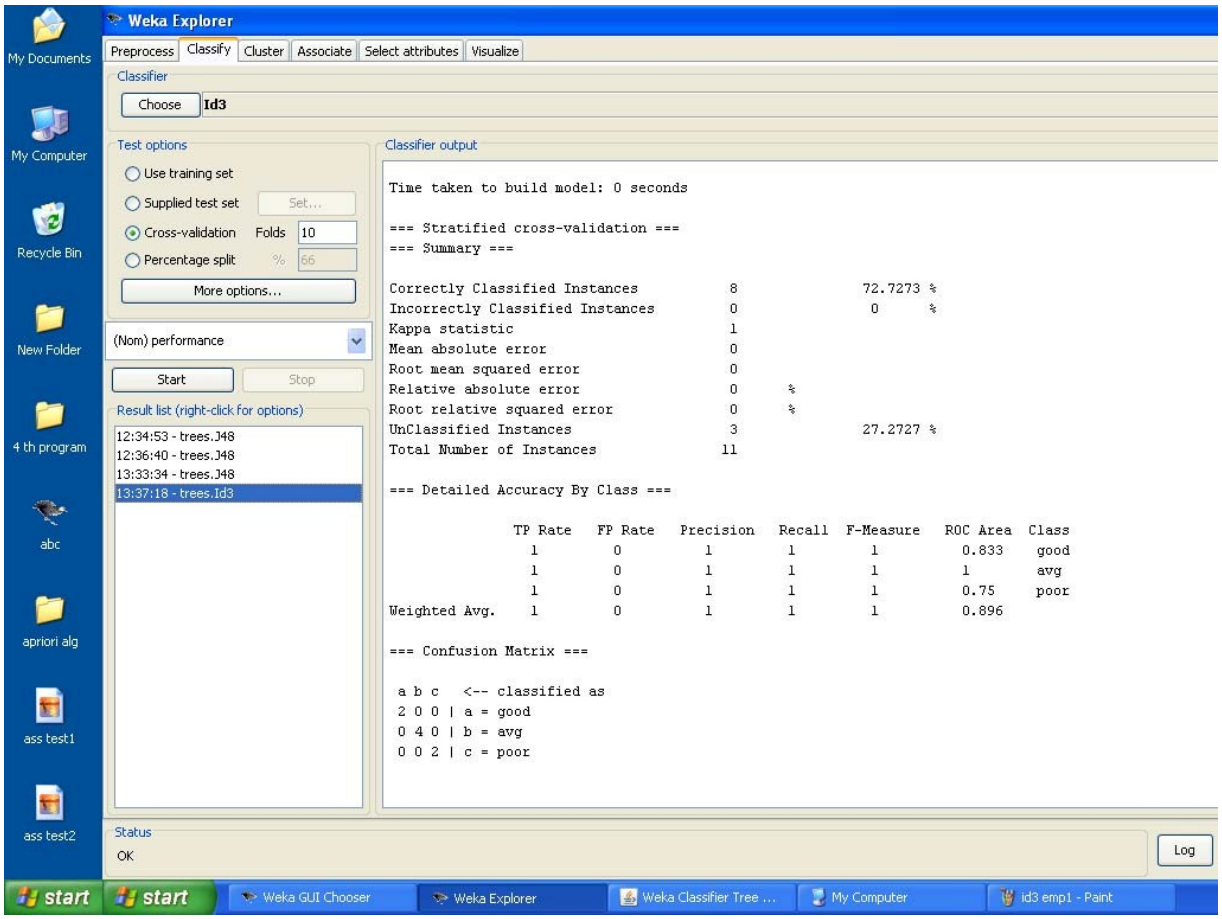
48, 34k, good

48, 32k, good

%

The following screenshot shows the classification rules that were generated when id3 algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
Id3
Test options
Use training set
Supplied test set
Set...
Cross-validation
Folds
10
Percentage split
%
66
More options...
(Nom) performance
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
12:36:40 - trees.J48
13:33:34 - trees.J48
13:37:18 - trees.Id3
Classifier output
Time taken to build model: 0 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances 8 72.7273 %
Incorrectly Classified Instances 0 0 %
Kappa statistic 1
Mean absolute error 0
Root mean squared error 0
Relative absolute error 0 %
Root relative squared error 0 %
UnClassified Instances 3 27.2727 %
Total Number of Instances 11
=== Detailed Accuracy By Class ===
TP Rate FP Rate Precision Recall F-Measure ROC Area Class
1 0 1 1 1 0.833 good
1 0 1 1 1 1 avg
1 0 1 1 1 0.75 poor
Weighted Avg. 1 0 1 1 1 0.896
=== Confusion Matrix ===
a b c <-- classified as
2 0 0 | a = good
0 4 0 | b = avg
0 0 2 | c = poor
Status
OK
Log
My Documents
My Computer
Recycle Bin
New Folder
4 th program
abc
apriori alg
ass test1
ass test2
start
Weka GUI Chooser
Weka Explorer
Weka Classifier Tree ...
My Computer
id3 emp1 - Paint

8.Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm

Aim: This experiment illustrates the use of naïve bayes classifier in weka. The sample data set used in this experiment is "employee"data available at arff format. This document assumes that appropriate data pre processing has been performed.

Steps involved in this experiment:

1. We begin the experiment by loading the data (employee.arff) into weka.

Step2: next we select the "classify" tab and click "choose" button to select the "id3"classifier.

Step3: now we specify the various parameters. These can be specified by clicking in the text box to the right of the chose button. In this example, we accept the default values his default version does perform some pruning but does not perform error pruning.

Step4: under the "text "options in the main panel. We select the 10-fold cross validation as our evaluation approach. Since we don't have separate evaluation data set, this is necessary to get a reasonable idea of accuracy of generated model.

Step-5: we now click"start"to generate the model .the ASCII version of the tree as well as evaluation statistic will appear in the right panel when the model construction is complete.

Step-6: note that the classification accuracy of model is about 69%.this indicates that we may find more work. (Either in preprocessing or in selecting current parameters for the classification)

Step-7: now weka also lets us a view a graphical version of the classification tree. This can be done by right clicking the last result set and selecting "visualize tree" from the pop-up menu.

Step-8: we will use our model to classify the new instances.

Step-9: In the main panel under "text "options click the "supplied test set" radio button and then click the "set" button. This will show pop-up window which will allow you to open the file containing test instances.

Data set employee.arff:

@relation employee

@attribute age {25, 27, 28, 29, 30, 35, 48}

@attribute salary{10k,15k,17k,20k,25k,30k,35k,32k}

@attribute performance {good, avg, poor}

@data

%

25, 10k, poor

27, 15k, poor

27, 17k, poor

28, 17k, poor

29, 20k, avg

30, 25k, avg

29, 25k, avg

30, 20k, avg

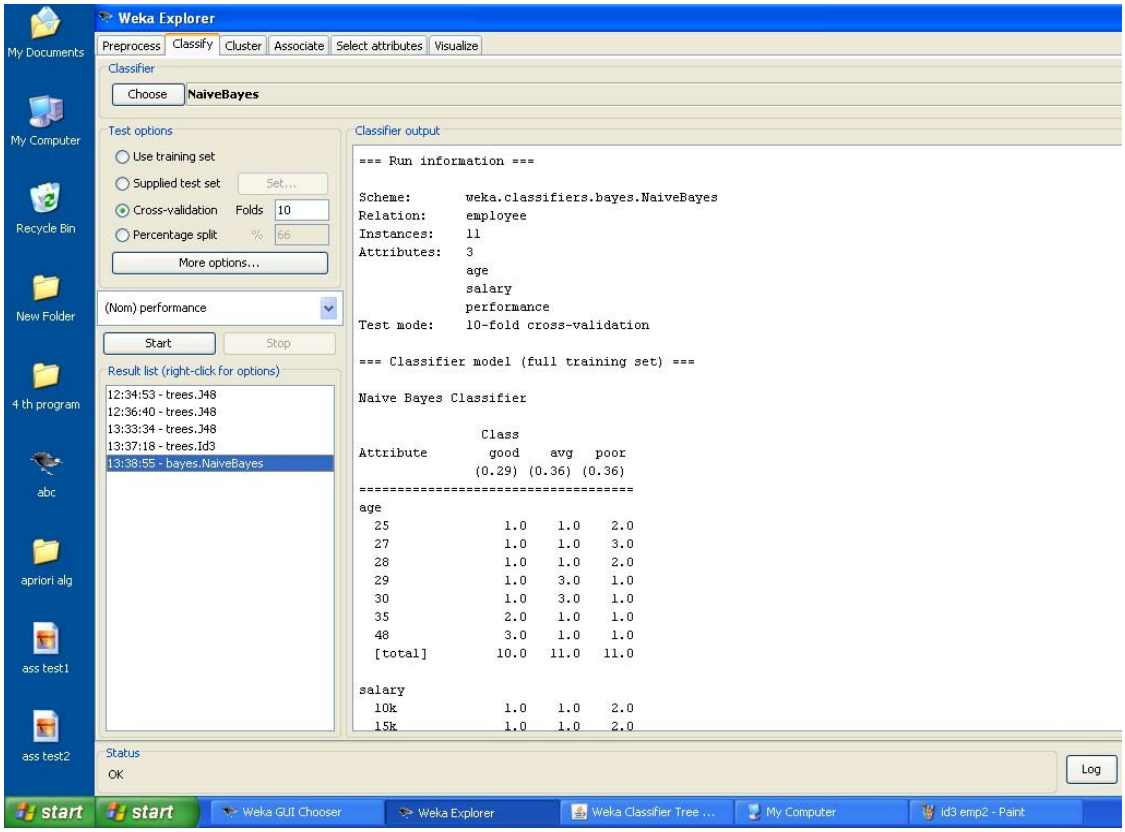
35, 32k, good

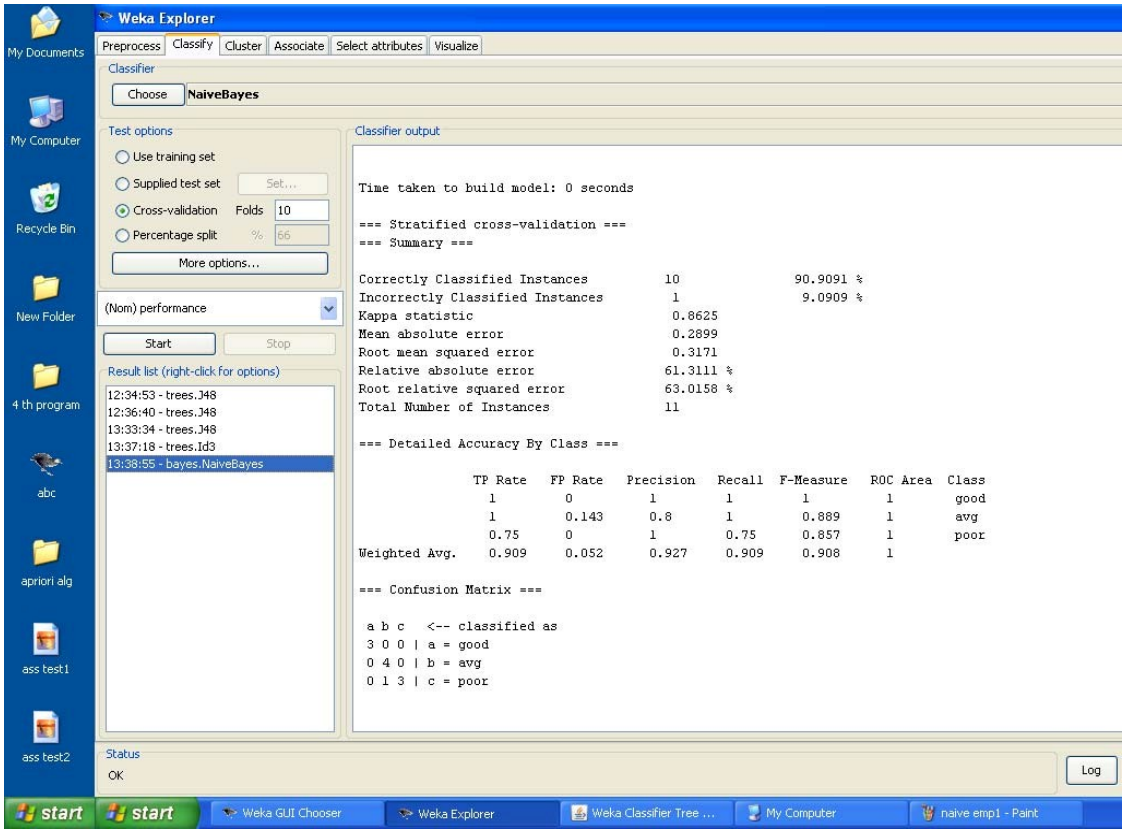
48, 34k, good

48, 32k, good

%

The following screenshot shows the classification rules that were generated when naive bayes algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Classifier
Choose
NaiveBayes
Test options
Use training set
Supplied test set
Set...
Cross-validation
Folds
10
Percentage split
%
66
More options...
(Nom) performance
Start
Stop
Result list (right-click for options)
12:34:53 - trees.J48
12:36:40 - trees.J48
13:33:34 - trees.J48
13:37:18 - trees.Id3
13:38:55 - bayes.NaiveBayes
Classifier output
Time taken to build model: 0 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances 10 90.9091 %
Incorrectly Classified Instances 1 9.0909 %
Kappa statistic 0.8625
Mean absolute error 0.2899
Root mean squared error 0.3171
Relative absolute error 61.3111 %
Root relative squared error 63.0158 %
Total Number of Instances 11
=== Detailed Accuracy By Class ===
TP Rate FP Rate Precision Recall F-Measure ROC Area Class
1 0 1 1 1 1 good
1 0.143 0.8 1 0.889 1 avg
0.75 0 1 0.75 0.857 1 poor
Weighted Avg. 0.909 0.052 0.927 0.909 0.908 1
=== Confusion Matrix ===
a b c <-- classified as
3 0 0 | a = good
0 4 0 | b = avg
0 1 3 | c = poor
Status
OK
Log
My Documents
My Computer
Recycle Bin
New Folder
4 th program
abc
apriori alg
ass test1
ass test2
start
Weka GUI Chooser
Weka Explorer
Weka Classifier Tree ...
My Computer
naive emp1 - Paint

9. Demonstration of clustering rule process on dataset iris.arff using simple k-means

Aim: This experiment illustrates the use of simple k-mean clustering with Weka explorer. The sample data set used for this example is based on the iris data available in ARFF format. This document assumes that appropriate preprocessing has been performed. This iris dataset includes 150 instances.

Steps involved in this Experiment

Step 1: Run the Weka explorer and load the data file iris.arff in preprocessing interface.

Step 2: Inorder to perform clustering select the 'cluster' tab in the explorer and click on the choose button. This step results in a dropdown list of available clustering algorithms.

Step 3 : In this case we select 'simple k-means'.

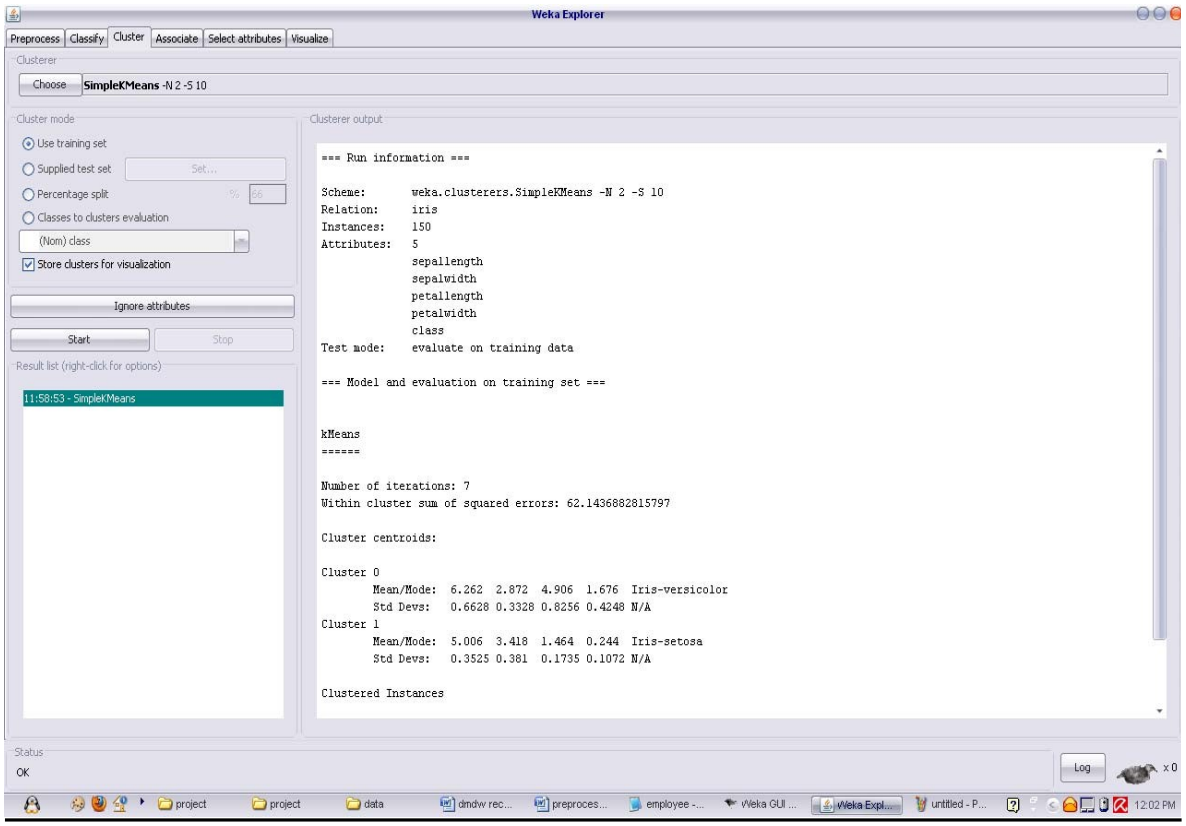
Step 4: Next click in text button to the right of the choose button to get popup window shown in the screenshots. In this window we enter six on the number of clusters and we leave the value of the seed on as it is. The seed value is used in generating a random number which is used for making the internal assignments of instances of clusters.

Step 5 : Once of the option have been specified. We run the clustering algorithm there we must make sure that they are in the 'cluster mode' panel. The use of training set option is selected and then we click 'start' button. This process and resulting window are shown in the following screenshots.

Step 6 : The result window shows the centroid of each cluster as well as statistics on the number and the percent of instances assigned to different clusters. Here clusters centroid are means vectors for each clusters. This clusters can be used to characterized the cluster.For eg, the centroid of cluster1 shows the class iris.versicolor mean value of the sepal length is 5.4706, sepal width 2.4765, petal width 1.1294, petal length 3.7941.

Step 7: Another way of understanding characterstics of each cluster through visualization ,we can do this, try right clicking the result set on the result. List panel and selecting the visualize cluster assignments.

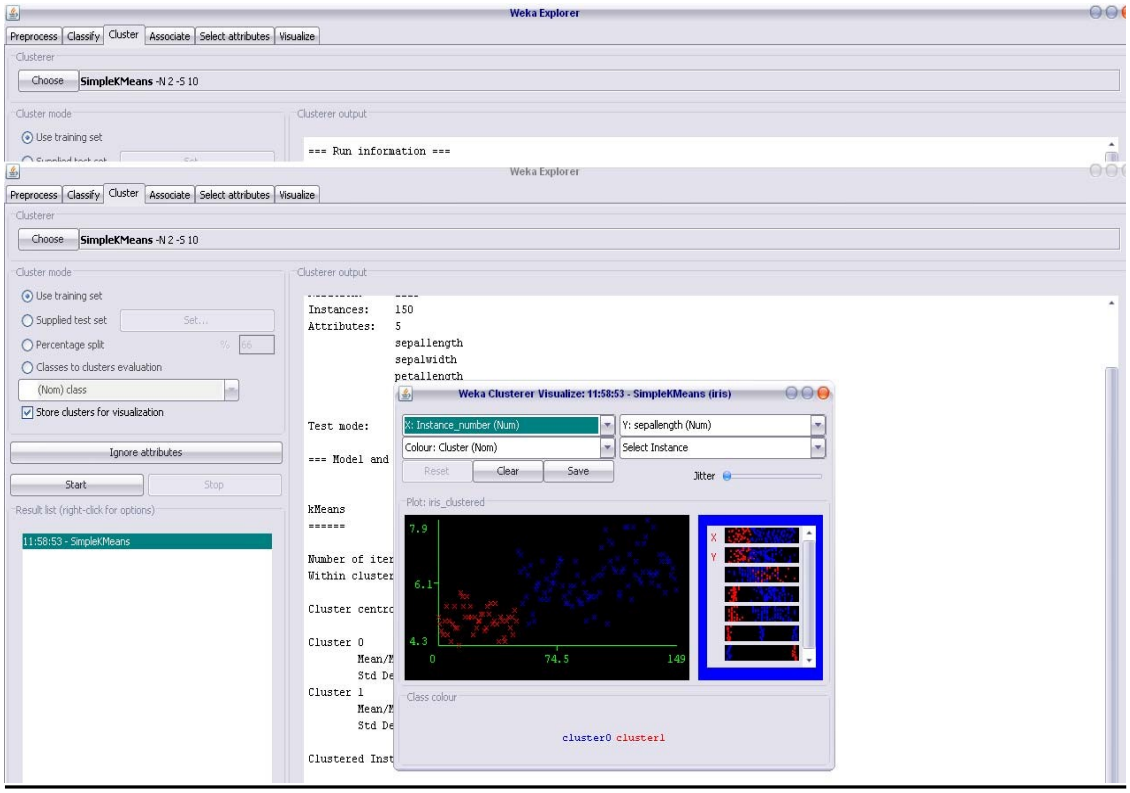
The following screenshot shows the clustering rules that were generated when simple k means algorithm is applied on the given dataset.



Interpretation of the above visualization

From the above visualization, we can understand the distribution of sepal length and petal length in each cluster. For instance, for each cluster is dominated by petal length. In this case by changing the color dimension to other attributes we can see their distribution with in each of the cluster.

Step 8: We can assure that resulting dataset which included each instance along with its assign cluster. To do so we click the save button in the visualization window and save the result iris k-mean .The top portion of this file is shown in the following figure.



10. Demonstration of clustering rule process on dataset student.arff using simple k-means

Aim: This experiment illustrates the use of simple k-mean clustering with Weka explorer. The sample data set used for this example is based on the student data available in ARFF format. This document assumes that appropriate preprocessing has been performed. This istudent dataset includes 14 instances.

Steps involved in this Experiment

Step 1: Run the Weka explorer and load the data file student.arff in preprocessing interface.

Step 2: Inorder to perform clustering select the 'cluster' tab in the explorer and click on the choose button. This step results in a dropdown list of available clustering algorithms.

Step 3 : In this case we select 'simple k-means'.

Step 4: Next click in text button to the right of the choose button to get popup window shown in the screenshots. In this window we enter six on the number of clusters and we leave the value of the seed on as it is. The seed value is used in generating a random number which is used for making the internal assignments of instances of clusters.

Step 5 : Once of the option have been specified. We run the clustering algorithm there we must make sure that they are in the 'cluster mode' panel. The use of training set option is selected and then we click 'start' button. This process and resulting window are shown in the following screenshots.

Step 6 : The result window shows the centroid of each cluster as well as statistics on the number and the percent of instances assigned to different clusters. Here clusters centroid are means vectors for each clusters. This clusters can be used to characterized the cluster.

Step 7: Another way of understanding characterstics of each cluster through visualization ,we can do this, try right clicking the result set on the result. List panel and selecting the visualize cluster assignments.

Interpretation of the above visualization

From the above visualization, we can understand the distribution of age and instance number in each cluster. For instance, for each cluster is dominated by age. In this case by changing the color dimension to other attributes we can see their distribution with in each of the cluster.

Step 8: We can assure that resulting dataset which included each instance along with its assign cluster. To do so we click the save button in the visualization window and save the result student k-mean .The top portion of this file is shown in the following figure.

Dataset student .arff

@relation student

@attribute age {<30,30-40,>40}

@attribute income {low,medium,high}

@attribute student {yes,no}

@attribute credit-rating {fair,excellent}

@attribute buyspc {yes,no}

@data

%

<30, high, no, fair, no

<30, high, no, excellent, no

30-40, high, no, fair, yes

>40, medium, no, fair, yes

>40, low, yes, fair, yes

>40, low, yes, excellent, no

30-40, low, yes, excellent, yes

<30, medium, no, fair, no

<30, low, yes, fair, no

>40, medium, yes, fair, yes

<30, medium, yes, excellent, yes

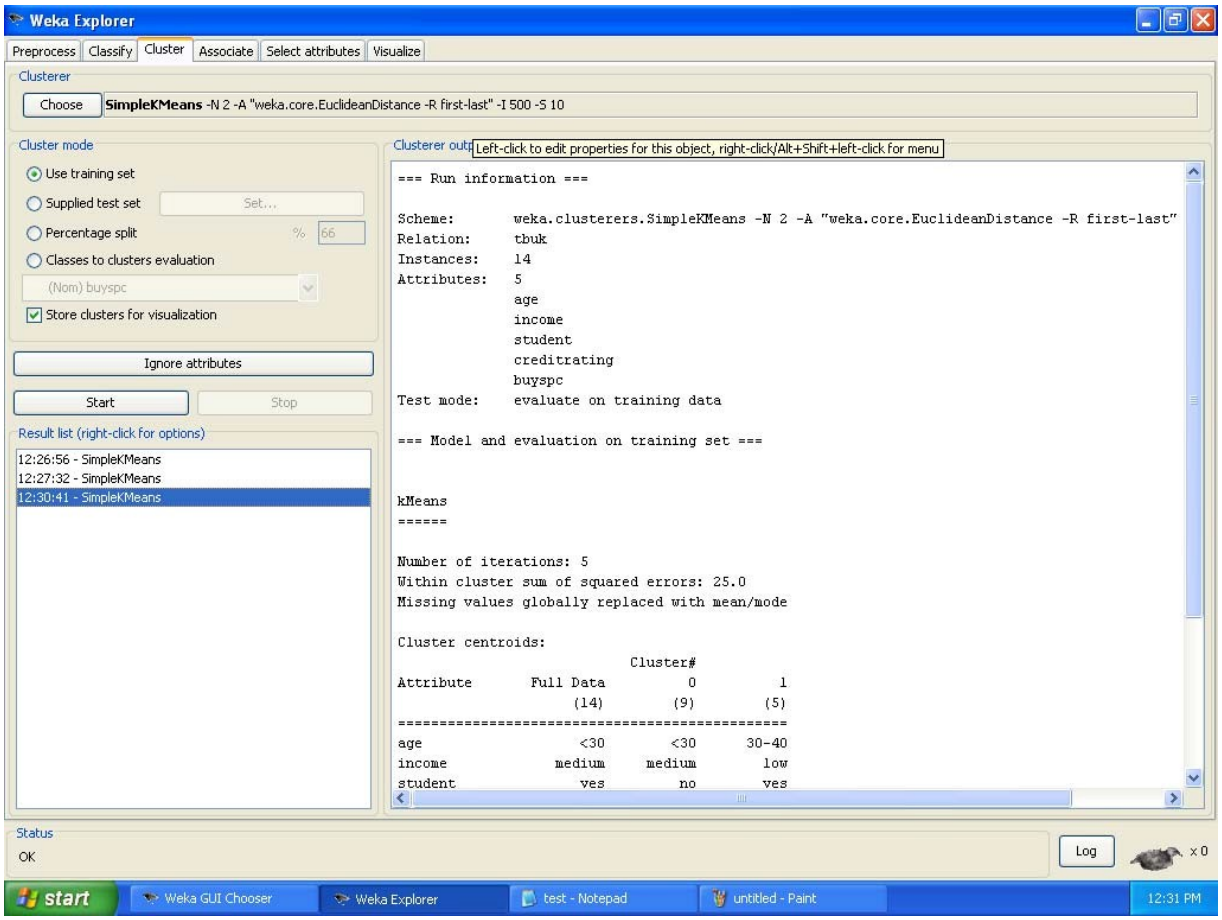
30-40, medium, no, excellent, yes

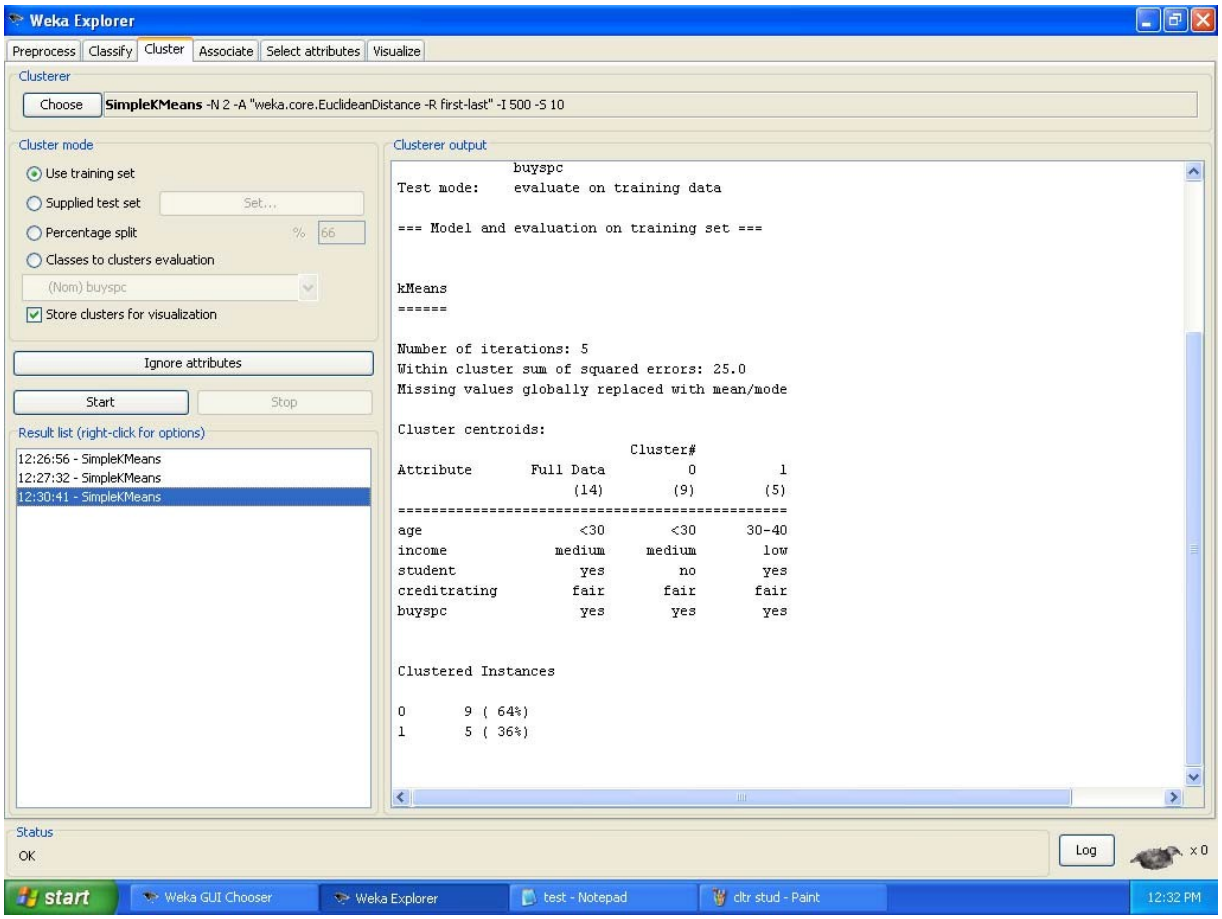
30-40, high, yes, fair, yes

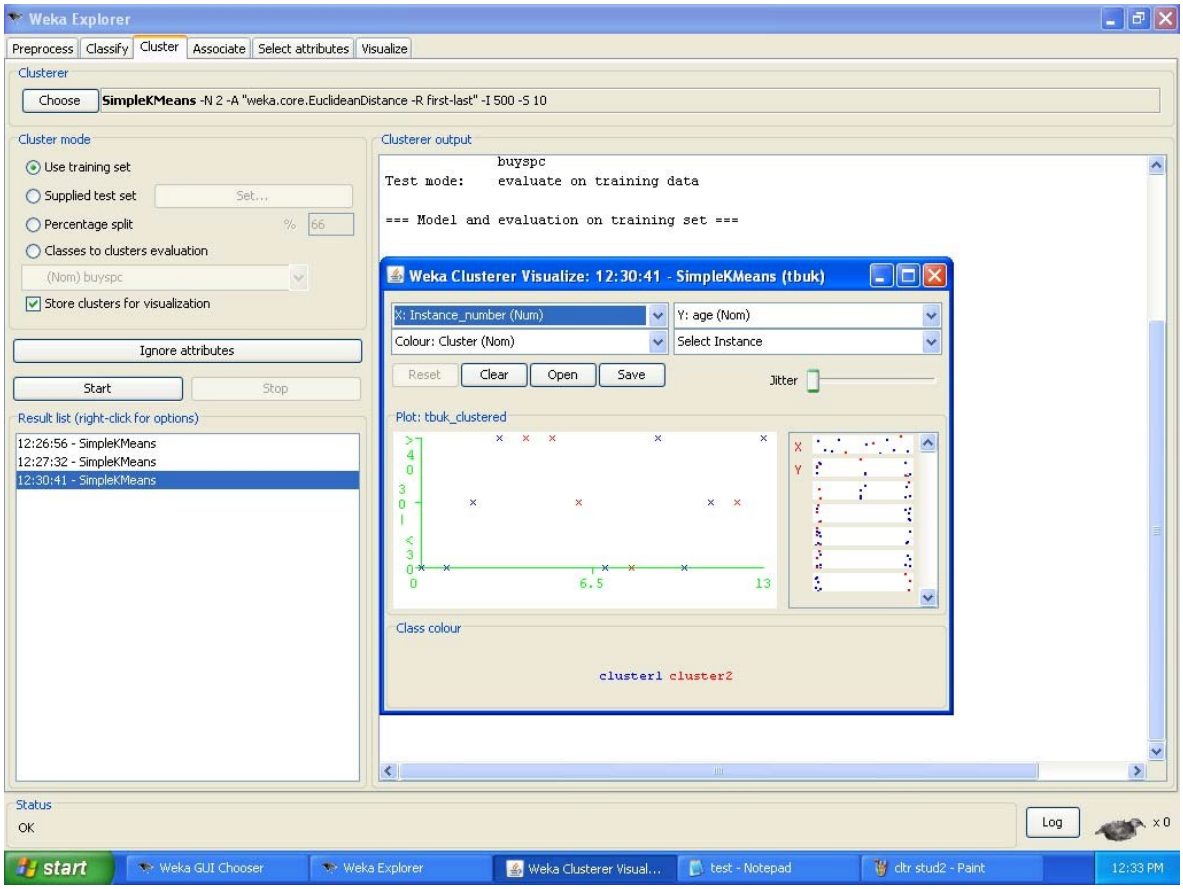
>40, medium, no, excellent, no

%

The following screenshot shows the clustering rules that were generated when simple k-means algorithm is applied on the given dataset.




Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
SimpleKMeans -N 2 -A "weka.core.EuclideanDistance -R first-last" -I 500 -S 10
Cluster mode
Use training set
Supplied test set
Set...
Percentage split
%
66
Classes to clusters evaluation
(Nom) buyspc
Store clusters for visualization
Ignore attributes
Start
Stop
Result list (right-click for options)
12:26:56 - SimpleKMeans
12:27:32 - SimpleKMeans
12:30:41 - SimpleKMeans
Clusterer output
buyspc
Test mode: evaluate on training data
=== Model and evaluation on training set ===
kMeans
======
Number of iterations: 5
Within cluster sum of squared errors: 25.0
Missing values globally replaced with mean/mode
Cluster centroids:
Cluster#
Attribute Full Data 0 1
(14) (9) (5)
age <30 <30 30-40
income medium medium low
student yes no yes
creditrating fair fair fair
buyspc yes yes yes
Clustered Instances
0 9 (64%)
1 5 (36%)
Status
OK
Log
x 0
start
Weka GUI Chooser
Weka Explorer
test - Notepad
cltr stud - Paint
12:32 PM


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
SimpleKMeans -N 2 -A "weka.core.EuclideanDistance -R first-last" -I 500 -S 10
Cluster mode
Use training set
Supplied test set
Set...
Percentage split
%
66
Classes to clusters evaluation
(Nom) buyspc
Store clusters for visualization
Ignore attributes
Start
Stop
Result list (right-click for options)
12:26:56 - SimpleKMeans
12:27:32 - SimpleKMeans
12:30:41 - SimpleKMeans
Clusterer output
buyspc
Test mode: evaluate on training data
=== Model and evaluation on training set ===
Weka Clusterer Visualize: 12:30:41 - SimpleKMeans (tbuk)
X: Instance_number (Num)
Y: age (Nom)
Colour: Cluster (Nom)
Select Instance
Reset
Clear
Open
Save
Jitter
Plot: tbuk_clustered
Class colour
cluster1 cluster2
Status
OK
Log
x 0
start
Weka GUI Chooser
Weka Explorer
Weka Clusterer Visual...
test - Notepad
cltr stud2 - Paint
12:33 PM