DATA WAREHOUSE AND DATA MINING PRACTICAL FILE

Submitted by :
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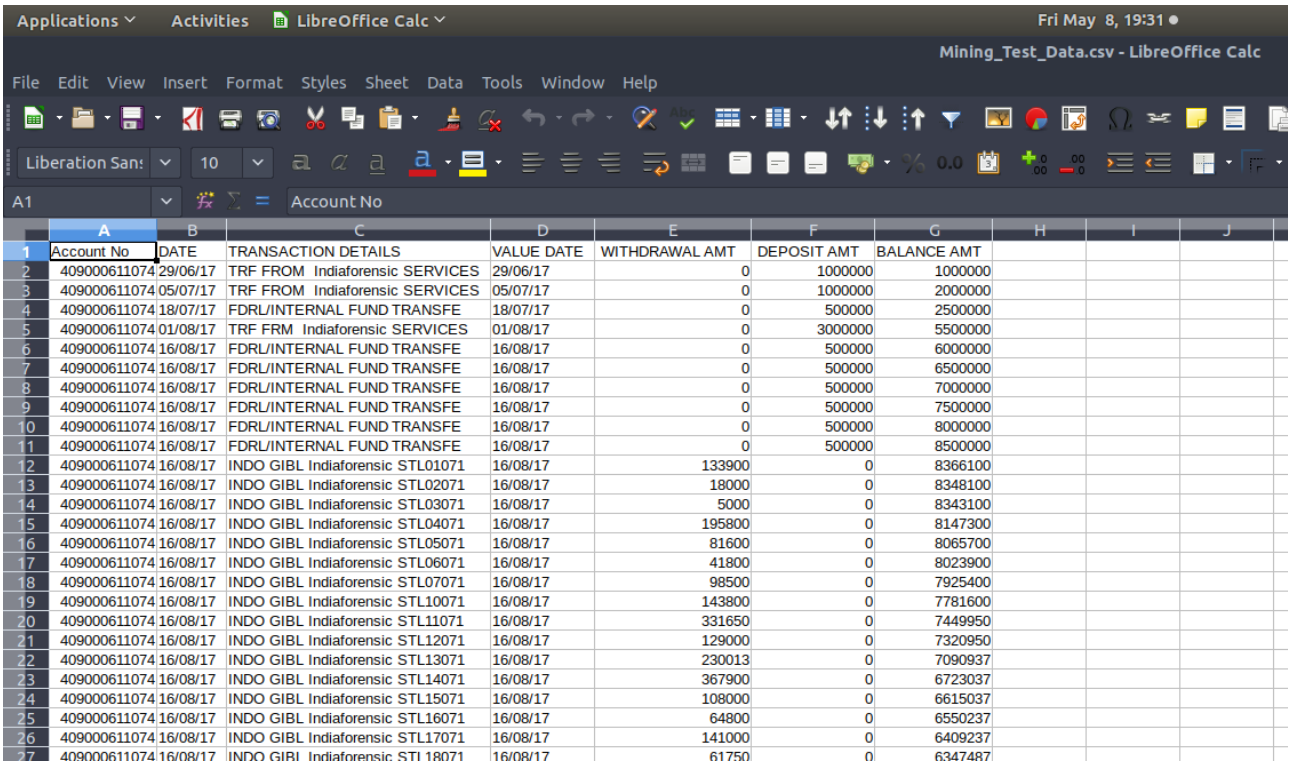
2016UIT2563
IT-2
8th Semester

Practical 1 : Create an Employee Table with the help of Data Mining Tool WEKA

1. Create an employee table with required entries in the MS-Excel (spreadsheet).



Applications Activities LibreOffice Calc Fri May 8, 19:31

Mining_Test_Data.csv - LibreOffice Calc

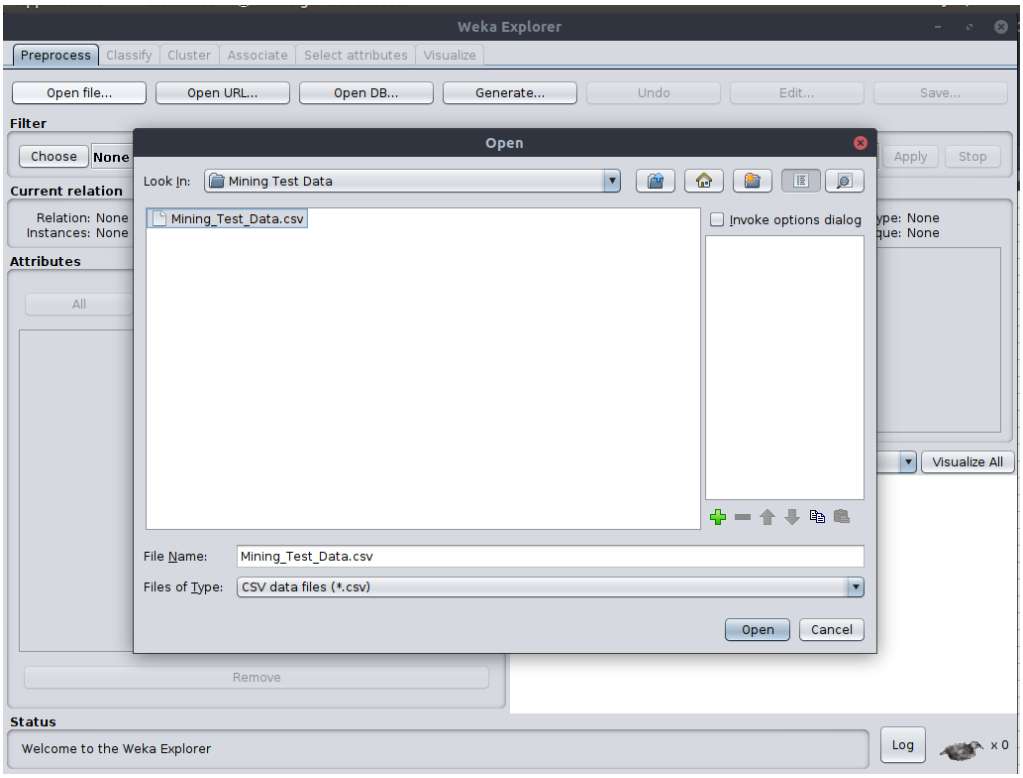
File Edit View Insert Format Styles Sheet Data Tools Window Help

Liberation Sans 10

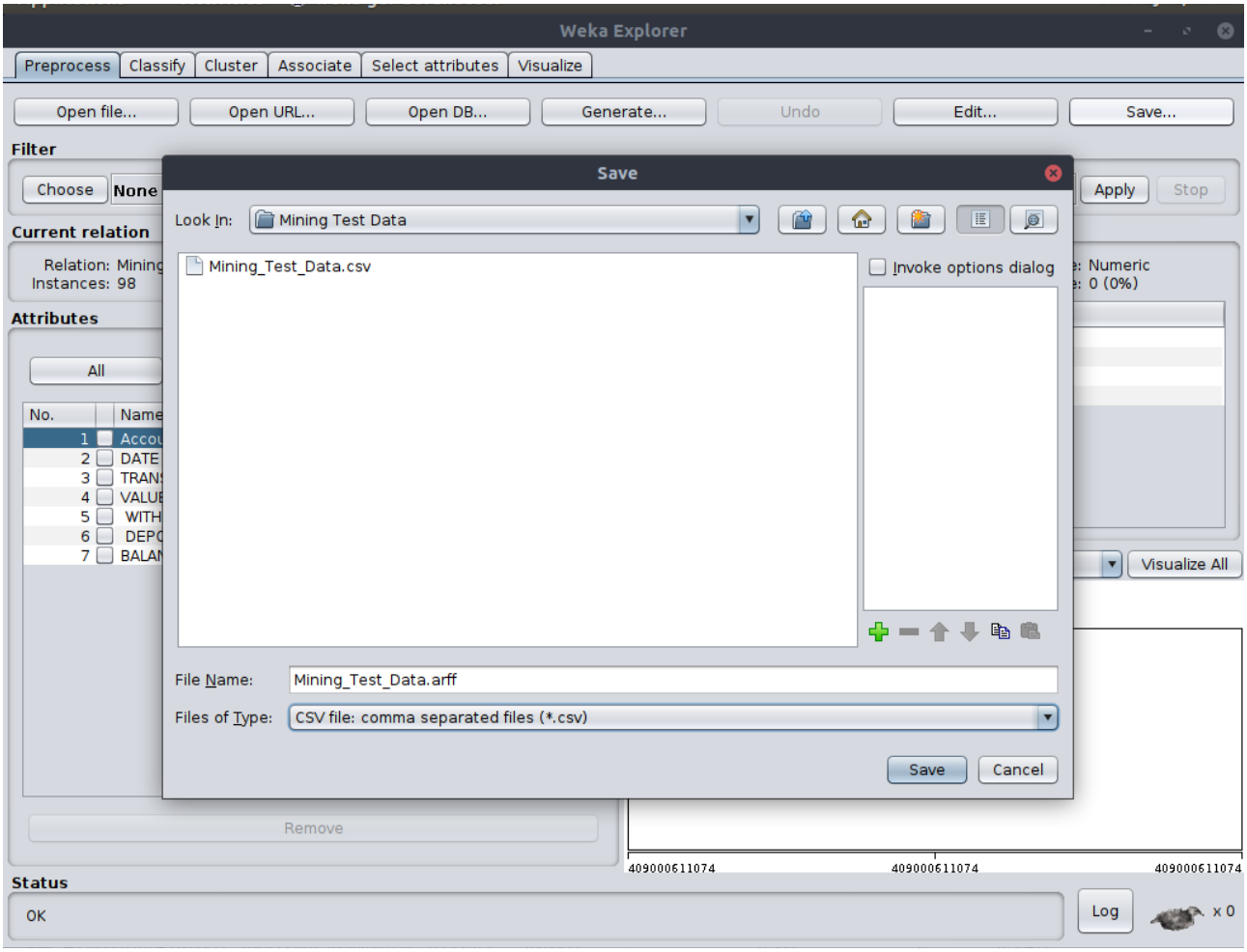
A1 Account No

	A	B	C	D	E	F	G
1	Account No	DATE	TRANSACTION DETAILS	VALUE DATE	WITHDRAWAL AMT	DEPOSIT AMT	BALANCE AMT
2	409000611074	29/06/17	TRF FROM Indiaforensic SERVICES	29/06/17	0	1000000	1000000
3	409000611074	05/07/17	TRF FROM Indiaforensic SERVICES	05/07/17	0	1000000	2000000
4	409000611074	18/07/17	FDRL/INTERNAL FUND TRANSFE	18/07/17	0	500000	2500000
5	409000611074	01/08/17	TRF FRM Indiaforensic SERVICES	01/08/17	0	3000000	5500000
6	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	6000000
7	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	6500000
8	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	7000000
9	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	7500000
10	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	8000000
11	409000611074	16/08/17	FDRL/INTERNAL FUND TRANSFE	16/08/17	0	500000	8500000
12	409000611074	16/08/17	INDO GIBL Indiaforensic STL01071	16/08/17	133900	0	8366100
13	409000611074	16/08/17	INDO GIBL Indiaforensic STL02071	16/08/17	18000	0	8348100
14	409000611074	16/08/17	INDO GIBL Indiaforensic STL03071	16/08/17	5000	0	8343100
15	409000611074	16/08/17	INDO GIBL Indiaforensic STL04071	16/08/17	195800	0	8147300
16	409000611074	16/08/17	INDO GIBL Indiaforensic STL05071	16/08/17	81600	0	8065700
17	409000611074	16/08/17	INDO GIBL Indiaforensic STL06071	16/08/17	41800	0	8023900
18	409000611074	16/08/17	INDO GIBL Indiaforensic STL07071	16/08/17	98500	0	7925400
19	409000611074	16/08/17	INDO GIBL Indiaforensic STL10071	16/08/17	143800	0	7781600
20	409000611074	16/08/17	INDO GIBL Indiaforensic STL11071	16/08/17	331650	0	7449950
21	409000611074	16/08/17	INDO GIBL Indiaforensic STL12071	16/08/17	129000	0	7320950
22	409000611074	16/08/17	INDO GIBL Indiaforensic STL13071	16/08/17	230013	0	7090937
23	409000611074	16/08/17	INDO GIBL Indiaforensic STL14071	16/08/17	367900	0	6723037
24	409000611074	16/08/17	INDO GIBL Indiaforensic STL15071	16/08/17	108000	0	6615037
25	409000611074	16/08/17	INDO GIBL Indiaforensic STL16071	16/08/17	64800	0	6550237
26	409000611074	16/08/17	INDO GIBL Indiaforensic STL17071	16/08/17	141000	0	6409237
27	409000611074	16/08/17	INDO GIBL Indiaforensic STL18071	16/08/17	61750	0	6347487

2. Save the file as .csv file from the spreadsheet software
3. Open .csv file in weka mining tool explorer

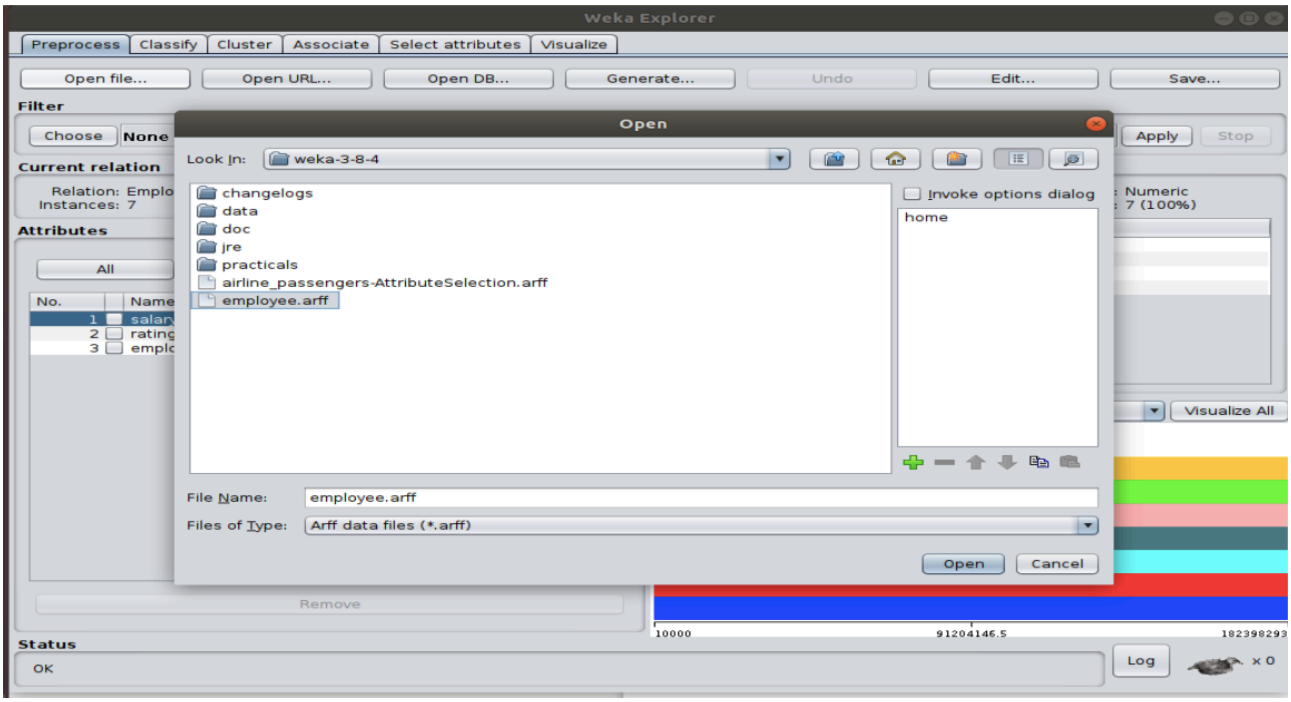


4. Save file as .arff from weka mining tool to create **.arff** file for the given employee table data.

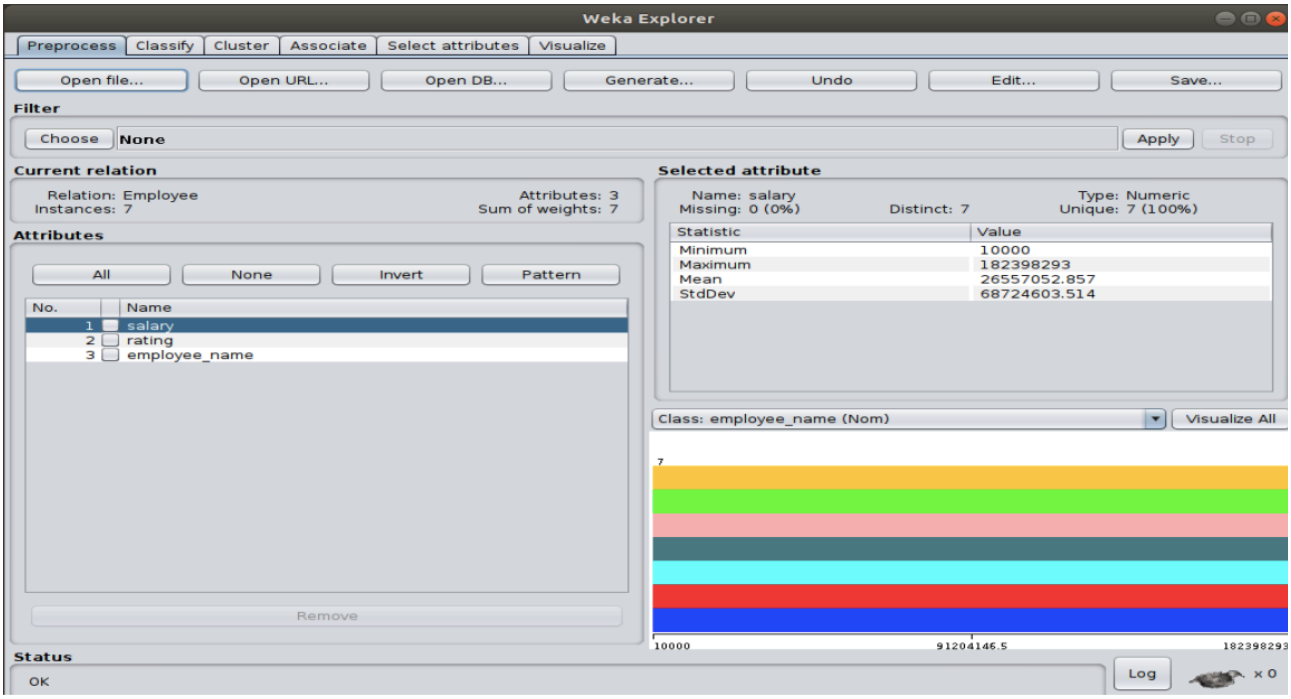


Practical 2 : Apply pre-processing to the training data-set of Employee table.

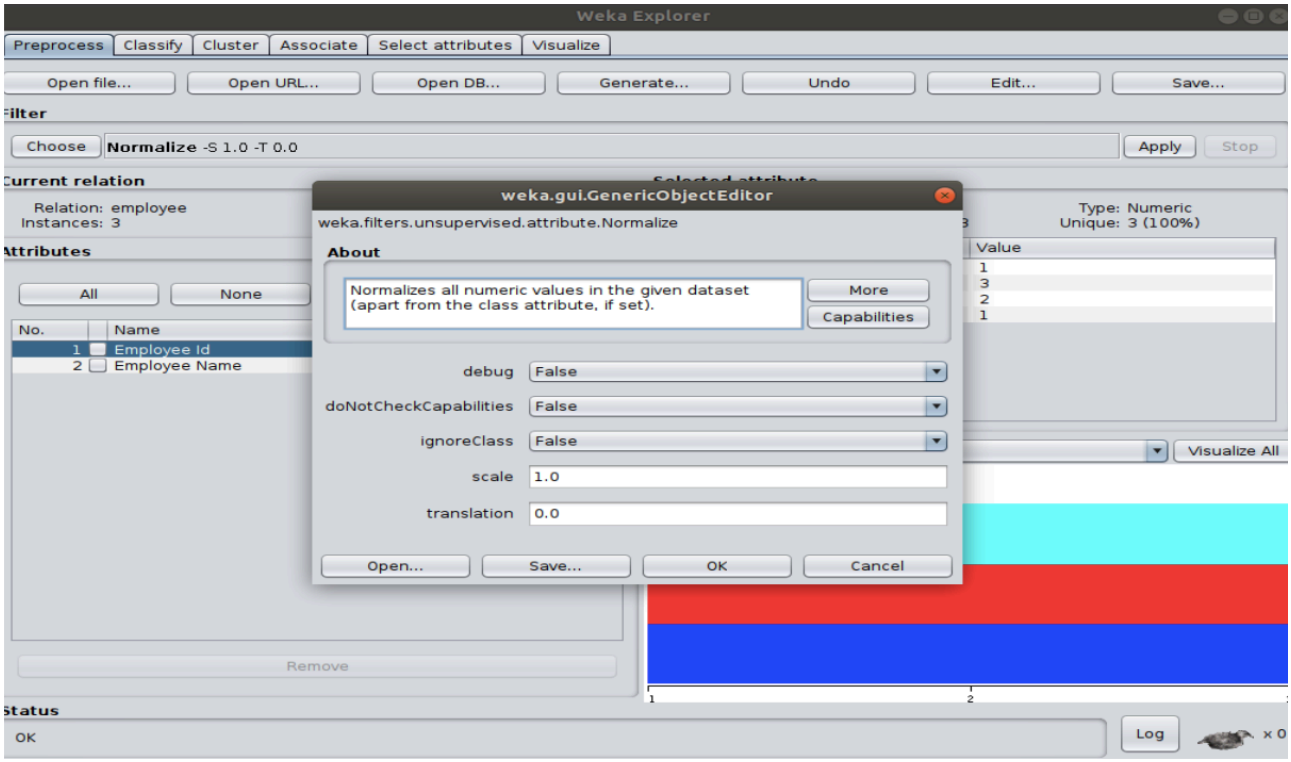
1. Open Weka Explorer.



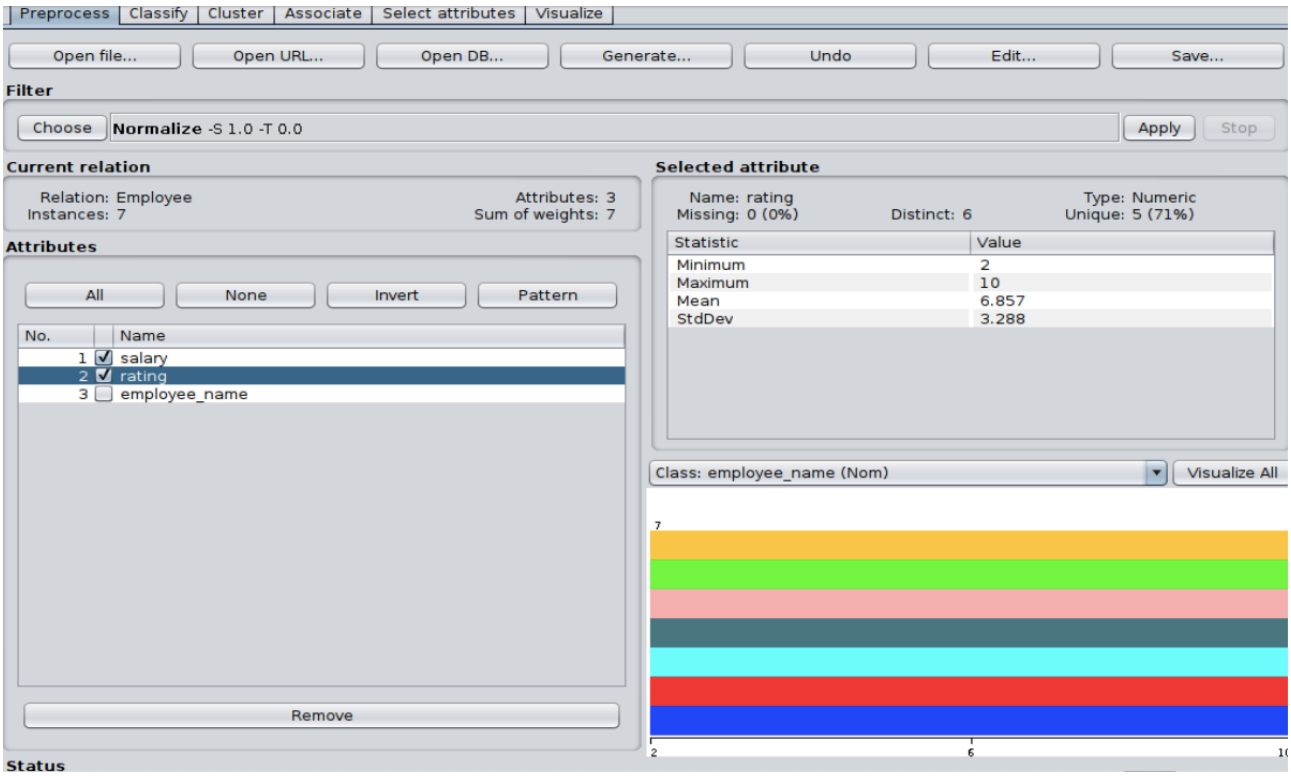
2. Open employee.arff table.



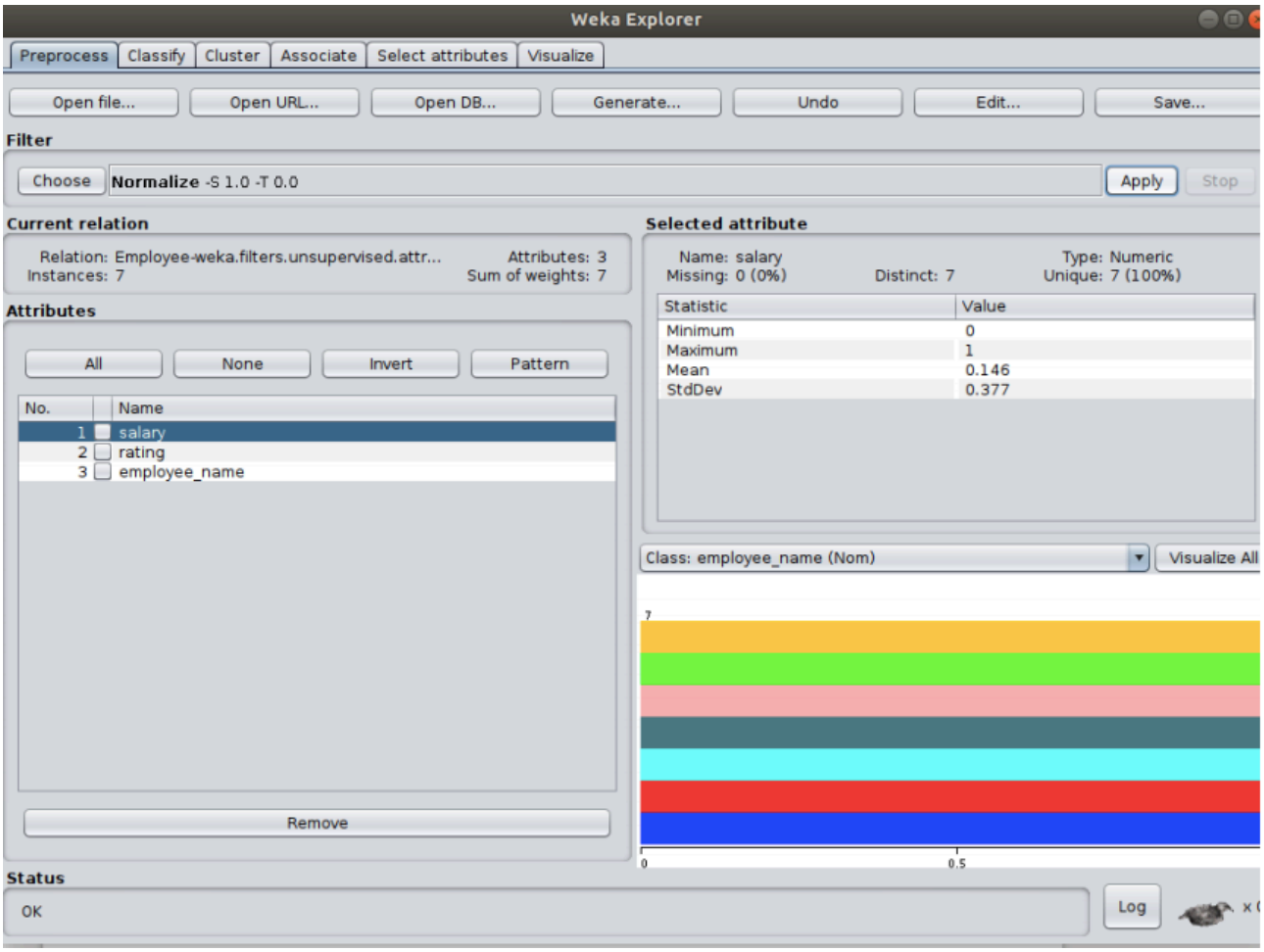
3. Select Normalize from Filter → Unsupervised Learning → Attributes → Normalize



4. Select the attributes you want to Normalize.

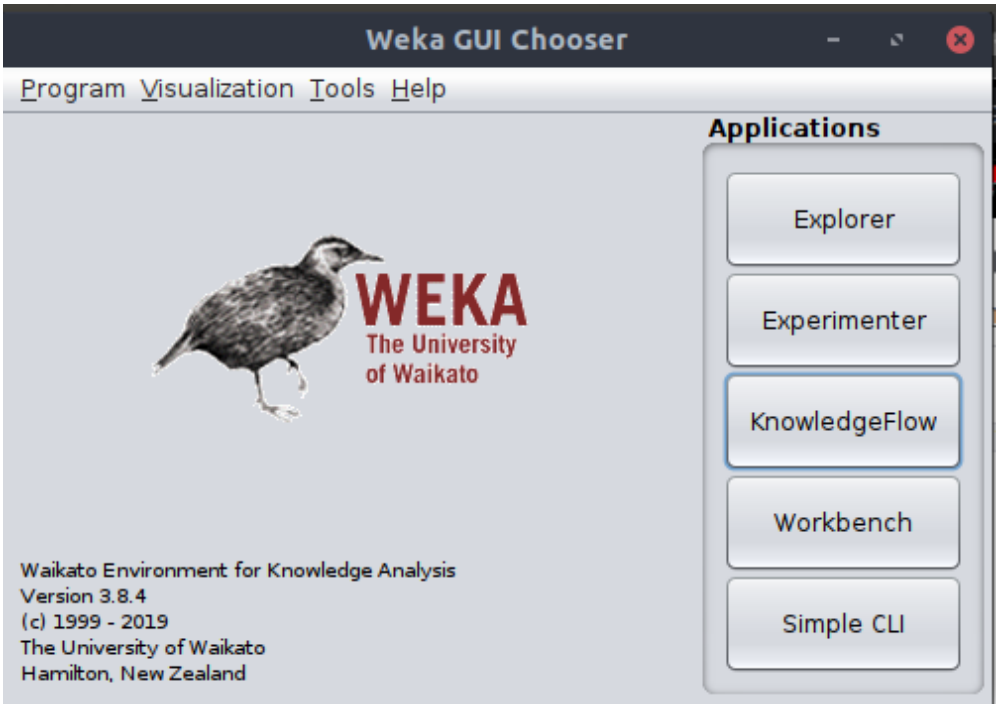


5. Click on apply to normalize the selected attributes

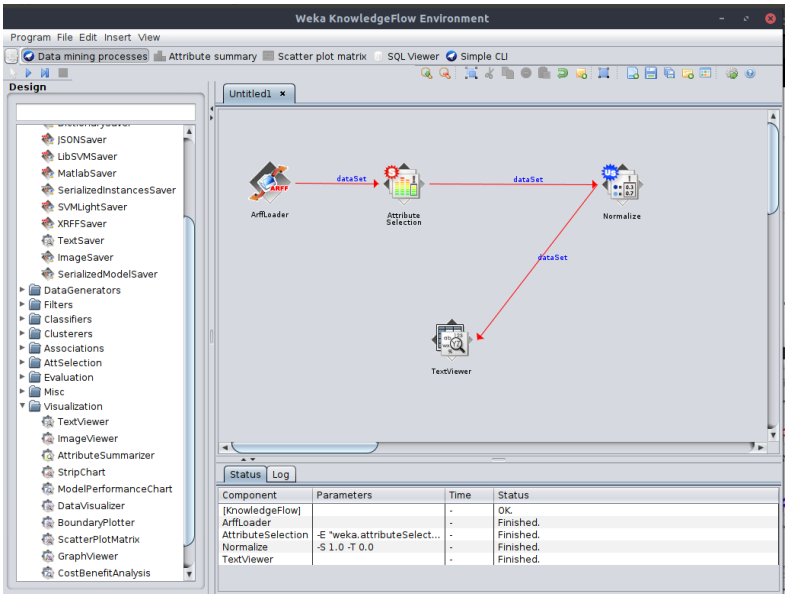


Practical 3 : Normalize Banking Table data using knowledge flow

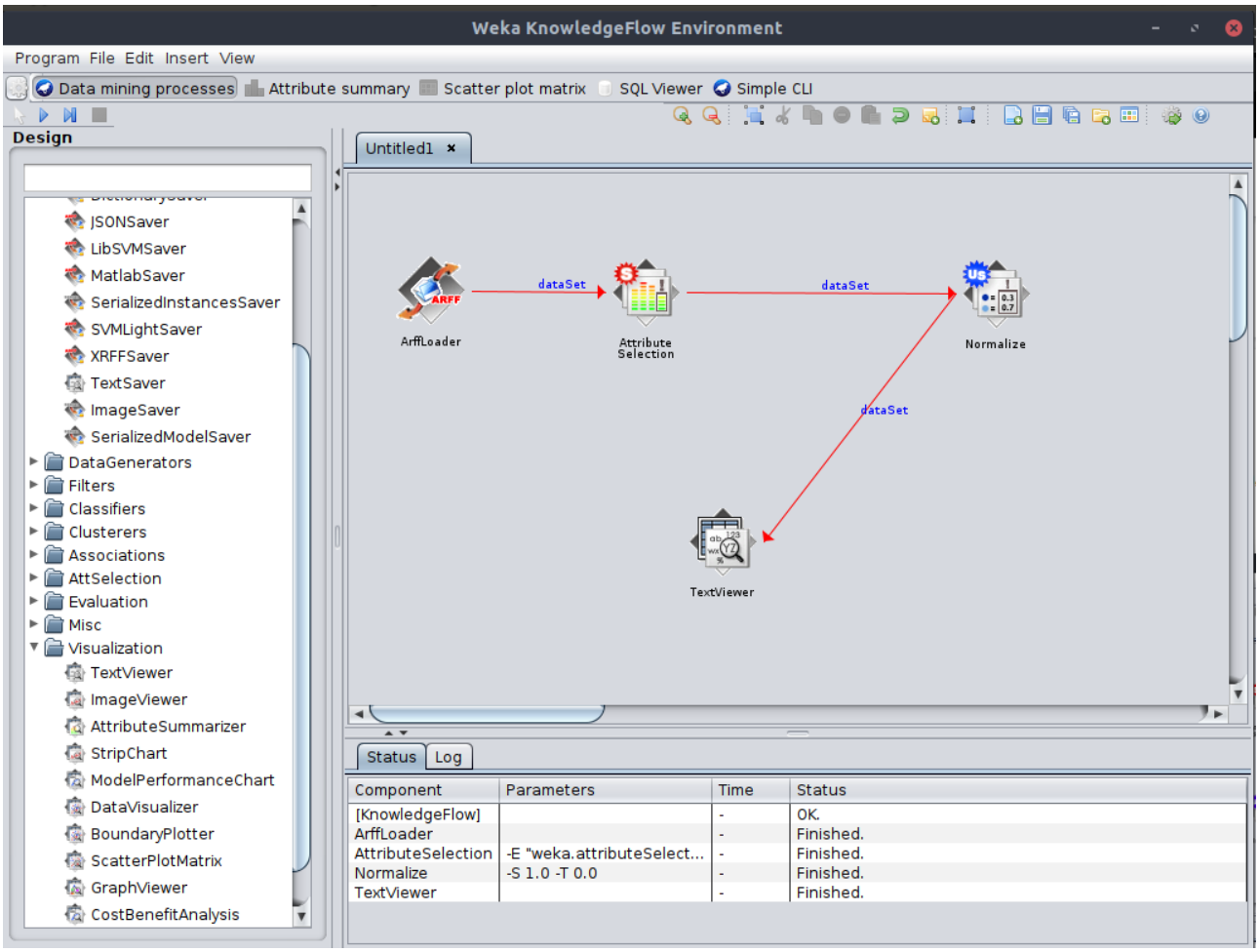
1. Open the weka mining tool and go to knowledge-flow tab



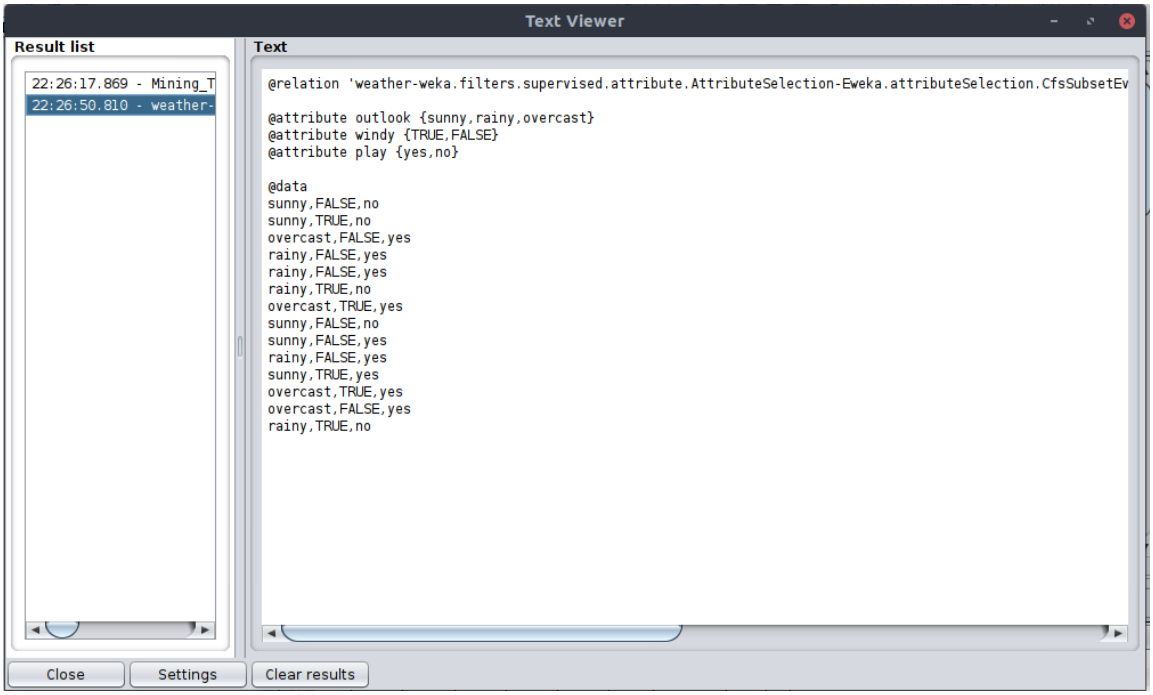
2. Select **ArffLoader** from **DataSources** and place it.
3. Right-click on ArffLoader and configure the **.arff** file in it
4. Select **AttributeSelection** from **Filters -> supervised -> attribute**
5. Select **Normalize** from **Filters -> unsupervised -> attribute**
6. Select **TextViewer** from **Visualization**



7. **Run Flow** by clicking **play** button in top left



8. Select **ShowResults** by right-clicking on **TextViewer.** Output is the **Normalized .arff data.**



Output:

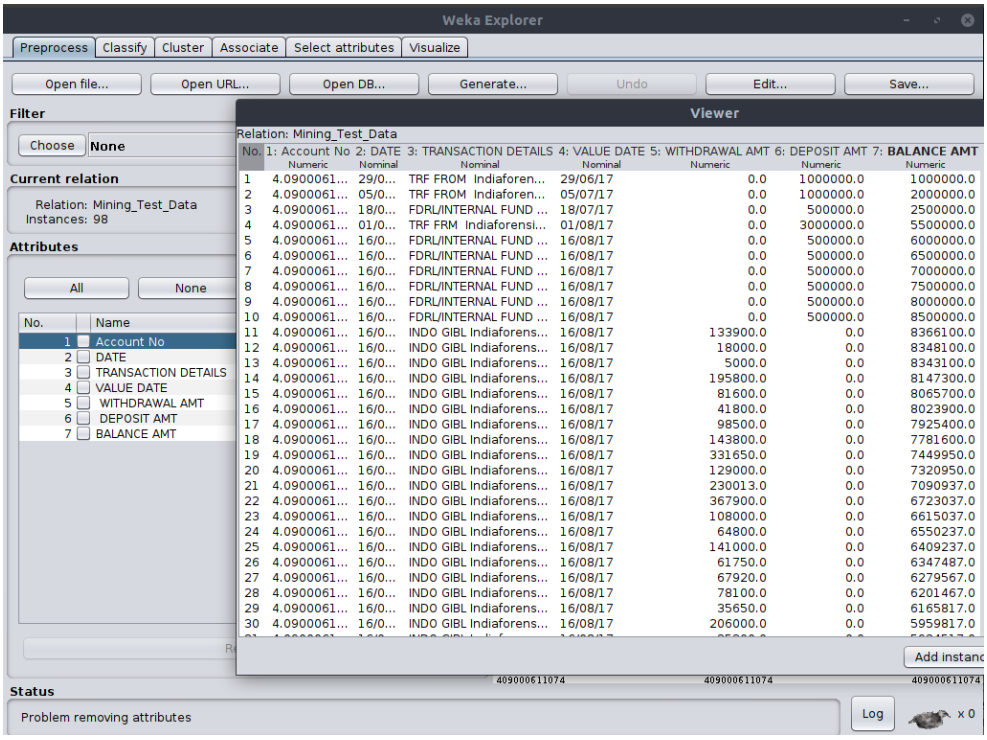
@relation 'weather-weka.filters.supervised.attribute.AttributeSelection-Eweka.attributeSelection.CfsSubsetEval -P 1 -E 1-Sweka.attributeSelection.BestFirst -D 1 -N 5-weka.filters.unsupervised.attribute.Normalize-S1.0-T0.0'

@attribute outlook {sunny,rainy,overcast}
@attribute windy {TRUE,FALSE}
@attribute play {yes,no}

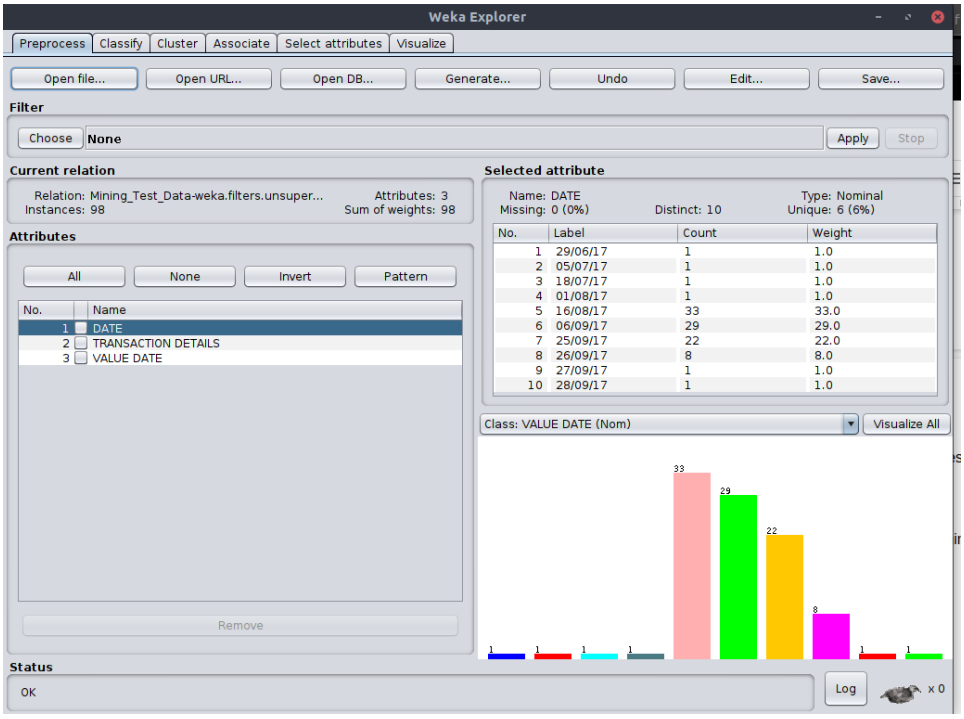
@data
sunny,FALSE,no
sunny,TRUE,no
overcast,FALSE,yes
rainy,FALSE,yes
rainy,FALSE,yes
rainy,TRUE,no
overcast,TRUE,yes
sunny,FALSE,no
sunny,FALSE,yes
rainy,FALSE,yes
sunny,TRUE,yes
overcast,TRUE,yes
overcast,FALSE,yes
rainy,TRUE,no

Practical 4 : Find association rules for banking data using weka

1. Open the .arff file in weka mining tool



2. Remove numeric attributes as only nominal attributes are used in apriori association rule mining



3. Click on Associate tab and select apriori algorithm

4. Start association and collect the association rules mined.

=== Run information ===

Scheme: weka.associations.Apriori -N 10 -T 0 -C 0.9 -D 0.05 -U 1.0 -M 0.1 -S -1.0 -c -1
Relation: Mining_Test_Data-weka.filters.unsupervised.attribute.Remove-R1,5-7
Instances: 98
Attributes: 3
DATE
TRANSACTION DETAILS
VALUE DATE
=== Associator model (full training set) ===

Apriori
=======

Minimum support: 0.1 (10 instances)
Minimum metric <confidence>: 0.9
Number of cycles performed: 18

Generated sets of large itemsets:

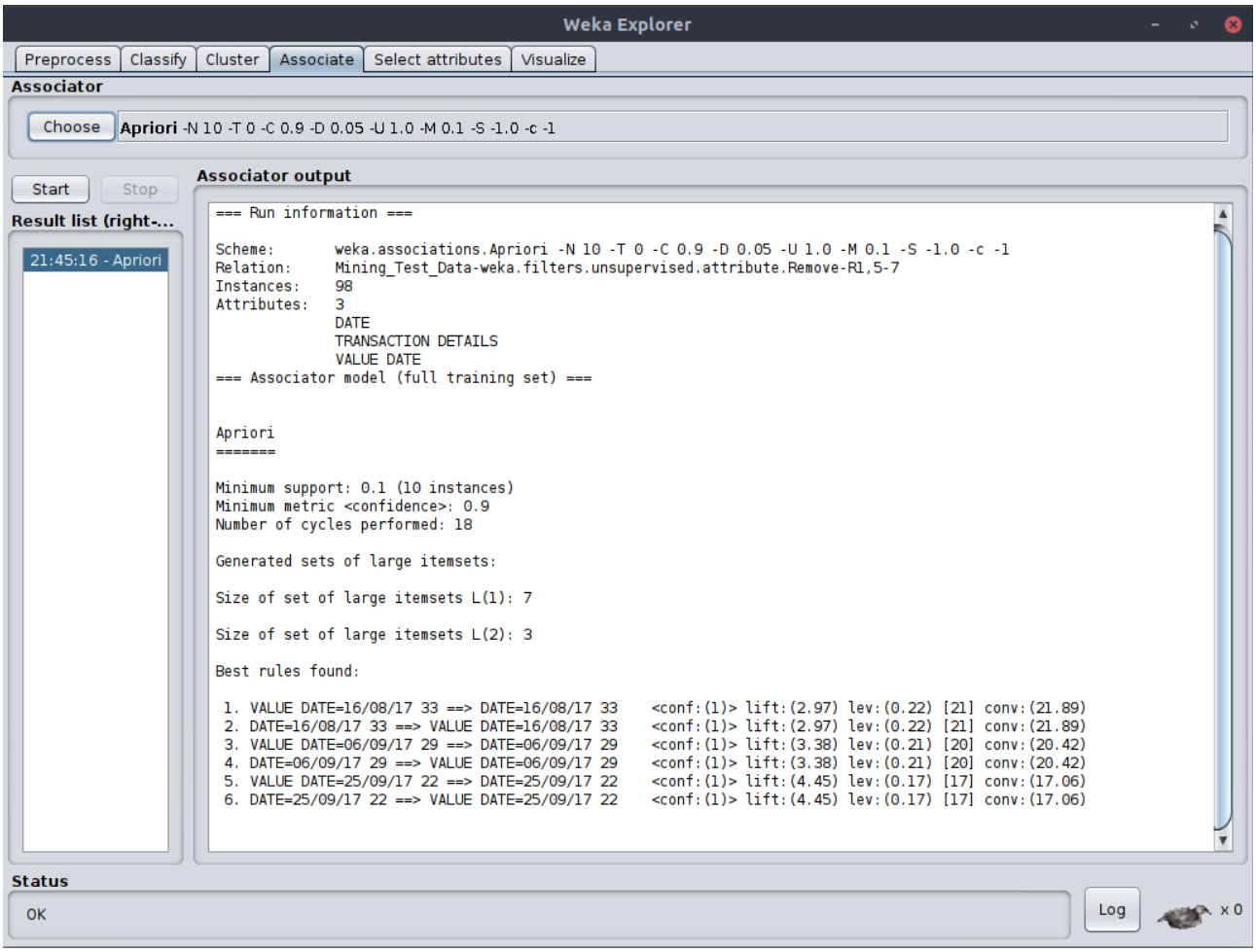
Size of set of large itemsets L(1): 7

Size of set of large itemsets L(2): 3

Best rules found:

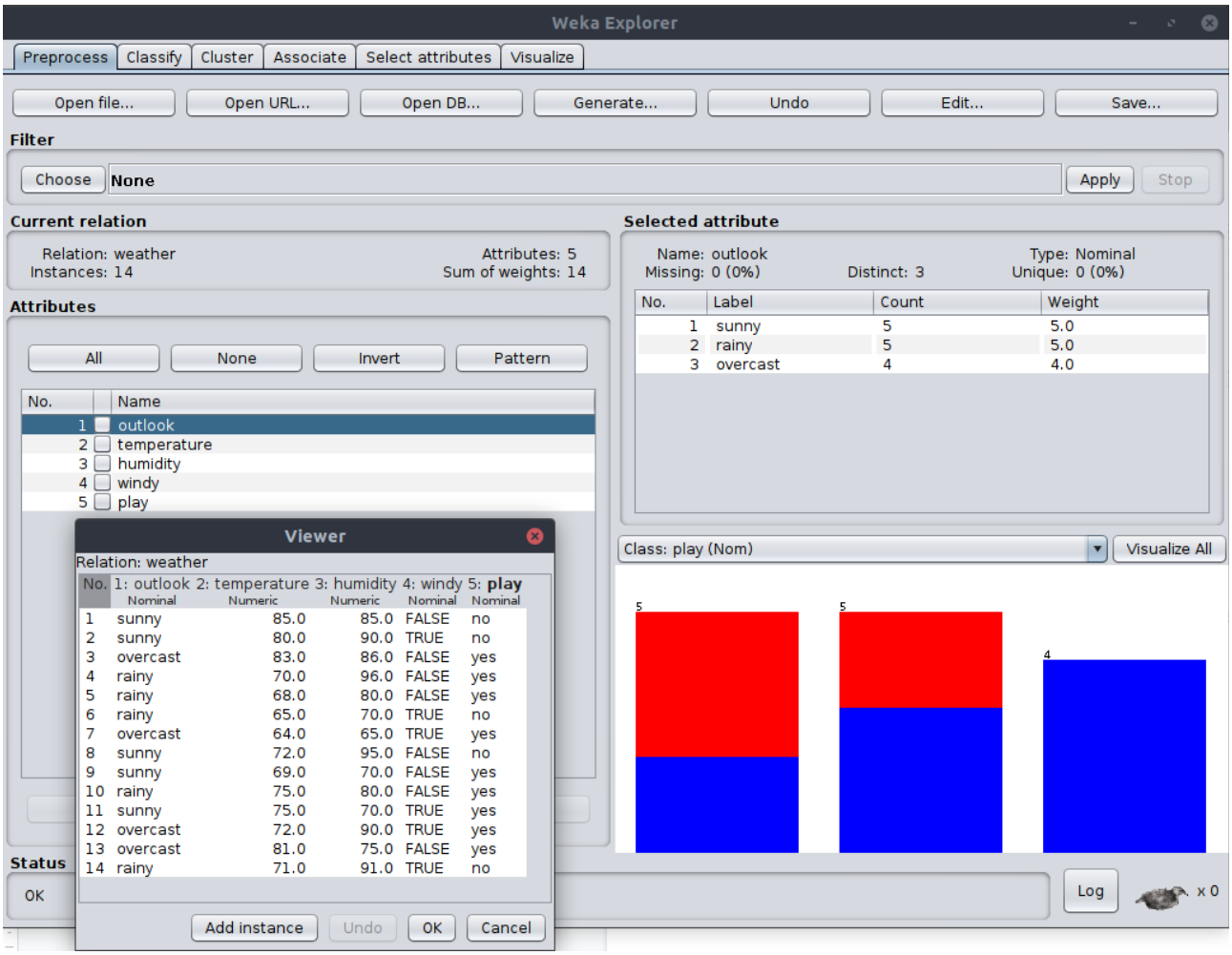
1. VALUE DATE=16/08/17 33 ==> DATE=16/08/17 33 <conf:(1)> lift:(2.97) lev:(0.22) [21] conv:(21.89)
2. DATE=16/08/17 33 ==> VALUE DATE=16/08/17 33 <conf:(1)> lift:(2.97) lev:(0.22) [21] conv:(21.89)
3. VALUE DATE=06/09/17 29 ==> DATE=06/09/17 29 <conf:(1)> lift:(3.38) lev:(0.21) [20] conv:(20.42)
4. DATE=06/09/17 29 ==> VALUE DATE=06/09/17 29 <conf:(1)> lift:(3.38) lev:(0.21) [20] conv:(20.42)
5. VALUE DATE=25/09/17 22 ==> DATE=25/09/17 22 <conf:(1)> lift:(4.45) lev:(0.17) [17] conv:(17.06)

6. DATE=25/09/17 22 ==> VALUE DATE=25/09/17 22 <conf:(1)> lift:(4.45) lev:(0.17) [17] conv:(17.06)



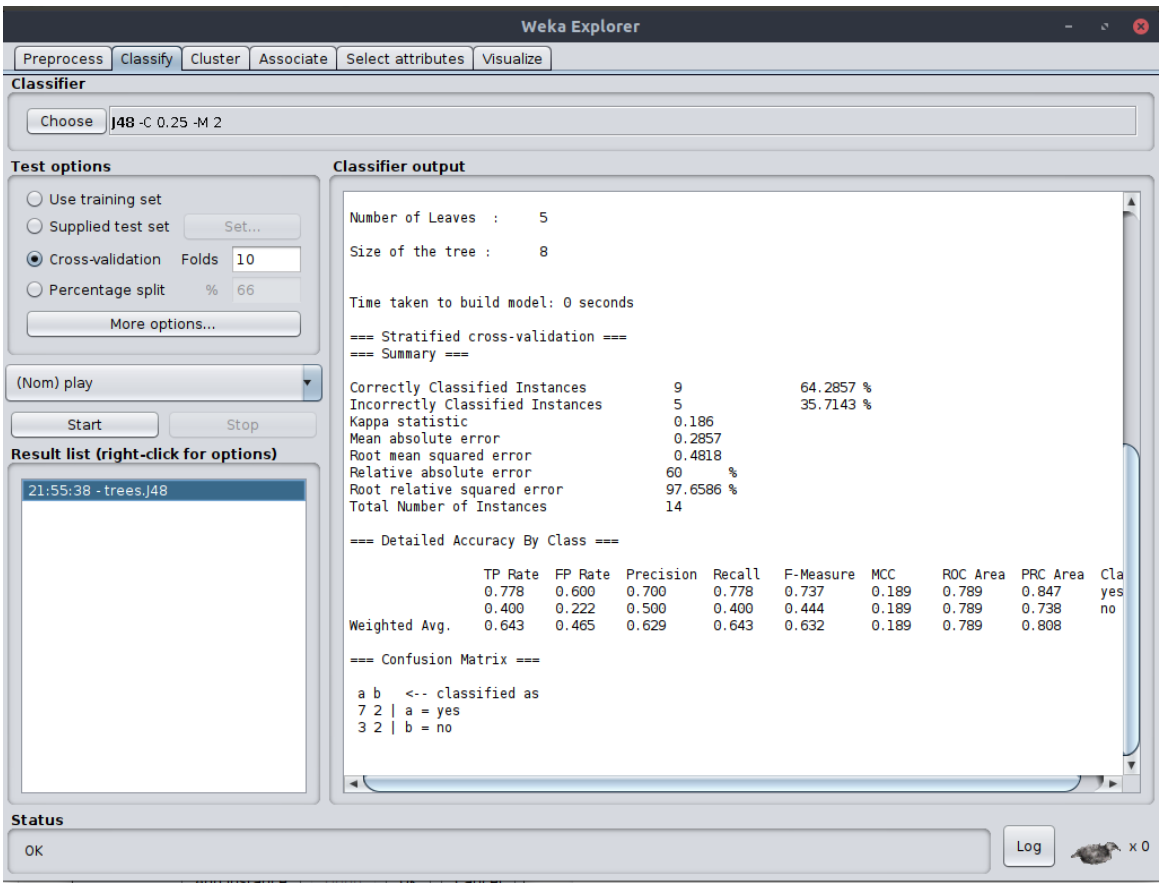
Practical 5 : To construct Decision tree for Weather data in weka

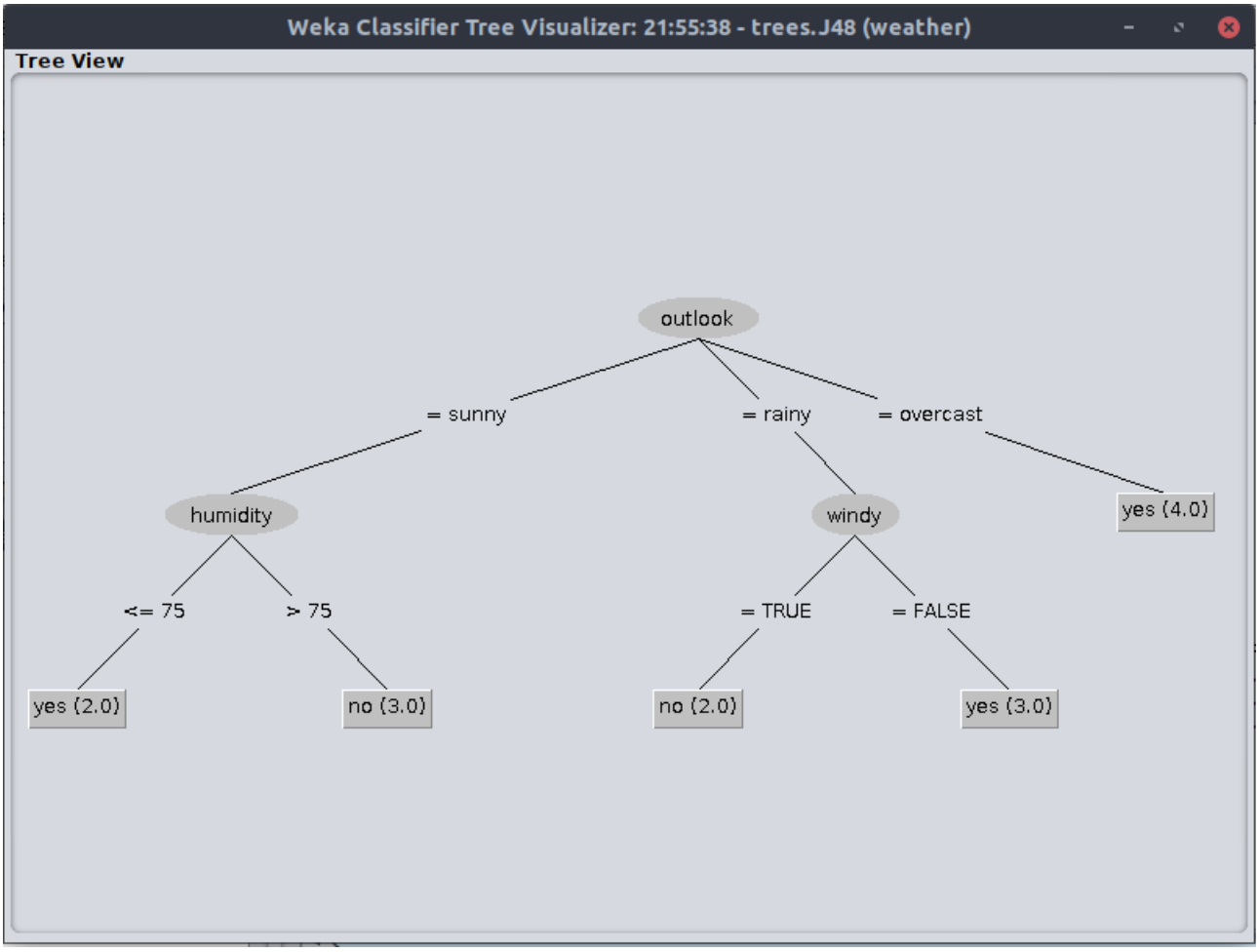
Step-1) Open the .arff file in weka mining tool



Step-2) Click on Classify tab and select J48 from the trees tab of the algorithms available

Step-3) Select Play attribute, Start algorithm


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) play
Start
Stop
Result list (right-click for options)
21:55:38 - trees.J48
Classifier output
Number of Leaves : 5
Size of the tree : 8
Time taken to build model: 0 seconds
=== Stratified cross-validation ===
=== Summary ===
Correctly Classified Instances 9 64.2857 %
Incorrectly Classified Instances 5 35.7143 %
Kappa statistic 0.186
Mean absolute error 0.2857
Root mean squared error 0.4818
Relative absolute error 60 %
Root relative squared error 97.6586 %
Total Number of Instances 14
=== Detailed Accuracy By Class ===
TP Rate FP Rate Precision Recall F-Measure MCC ROC Area PRC Area Cla
0.778 0.600 0.700 0.778 0.737 0.189 0.789 0.847 yes
0.400 0.222 0.500 0.400 0.444 0.189 0.789 0.738 no
Weighted Avg. 0.643 0.465 0.629 0.643 0.632 0.189 0.789 0.808
=== Confusion Matrix ===
a b <-- classified as
7 2 | a = yes
3 2 | b = no
Status
OK
Log
x 0


Weka Classifier Tree Visualizer: 21:55:38 - trees.J48 (weather)
Tree View
outlook
= sunny
= rainy
= overcast
humidity
windy
yes (4.0)
<= 75
> 75
= TRUE
= FALSE
yes (2.0)
no (3.0)
no (2.0)
yes (3.0)

```
=== Run information ===

Scheme:       weka.classifiers.trees.J48 -C 0.25 -M 2
Relation:     weather
Instances:    14
Attributes:   5
              outlook
              temperature
              humidity
              windy
              play
Test mode:    10-fold cross-validation

=== Classifier model (full training set) ===

J48 pruned tree
------------------

outlook = sunny
|   humidity <= 75: yes (2.0)
|   humidity > 75: no (3.0)
outlook = rainy
|   windy = TRUE: no (2.0)
|   windy = FALSE: yes (3.0)
outlook = overcast: yes (4.0)

Number of Leaves  :         5

Size of the tree :      8


Time taken to build model: 0 seconds

=== Stratified cross-validation ===
=== Summary ===

Correctly Classified Instances           9               64.2857 %
Incorrectly Classified Instances         5               35.7143 %
Kappa statistic                          0.186
Mean absolute error                      0.2857
Root mean squared error                  0.4818
Relative absolute error                 60      %
```

Root relative squared error 97.6586 %
Total Number of Instances 14

=== Detailed Accuracy By Class ===

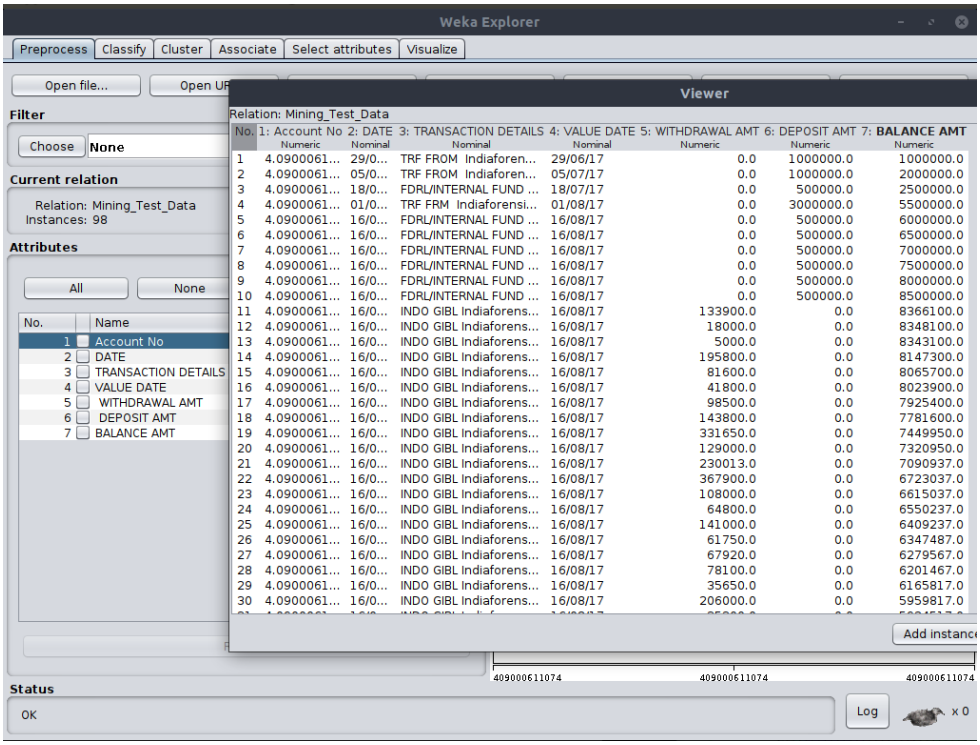
	TP Rate	FP Rate	Precision	Recall	F-Measure	MCC	ROC Area	PRC Area	Class
	0.778	0.600	0.700	0.778	0.737	0.189	0.789	0.847	yes
	0.400	0.222	0.500	0.400	0.444	0.189	0.789	0.738	no
Weighted Avg.	0.643	0.465	0.629	0.643	0.632	0.189	0.789	0.808	

=== Confusion Matrix ===

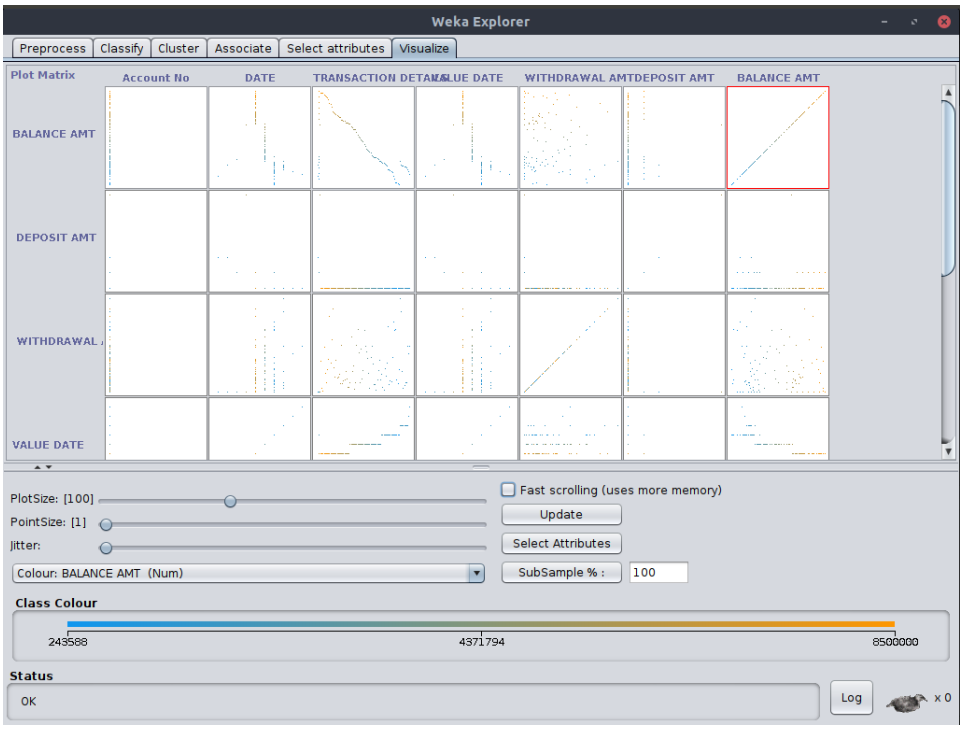
a	b	<-- classified as
7	2	a = yes
3	2	b = no

Practical 6 : Write a procedure for visualization of weather table

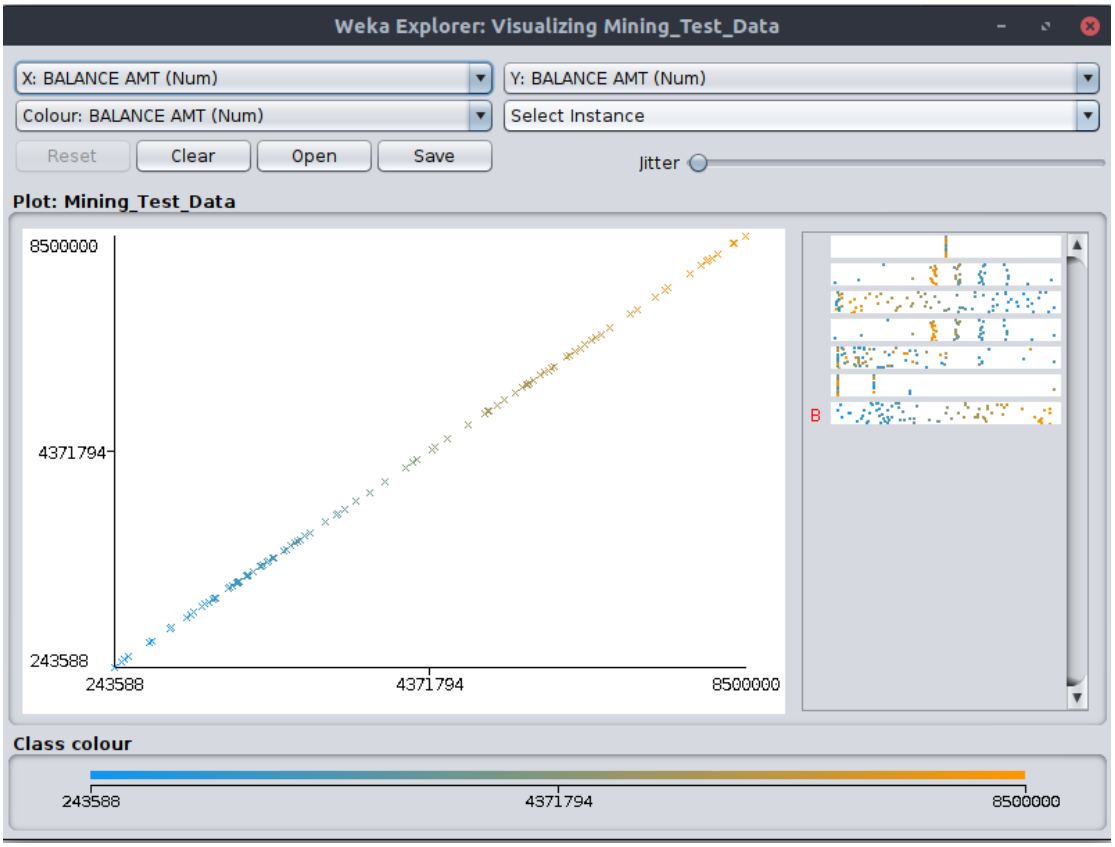
1. Open the .arff file in weka mining tool



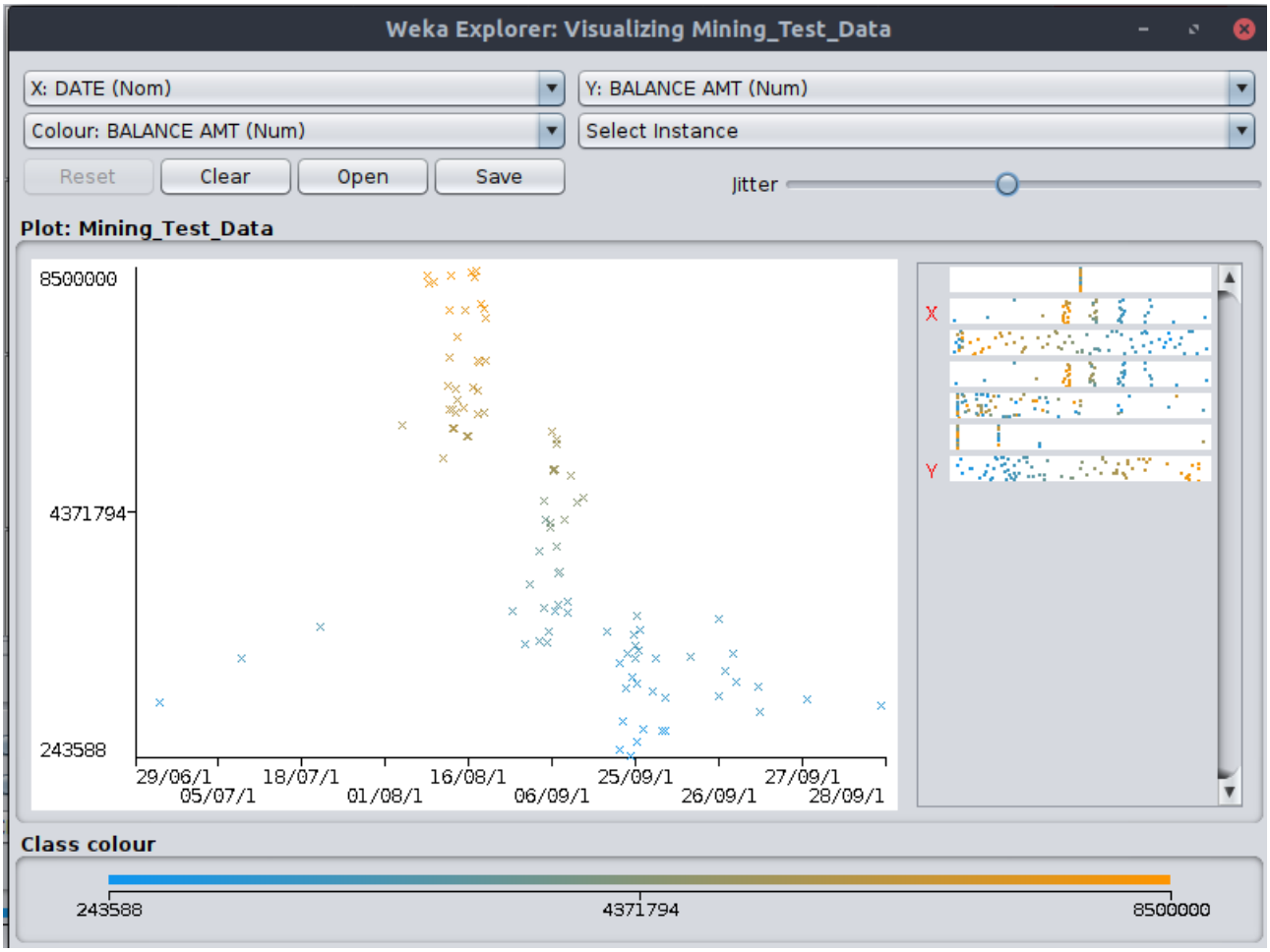
2. Click on the visualize tab and see various attributes and their visualization



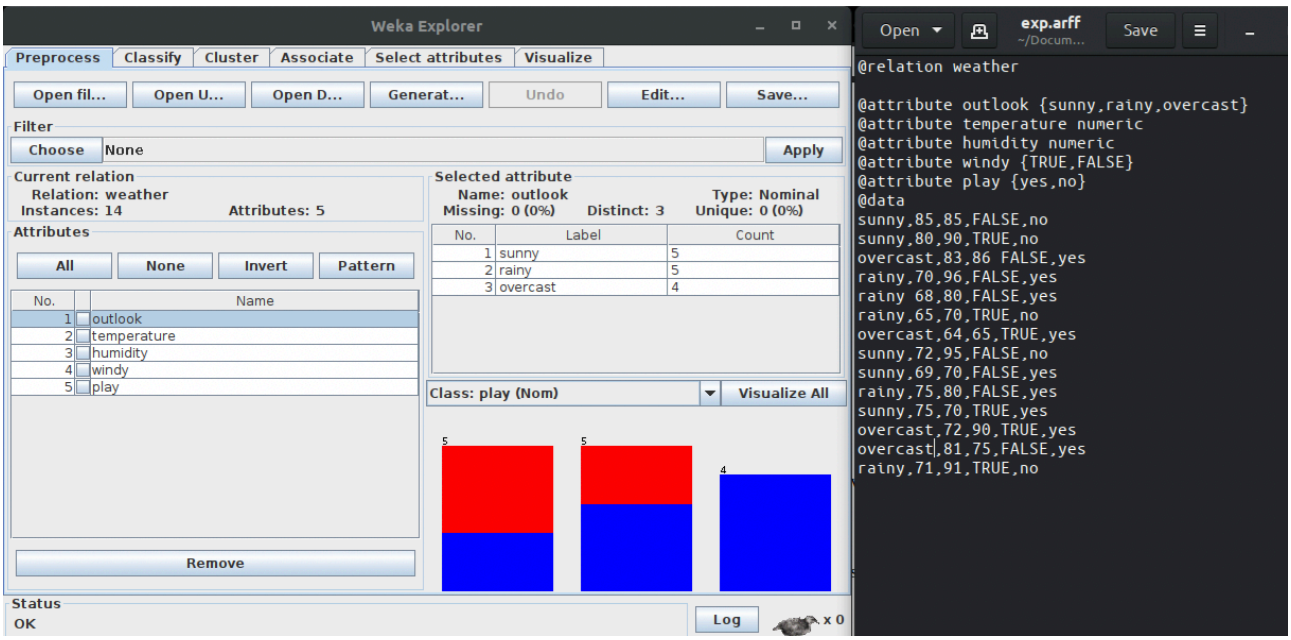
3. Select an attribute and visualize it with various jitter levels.

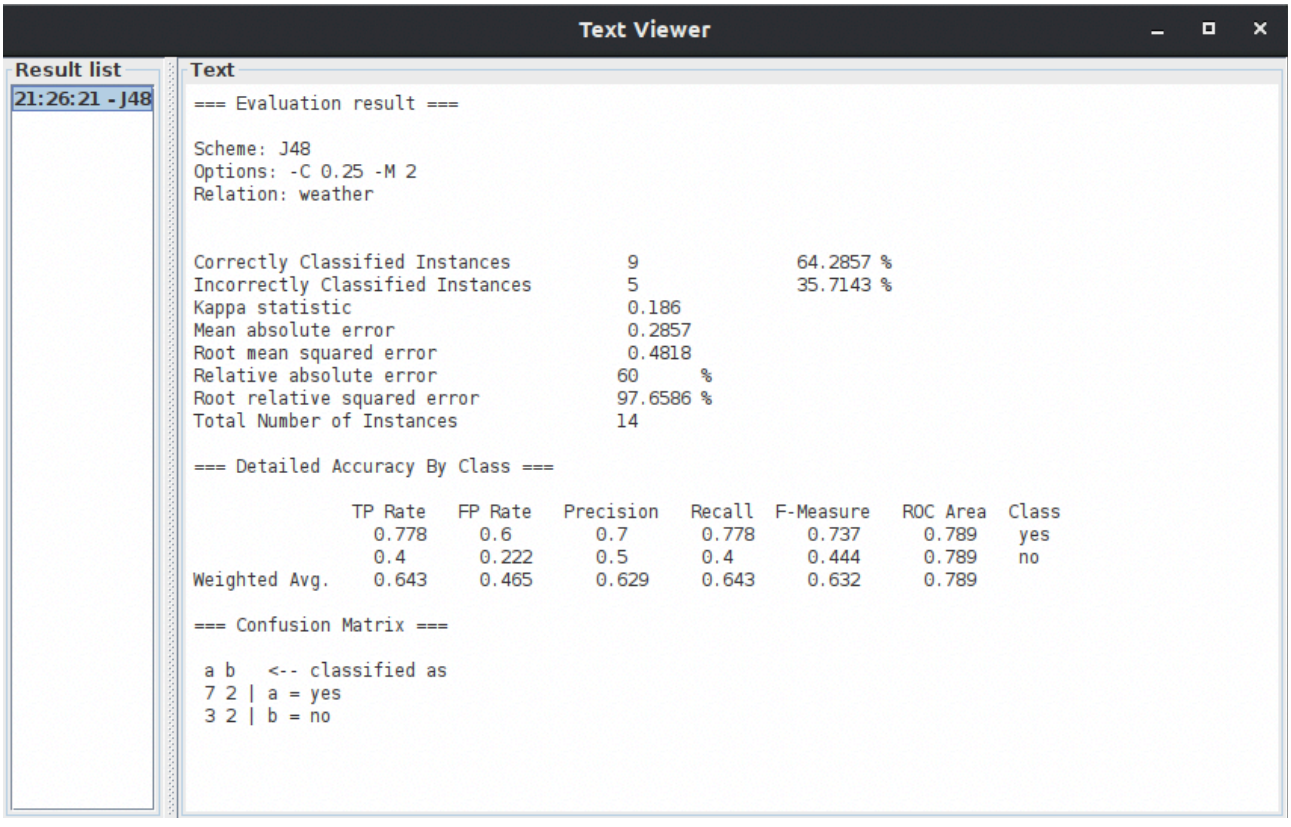

Weka Explorer: Visualizing Mining_Test_Data
X: BALANCE AMT (Num)
Y: BALANCE AMT (Num)
Colour: BALANCE AMT (Num)
Select Instance
Reset
Clear
Open
Save
Jitter
Plot: Mining_Test_Data
8500000
4371794
243588
243588
4371794
8500000
B
Class colour
243588
4371794
8500000


Weka Explorer: Visualizing Mining_Test_Data
X: BALANCE AMT (Num)
Y: BALANCE AMT (Num)
Colour: BALANCE AMT (Num)
Select Instance
Reset
Clear
Open
Save
Jitter
Plot: Mining_Test_Data
8500000
4371794
243588
243588
4371794
8500000
B
Class colour
243588
4371794
8500000


Weka Explorer: Visualizing Mining_Test_Data
X: DATE (Nom)
Y: BALANCE AMT (Num)
Colour: BALANCE AMT (Num)
Select Instance
Reset
Clear
Open
Save
Jitter
Plot: Mining_Test_Data
8500000
4371794
243588
29/06/1
05/07/1
18/07/1
01/08/1
16/08/1
06/09/1
25/09/1
26/09/1
27/09/1
28/09/1
X
Y
Class colour
243588
4371794
8500000

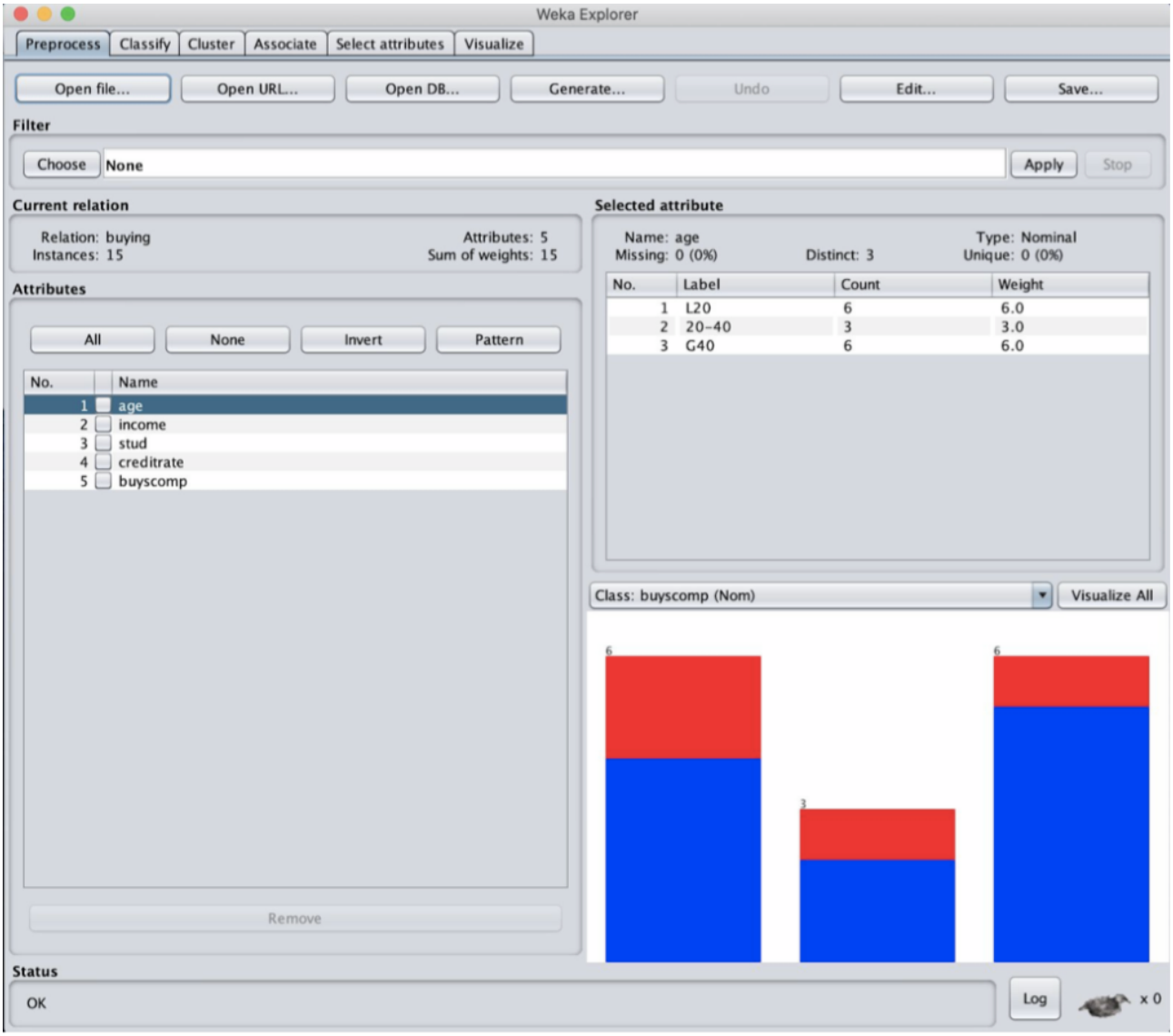
Practical 7 : Write a procedure for cross validation using J48 algo for weather table



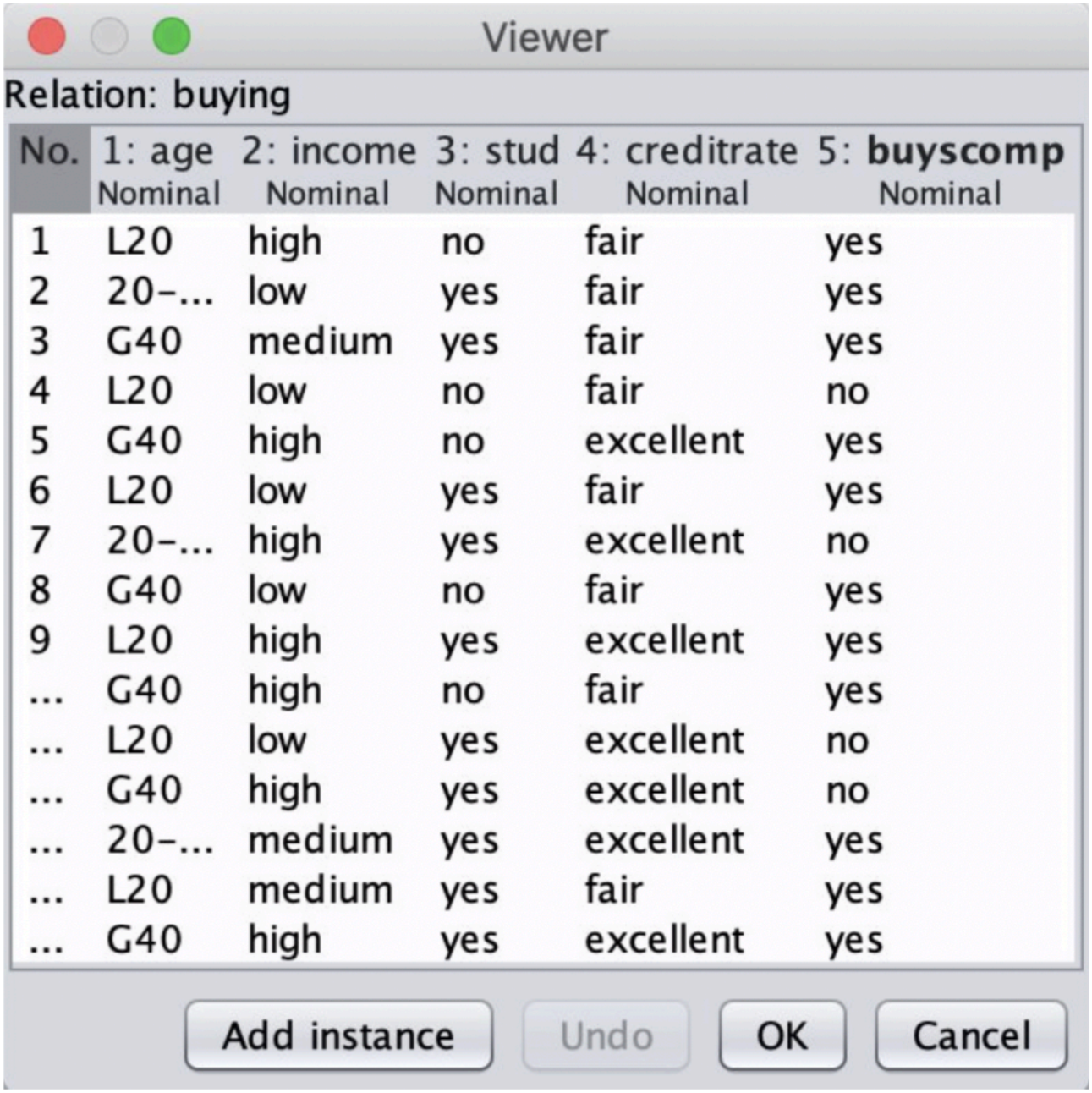


Practical 8 : Write a procedure for Clustering Buying data using Cobweb Algorithm.

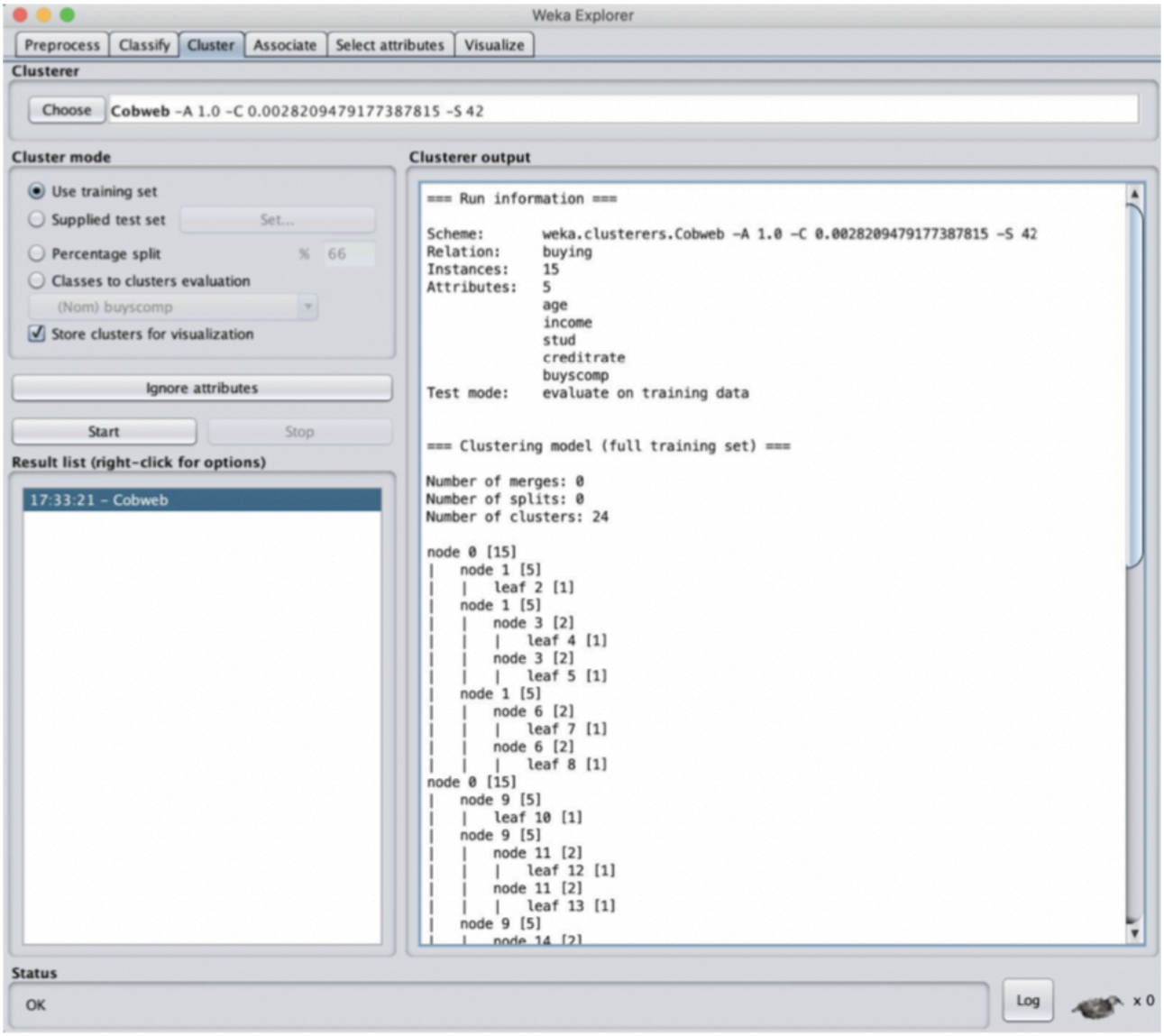
1. Data Loading

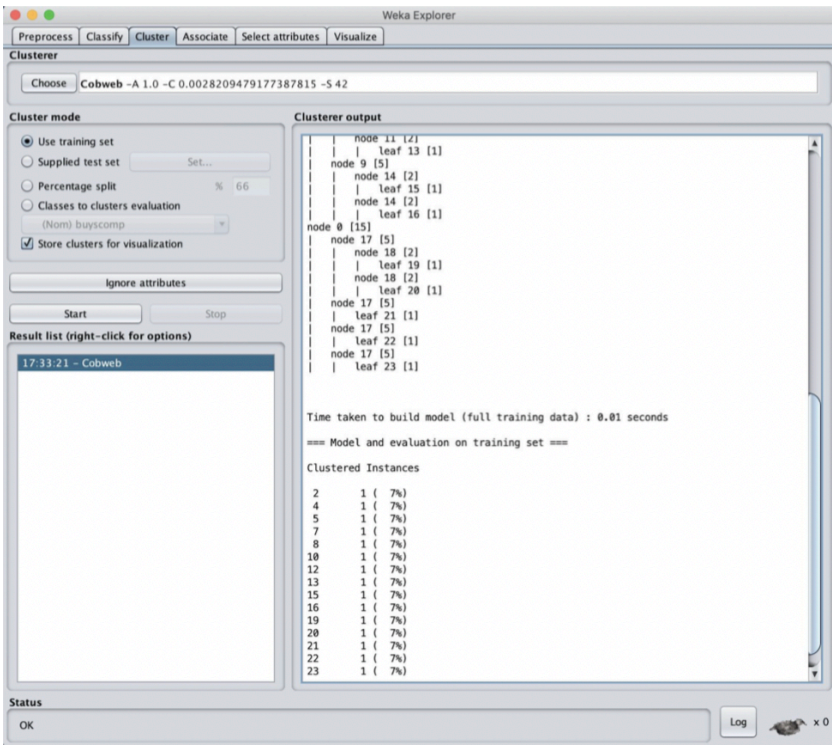


2. Review of Loaded Data



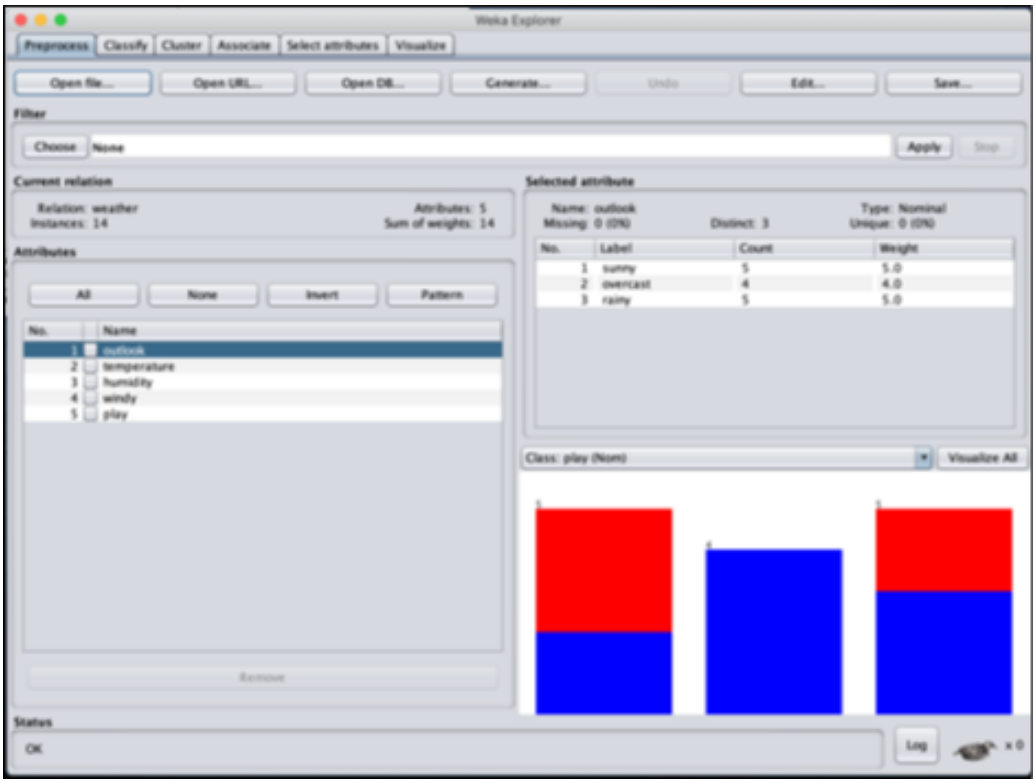
3. Result after COBWEB algorithm


Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
Cobweb -A 1.0 -C 0.0028209479177387815 -S 42
Cluster mode
Use training set
Supplied test set
Set...
Percentage split
%
66
Classes to clusters evaluation
(Nom) buyscomp
Store clusters for visualization
Ignore attributes
Start
Stop
Result list (right-click for options)
17:33:21 - Cobweb
Clusterer output
=== Run information ===
Scheme: weka.clusterers.Cobweb -A 1.0 -C 0.0028209479177387815 -S 42
Relation: buying
Instances: 15
Attributes: 5
age
income
stud
creditrate
buyscomp
Test mode: evaluate on training data
=== Clustering model (full training set) ===
Number of merges: 0
Number of splits: 0
Number of clusters: 24
node 0 [15]
| node 1 [5]
| | leaf 2 [1]
| node 1 [5]
| | node 3 [2]
| | | leaf 4 [1]
| | node 3 [2]
| | | leaf 5 [1]
| node 1 [5]
| | node 6 [2]
| | | leaf 7 [1]
| | node 6 [2]
| | | leaf 8 [1]
node 0 [15]
| node 9 [5]
| | leaf 10 [1]
| node 9 [5]
| | node 11 [2]
| | | leaf 12 [1]
| | node 11 [2]
| | | leaf 13 [1]
| node 9 [5]
Status
OK
Log
x 0

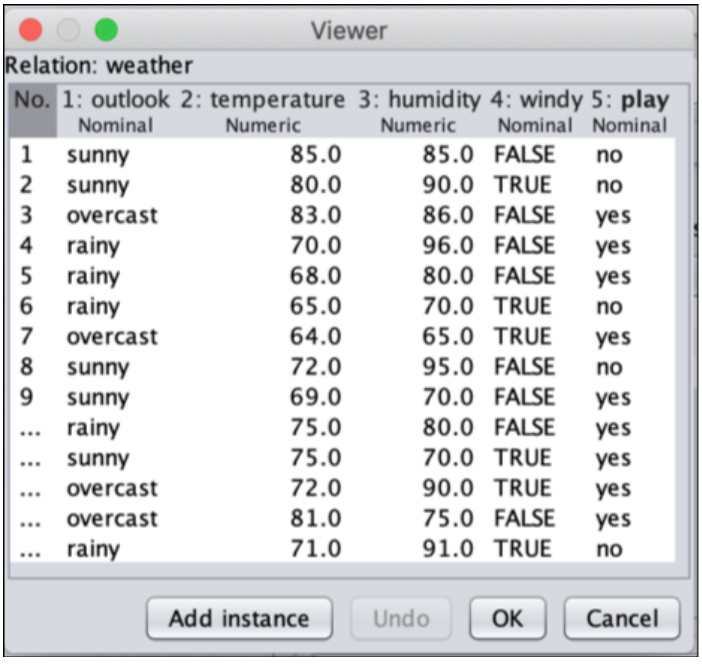

Weka Explorer
Preprocess
Classify
Cluster
Associate
Select attributes
Visualize
Clusterer
Choose
Cobweb -A 1.0 -C 0.0028209479177387815 -S 42
Cluster mode
Use training set
Supplied test set
Set...
Percentage split
%
66
Classes to clusters evaluation
(Nom) buyscomp
Store clusters for visualization
Ignore attributes
Start
Stop
Result list (right-click for options)
17:33:21 - Cobweb
Clusterer output
| | node 11 [2]
| | | leaf 13 [1]
| node 9 [5]
| | node 14 [2]
| | | leaf 15 [1]
| | node 14 [2]
| | | leaf 16 [1]
node 0 [15]
| node 17 [5]
| | node 18 [2]
| | | leaf 19 [1]
| | node 18 [2]
| | | leaf 20 [1]
| node 17 [5]
| | leaf 21 [1]
| node 17 [5]
| | leaf 22 [1]
| node 17 [5]
| | leaf 23 [1]
Time taken to build model (full training data) : 0.01 seconds
=== Model and evaluation on training set ===
Clustered Instances
2 1 (7%)
4 1 (7%)
5 1 (7%)
7 1 (7%)
8 1 (7%)
10 1 (7%)
12 1 (7%)
13 1 (7%)
15 1 (7%)
16 1 (7%)
19 1 (7%)
20 1 (7%)
21 1 (7%)
22 1 (7%)
23 1 (7%)
Status
OK
Log
x 0

Practical 9 : Write a procedure for Clustering Weather data using EM Algorithm.

1. Data Loading



2. Review of Loaded Data



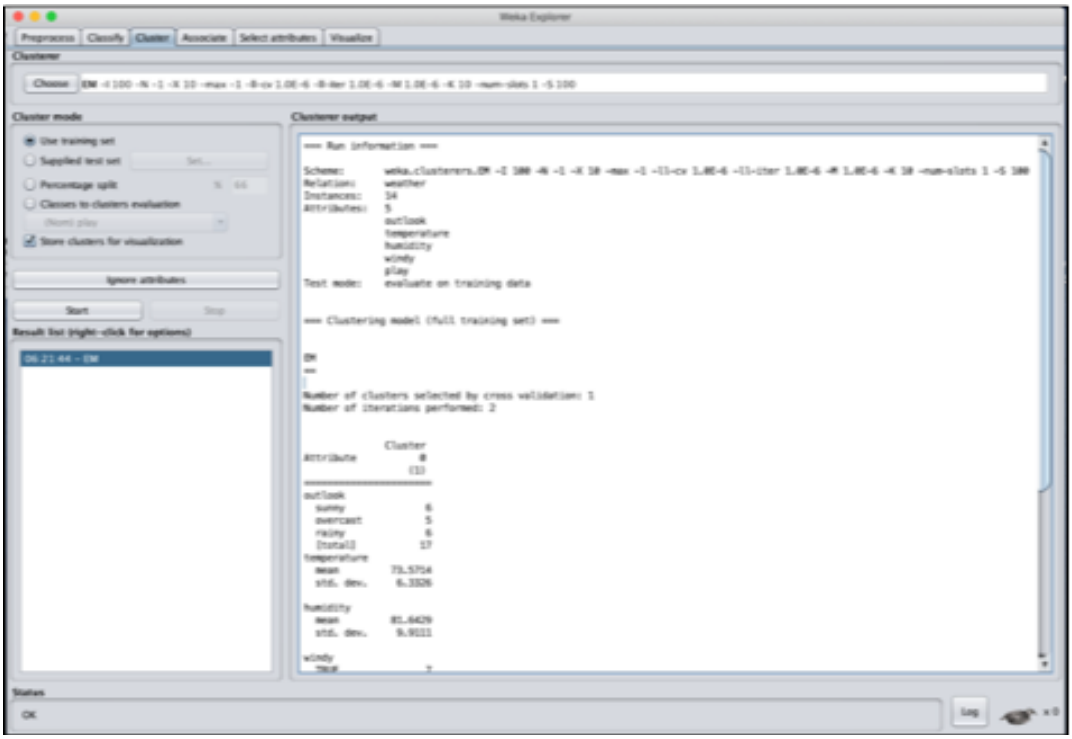
Viewer

Relation: weather

No.	1: outlook Nominal	2: temperature Numeric	3: humidity Numeric	4: windy Nominal	5: 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
...	rainy	75.0	80.0	FALSE	yes
...	sunny	75.0	70.0	TRUE	yes
...	overcast	72.0	90.0	TRUE	yes
...	overcast	81.0	75.0	FALSE	yes
...	rainy	71.0	91.0	TRUE	no

Add instance | Undo | OK | Cancel

3. Result after EM algorithm

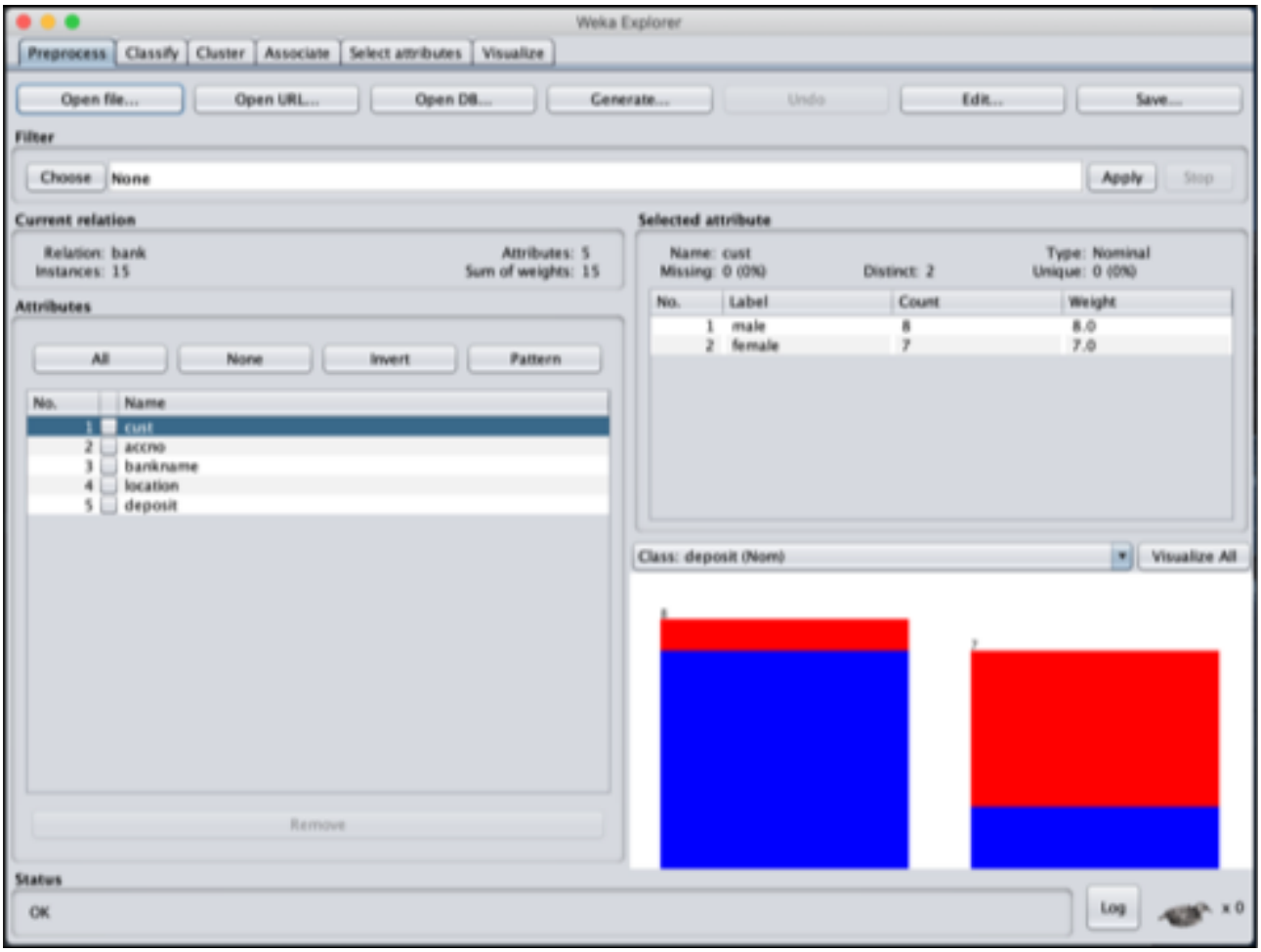


Clusterer output

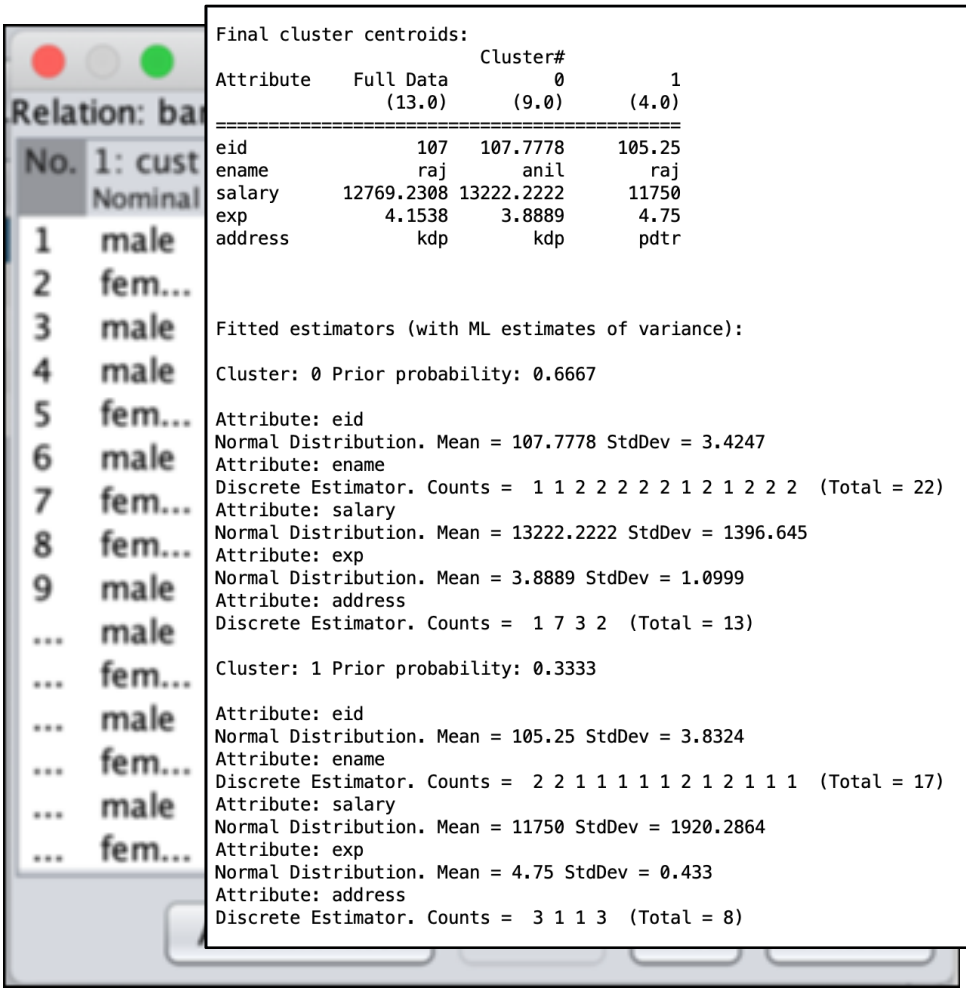
```
Number of clusters selected by cross validation: 1
Number of iterations performed: 2


               Cluster
Attribute            0
                   (1)
=======================
outlook
  sunny              6
  overcast           5
  rainy              6
  [total]           17
temperature
  mean         73.5714
  std. dev.     6.3326

humidity
  mean         81.6429
  std. dev.     9.9111

windy
  TRUE               7
  FALSE              9
  [total]           16
play
  yes               10
  no                 6
  [total]           16


Time taken to build model (full training data) : 0.06 seconds

=== Model and evaluation on training set ===

Clustered Instances

0      14 (100%)


Log likelihood: -9.4063
```

Practical 10 : Write a procedure for Banking data using Farthest First Algorithm.

1. Data Loading

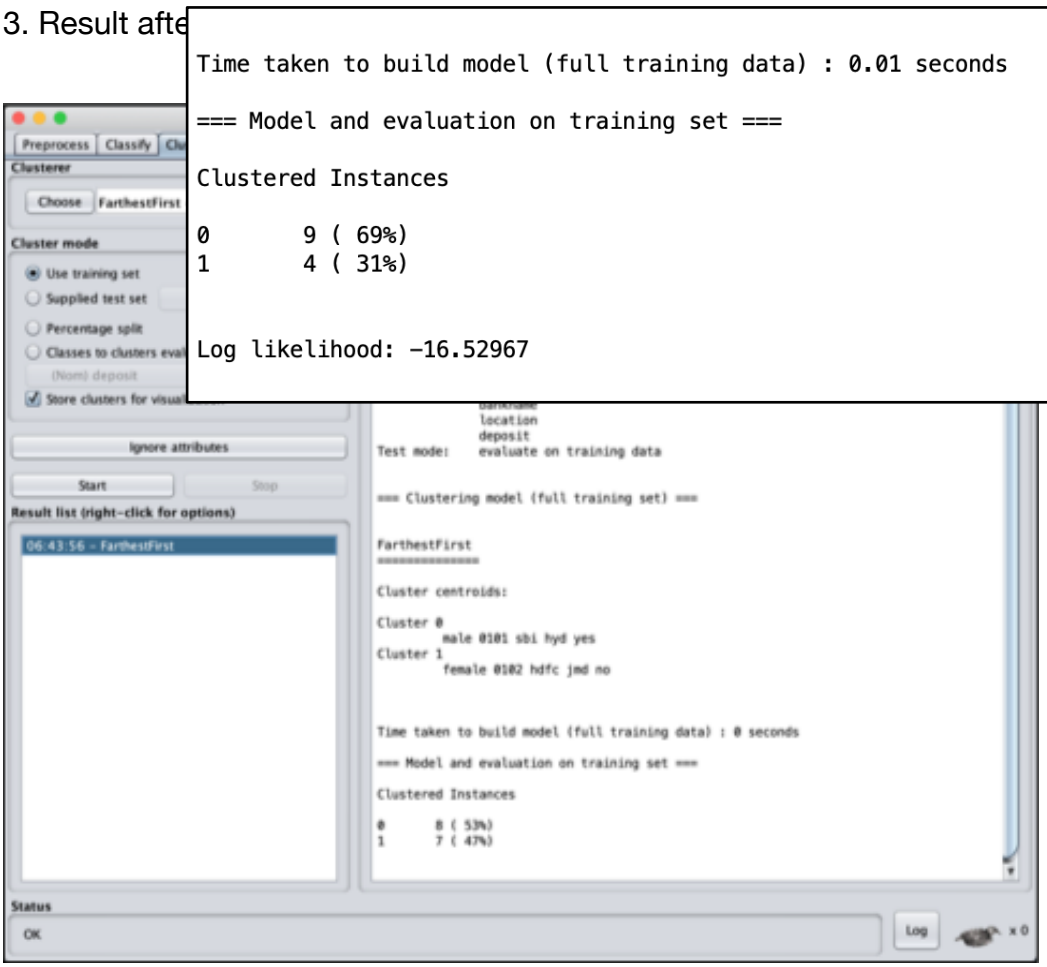


2. Review of Loaded Data



```
Final cluster centroids:
                           Cluster#
Attribute    Full Data          0          1
                (13.0)      (9.0)      (4.0)
=========================================
eid                107   107.7778     105.25
ename              raj        anil        raj
salary      12769.2308 13222.2222      11750
exp             4.1538     3.8889       4.75
address            kdp        kdp       pdtr


Fitted estimators (with ML estimates of variance):

Cluster: 0 Prior probability: 0.6667

Attribute: eid
Normal Distribution. Mean = 107.7778 StdDev = 3.4247
Attribute: ename
Discrete Estimator. Counts =  1 1 2 2 2 2 2 1 2 1 2 2 2  (Total = 22)
Attribute: salary
Normal Distribution. Mean = 13222.2222 StdDev = 1396.645
Attribute: exp
Normal Distribution. Mean = 3.8889 StdDev = 1.0999
Attribute: address
Discrete Estimator. Counts =  1 7 3 2  (Total = 13)

Cluster: 1 Prior probability: 0.3333

Attribute: eid
Normal Distribution. Mean = 105.25 StdDev = 3.8324
Attribute: ename
Discrete Estimator. Counts =  2 2 1 1 1 1 2 1 2 1 1 1  (Total = 17)
Attribute: salary
Normal Distribution. Mean = 11750 StdDev = 1920.2864
Attribute: exp
Normal Distribution. Mean = 4.75 StdDev = 0.433
Attribute: address
Discrete Estimator. Counts =  3 1 1 3  (Total = 8)
```

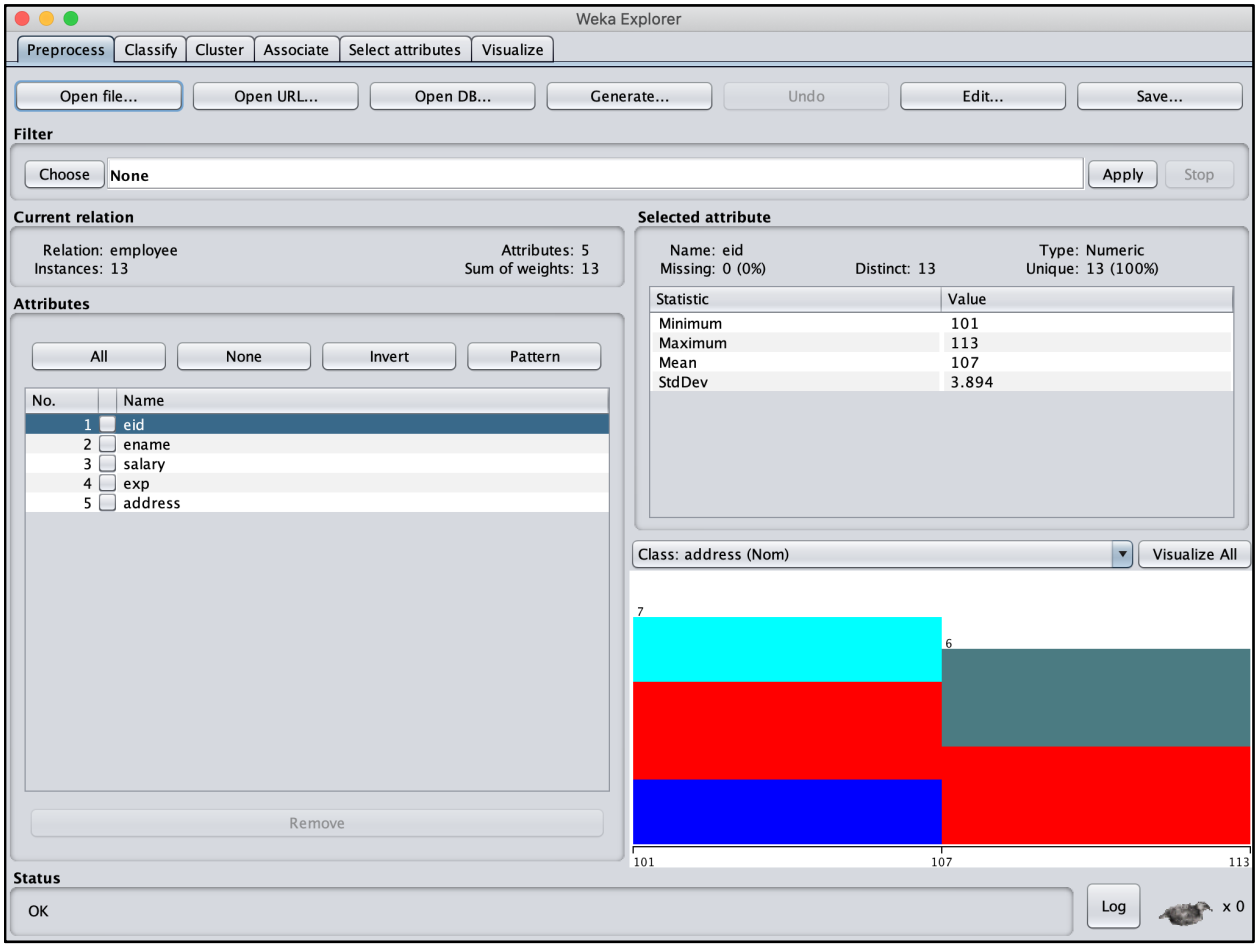
3. Result afte



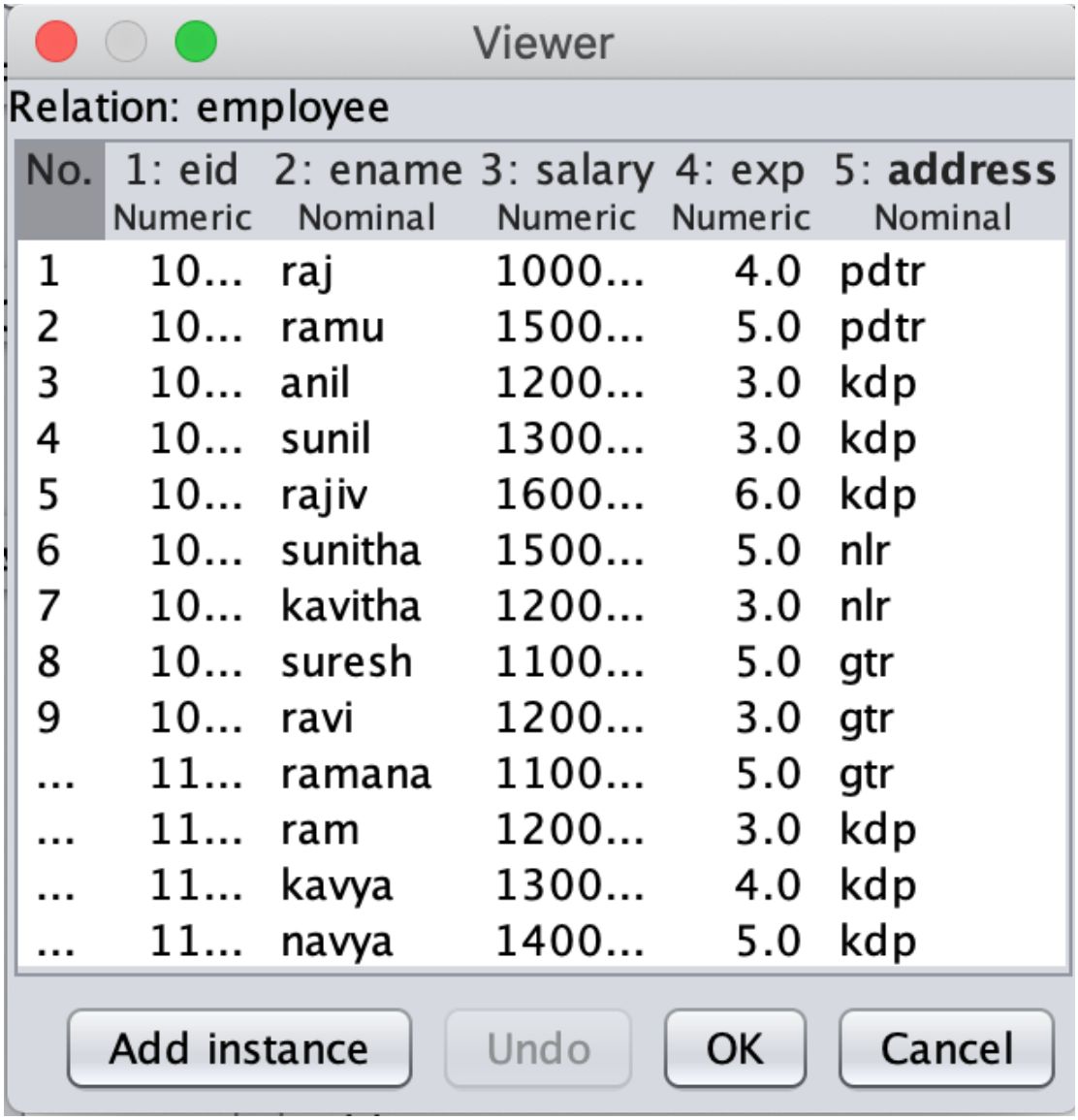
```
Time taken to build model (full training data) : 0.01 seconds

=== Model and evaluation on training set ===

Clustered Instances

0       9 ( 69%)
1       4 ( 31%)


Log likelihood: -16.52967
```

Practical 11 : Write a procedure for Employee data using Make Density Based Cluster Algorithm.

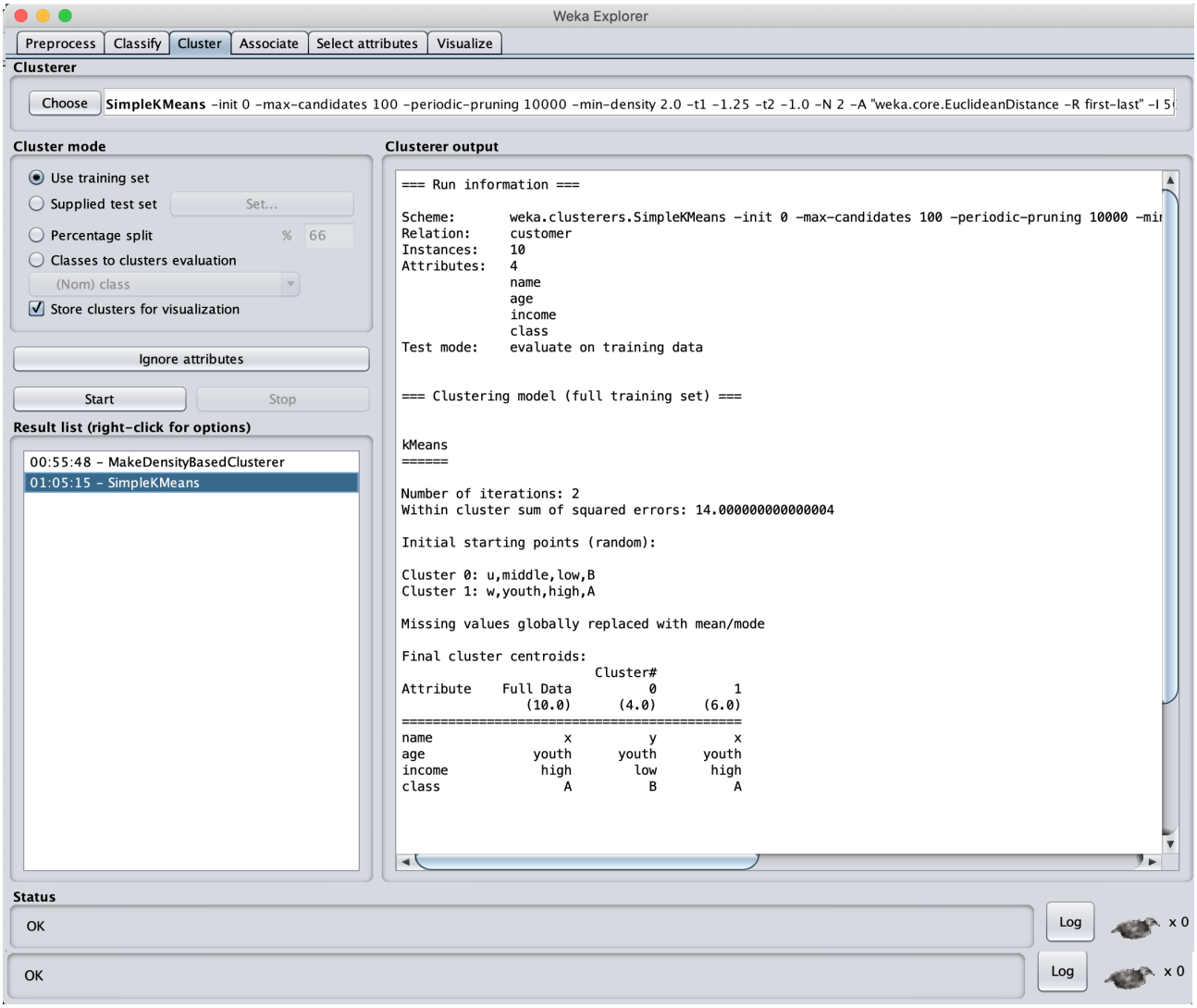
1. Data Loading



2. Review of Loaded Data



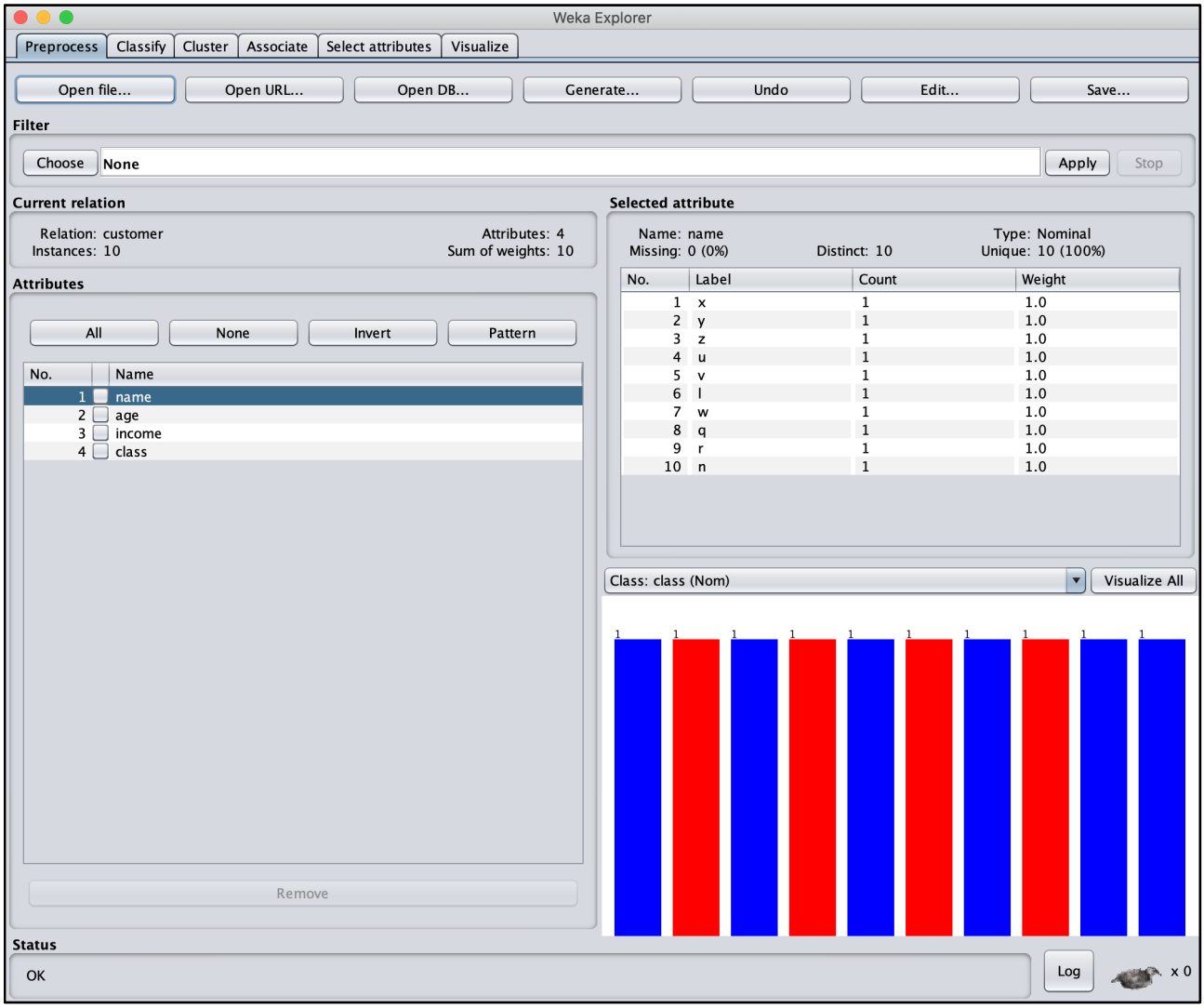
3. Result after Make Density Based Cluster Algorithm.



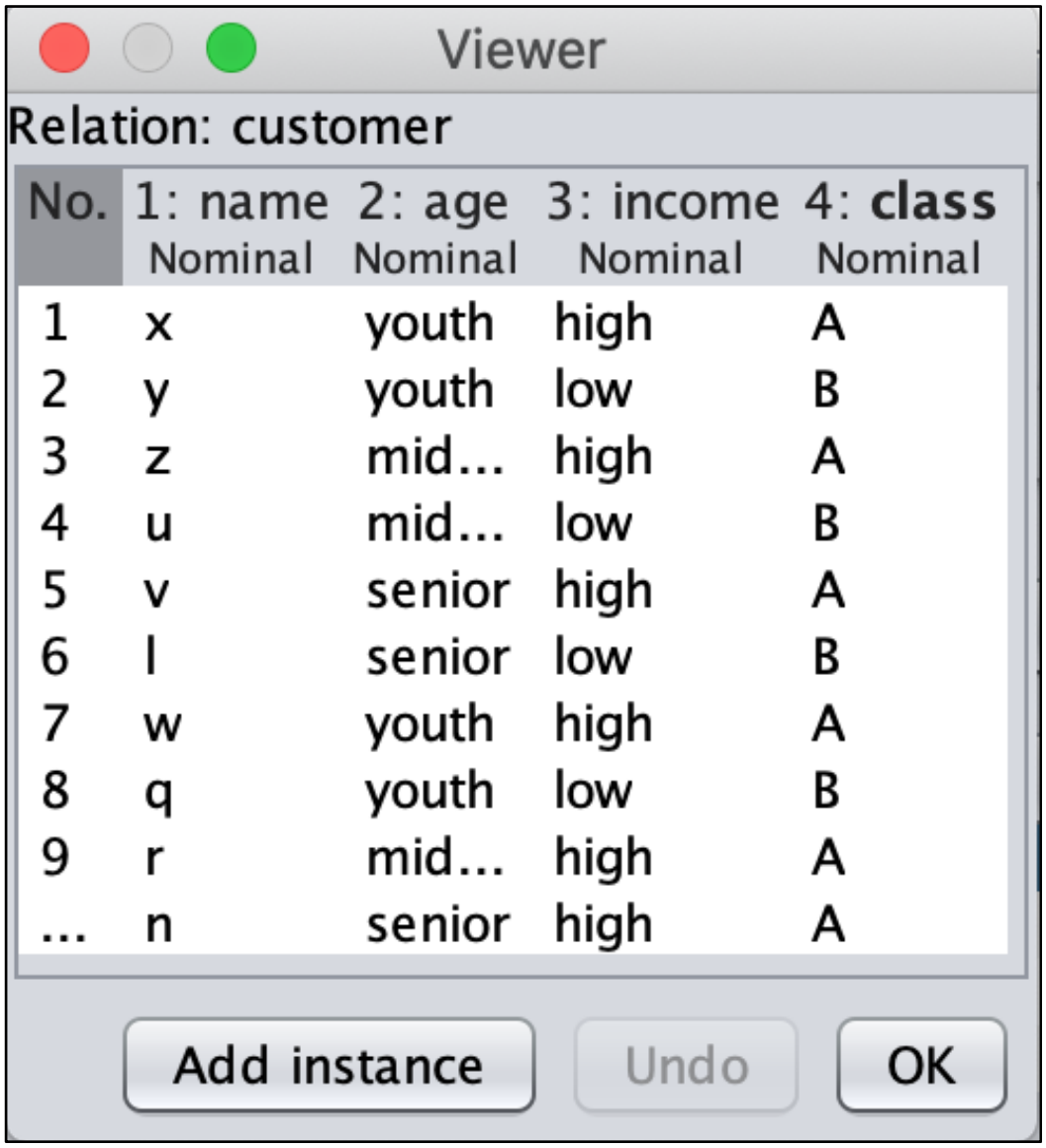

```
Final cluster centroids:
                        Cluster#
Attribute    Full Data          0          1
                (10.0)      (4.0)      (6.0)
==========================================
name                 x          y          x
age              youth      youth      youth
income            high        low       high
class                A          B          A



Time taken to build model (full training data) : 0 seconds

=== Model and evaluation on training set ===

Clustered Instances

0       4 ( 40%)
1       6 ( 60%)
```

Practical 12 : Write a procedure for Clustering Customer data using Simple KMeans Algorithm.

1. Data Loading



2. Review of Loaded Data

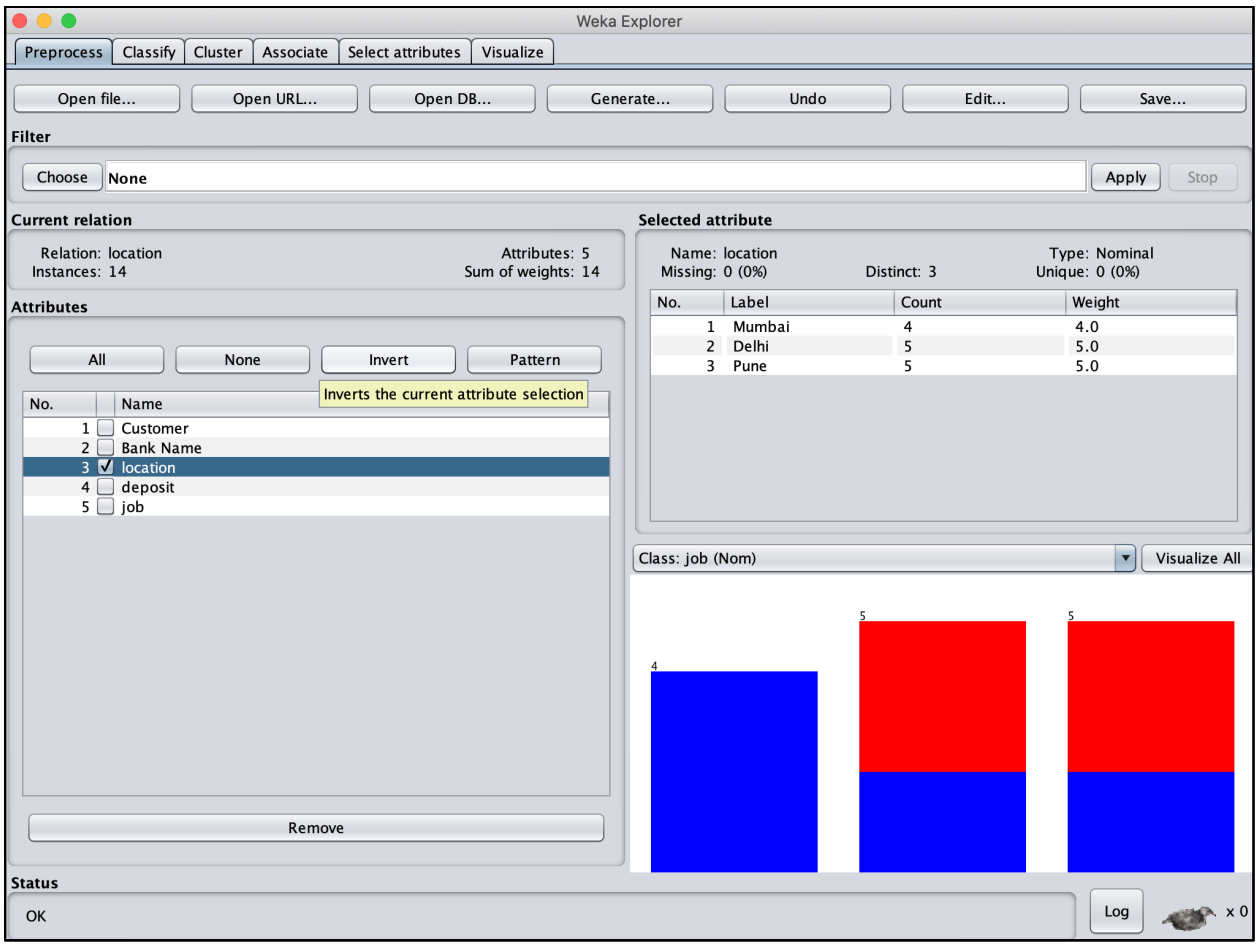


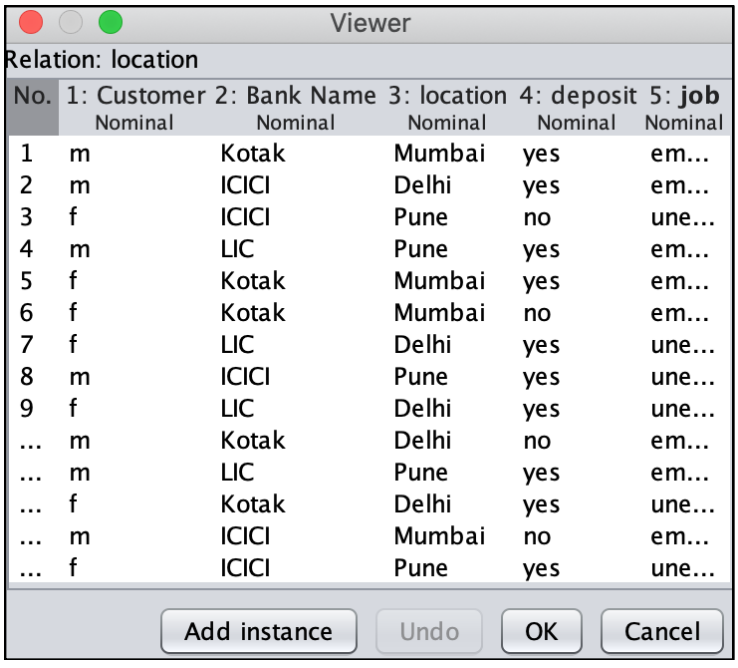
3. Result after Simple KMeans Algorithm.

Practical 13: Decision Tree for Location Data (J48 classifier)

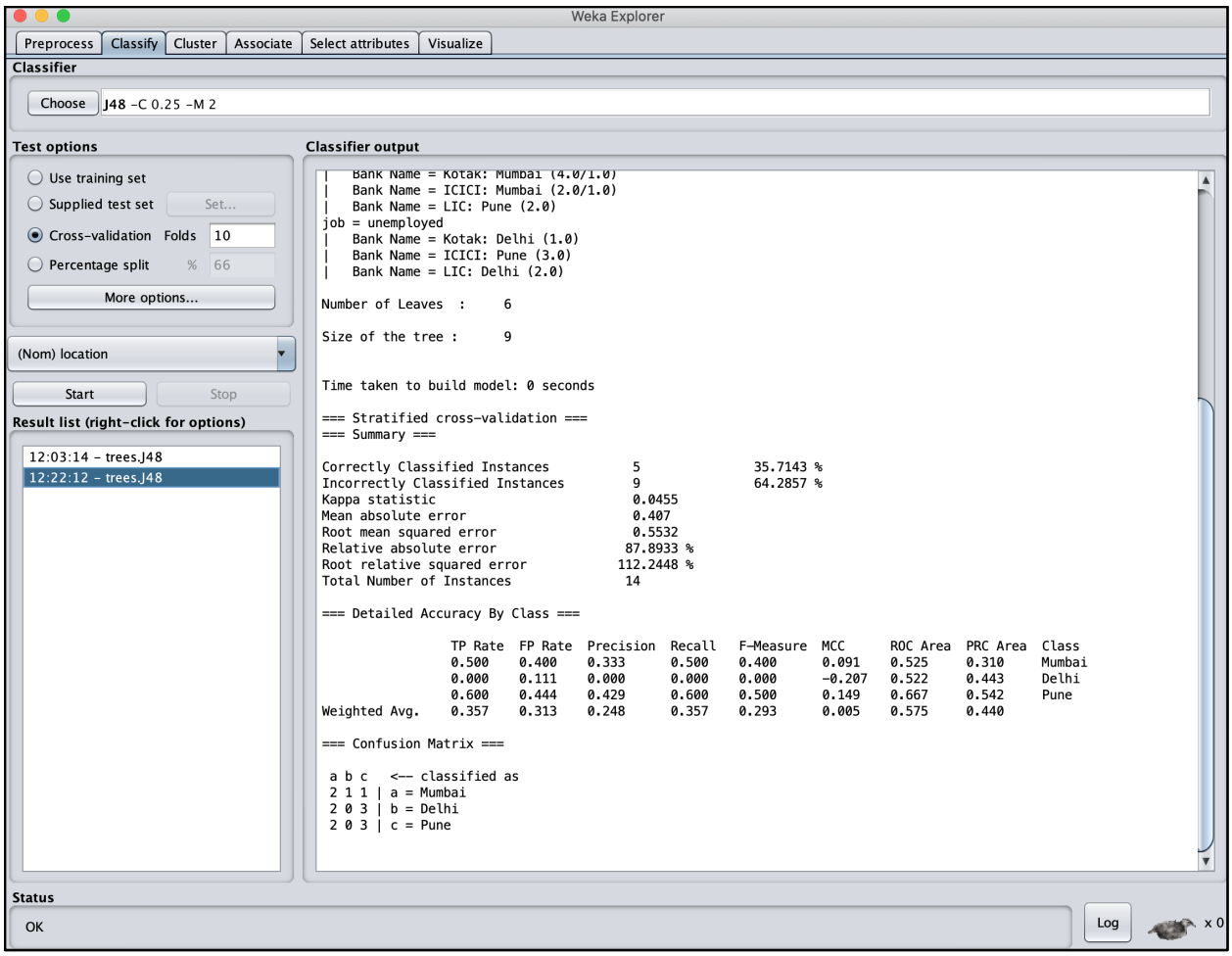
Dataset:

```
@relation location
@attribute Customer {m,f}
@attribute 'Bank Name' {Kotak,ICICI,LIC}
@attribute location {Mumbai,Delhi,Pune}
@attribute deposit {yes,no}
@attribute job {employed,unemployed}
@data
m,Kotak,Mumbai,yes,employed
m,ICICI,Delhi,yes,employed
f,ICICI,Pune,no,unemployed
m,LIC,Pune,yes,employed
f,Kotak,Mumbai,yes,employed
f,Kotak,Mumbai,no,employed
f,LIC,Delhi,yes,unemployed
m,ICICI,Pune,yes,unemployed
f,LIC,Delhi,yes,unemployed
m,Kotak,Delhi,no,employed
m,LIC,Pune,yes,employed
f,Kotak,Delhi,yes,unemployed
m,ICICI,Mumbai,no,employed
f,ICICI,Pune,yes,unemployed
```





After applying J48 classifier:



Decision Tree