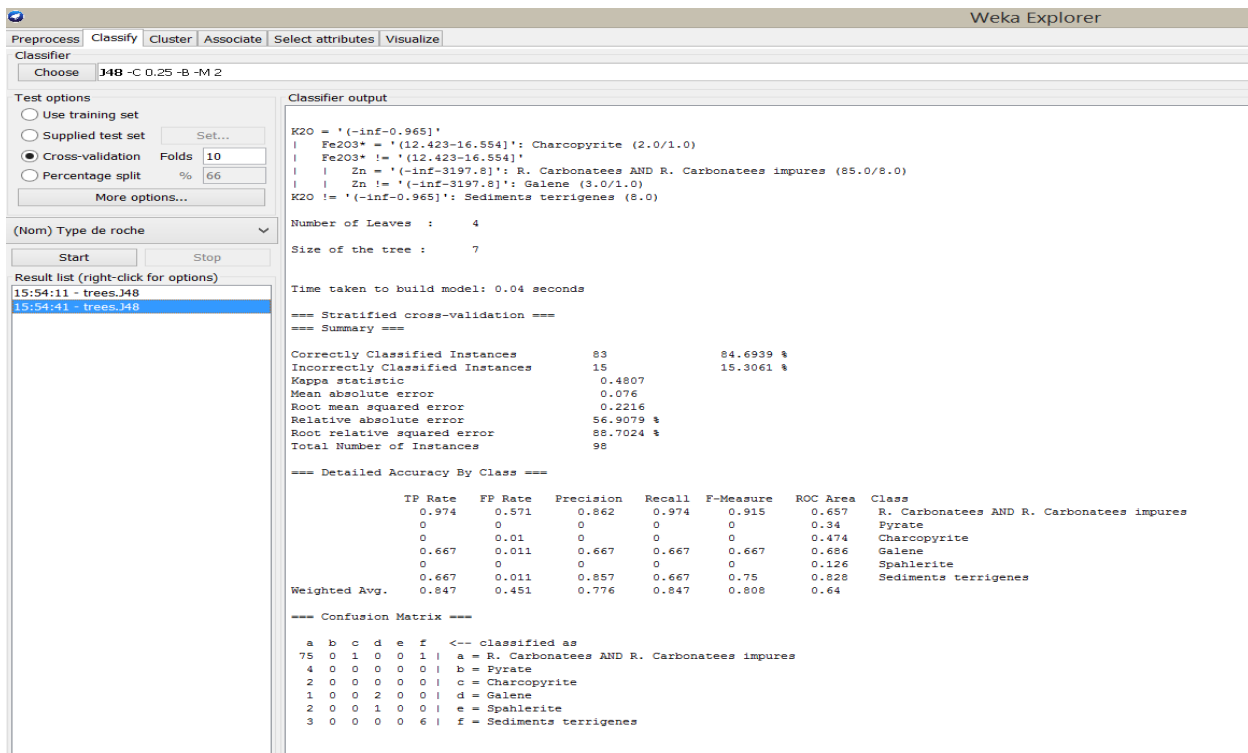
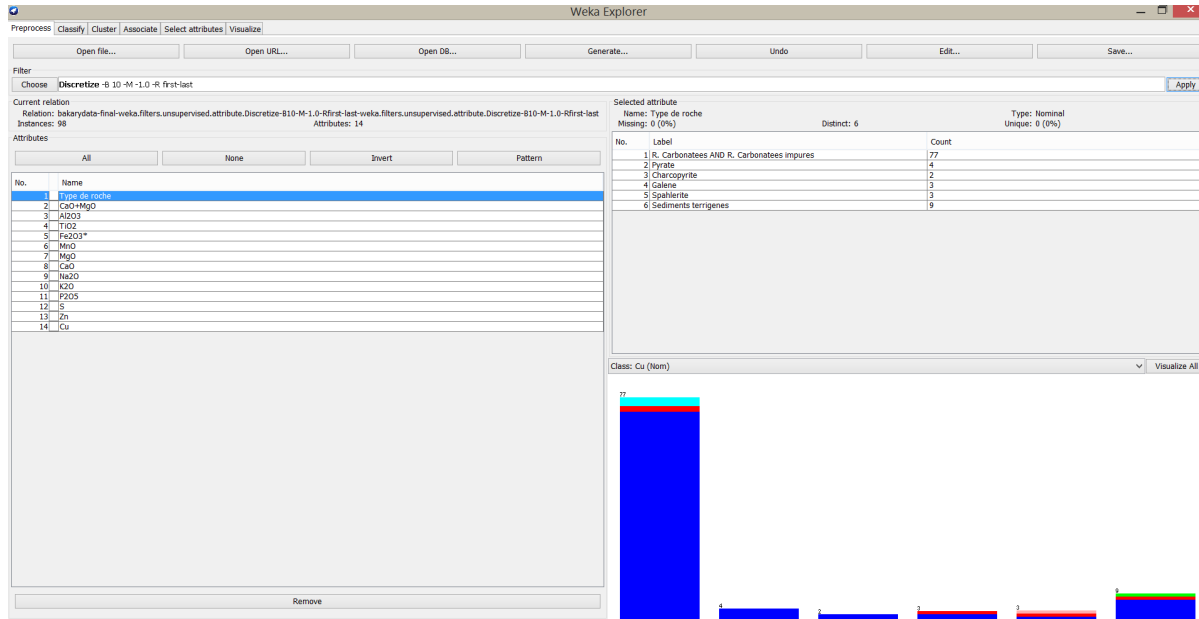


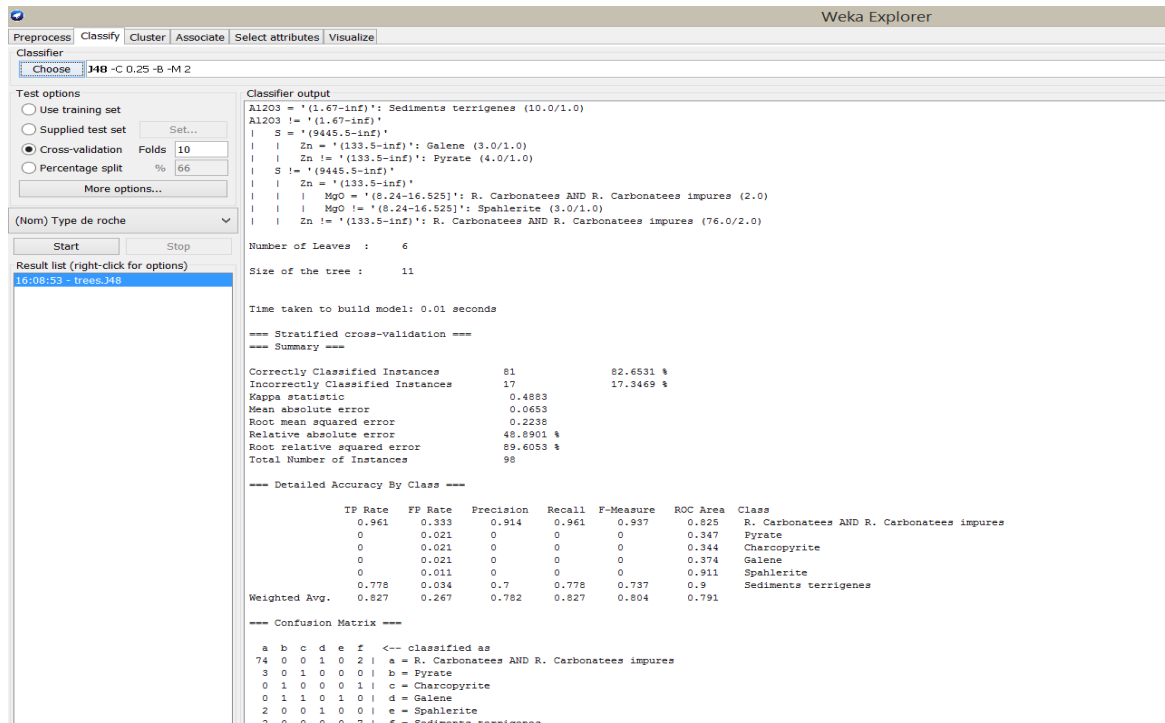
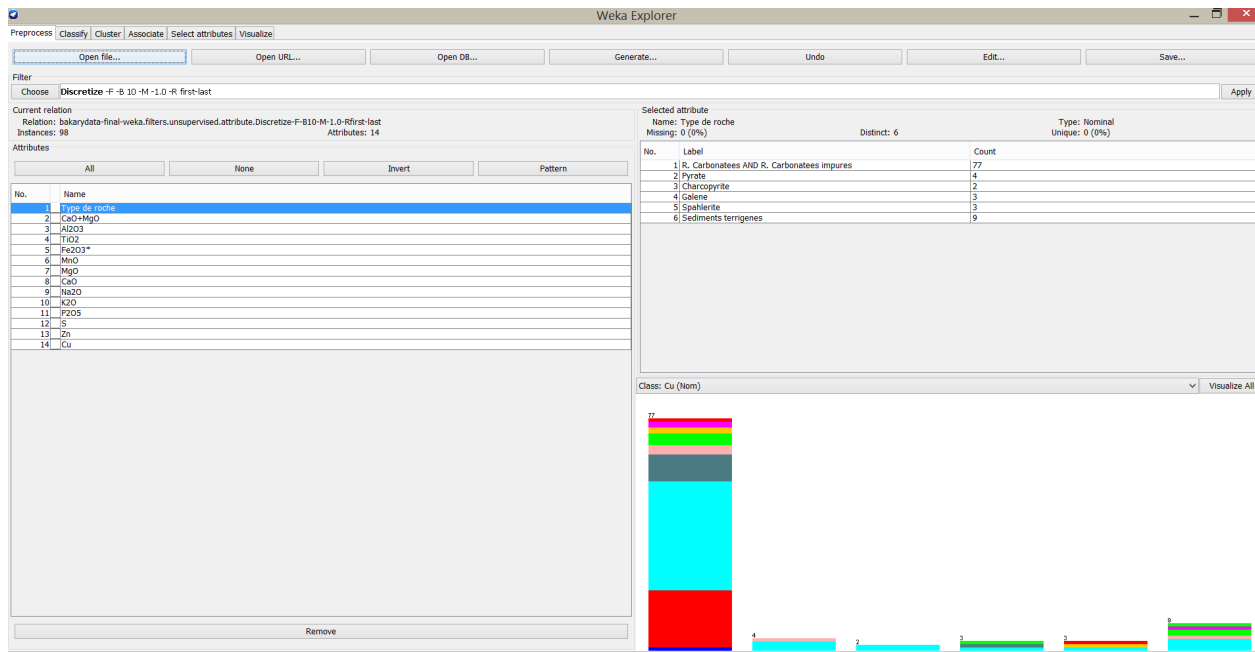
Experiment 1:

To find rules for the full classification - rules describing C1 -C6 simultaneously

1.1 Discretize with Equal Width Binning



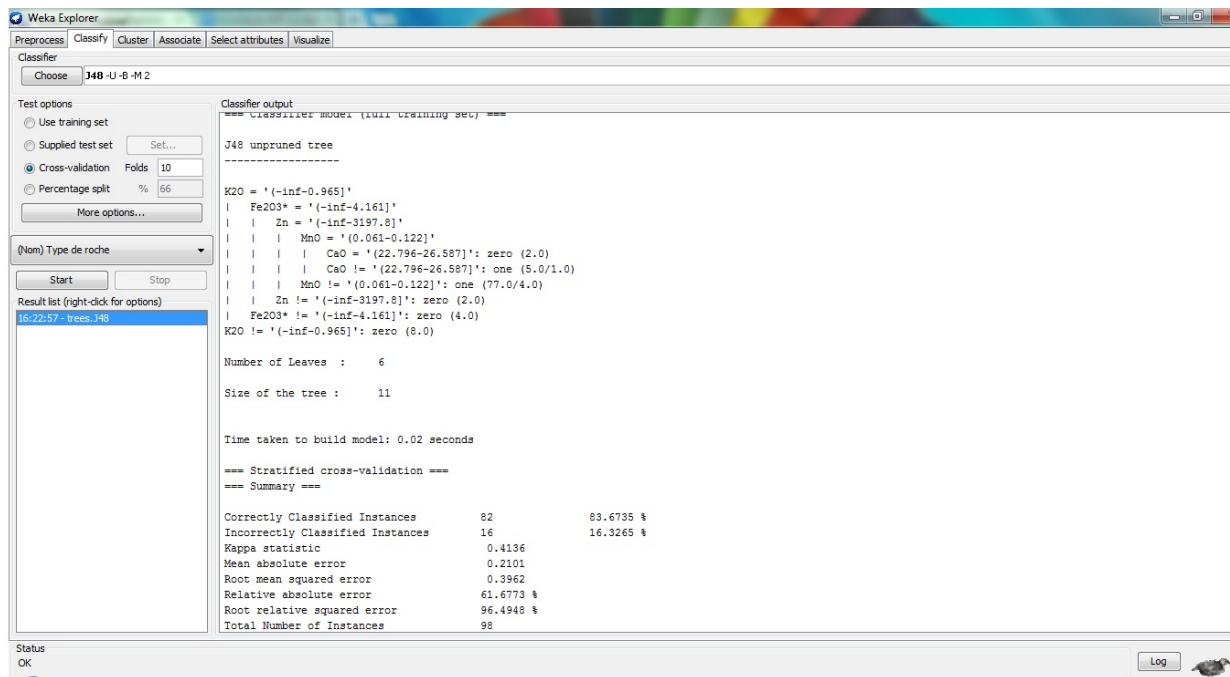
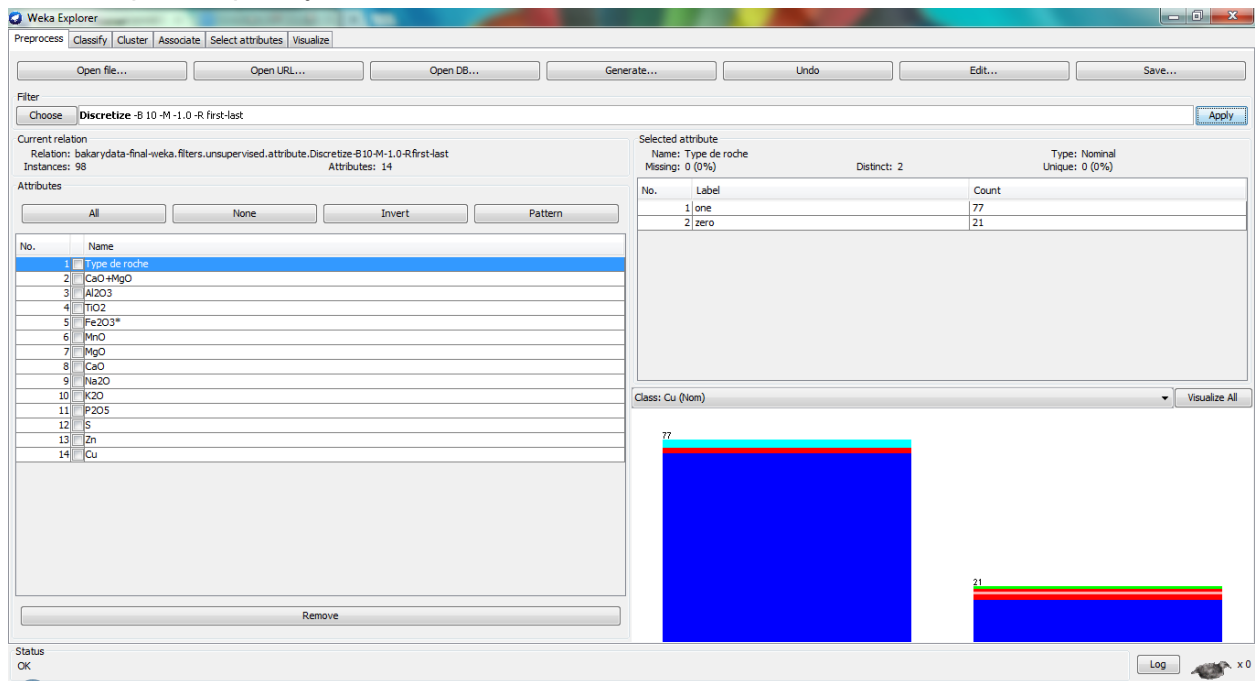
1.2 Discretize with Equal Frequency Binning



Experiment 2

Contrasting classes C1 with the rest of them.

2.1 Discretize with Equal Width Binning set useEqualFrequency = False



2.2 Equal Frequency binning:

set useEqualFrequency =true.

Weka Explorer

Preprocess | Classify | Cluster | Associate | Select attributes | Visualize

Open file... Open URL... Open DB... Generate... Undo Edit... Save...

Filter: Choose **Discretize** -F -B 10 -M -1.0 -R first-last Apply

Current relation: bakarydata-final-weka.filters.unsupervised.attribute.Discretize-F-810-M-1.0-R-first-last
Instances: 98 Attributes: 14

Attributes: All None Invert Pattern

No.	Name
1	Type de roche
2	CaO+MgO
3	Al2O3
4	TiO2
5	Fe2O3*
6	MnO
7	MgO
8	CaO
9	Na2O
10	K2O
11	P2O5
12	S
13	Zn
14	Cu

Remove

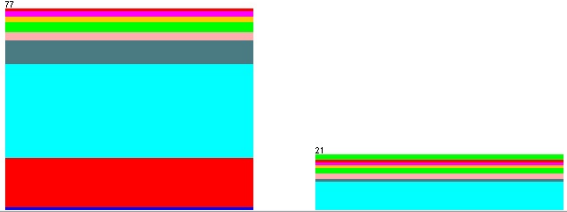
Status: OK

Log

Selected attribute: Name: Type de roche, Missing: 0 (0%), Distinct: 2, Type: Nominal, Unique: 0 (0%)

No.	Label	Count
1	one	77
2	zero	21

Class: Cu (Nom) Visualize All



Weka Explorer

Preprocess | Classify | Cluster | Associate | Select attributes | Visualize

Classifier: Choose **J48** -U -B -M 2

Test options: Use training set, Supplied test set, Cross-validation (Folds: 10), Percentage split (%: 66), More options...

(Nom) Type de roche: Start Stop

Result list (right-click for options): 16:25:55 - tree.j48

Classifier output:

```
zn
Cu
Test mode:10-fold cross-validation
=== Classifier model (full training set) ===
J48 unpruned tree
-----
CaO+MgO = '(<inf-28.275]': zero (10.0)
CaO+MgO != '(<inf-28.275]':
| S = '(9445.5-<inf)': zero (6.0)
| S != '(9445.5-<inf)':
| | Zn = '(133.5-<inf)'
| | | MgO = '(8.24-16.525]': one (2.0)
| | | MgO != '(8.24-16.525]': zero (3.0)
| | | Zn != '(133.5-<inf)'
| | | K2O = '(0.385-1.91]'
| | | | S = '(802-1280.5]': one (3.0)
| | | | S != '(802-1280.5]': zero (2.0)
| | | K2O != '(0.385-1.91]': one (72.0)

Number of Leaves :    7
Size of the tree :    13

Time taken to build model: 0.02 seconds

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

Correctly Classified Instances      93      94.898 %
Incorrectly Classified Instances    5       5.102 %
```

Status: OK

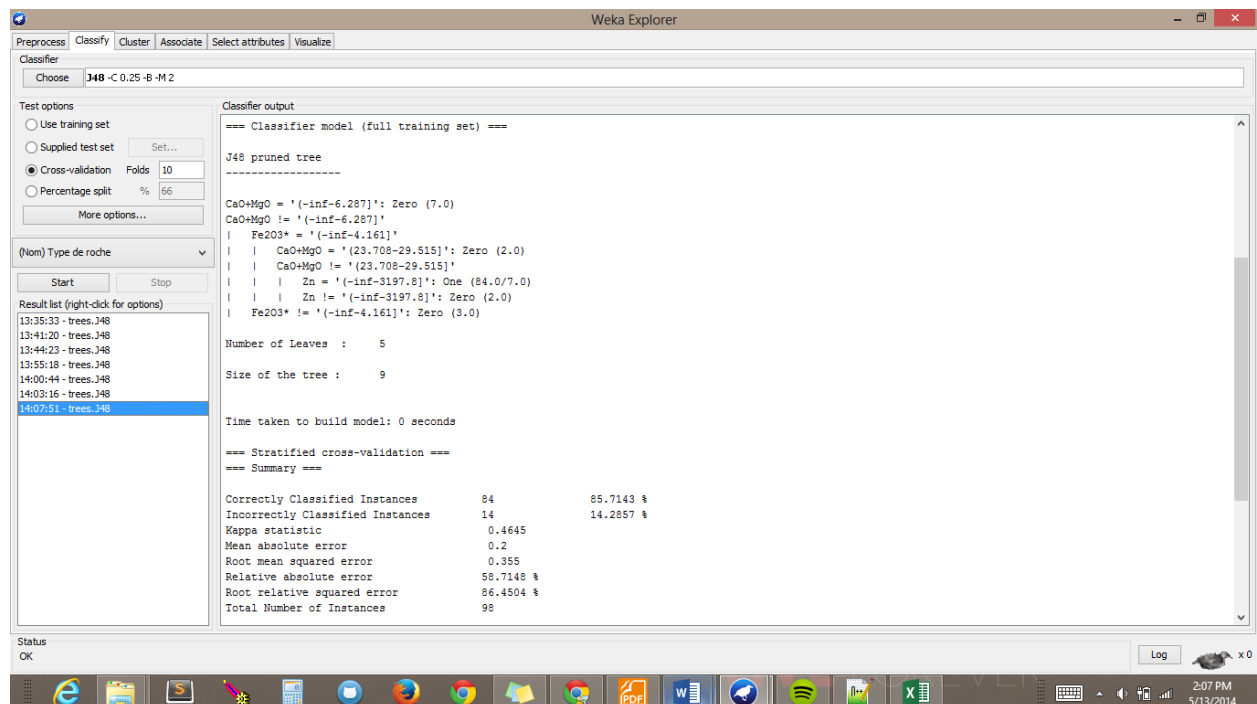
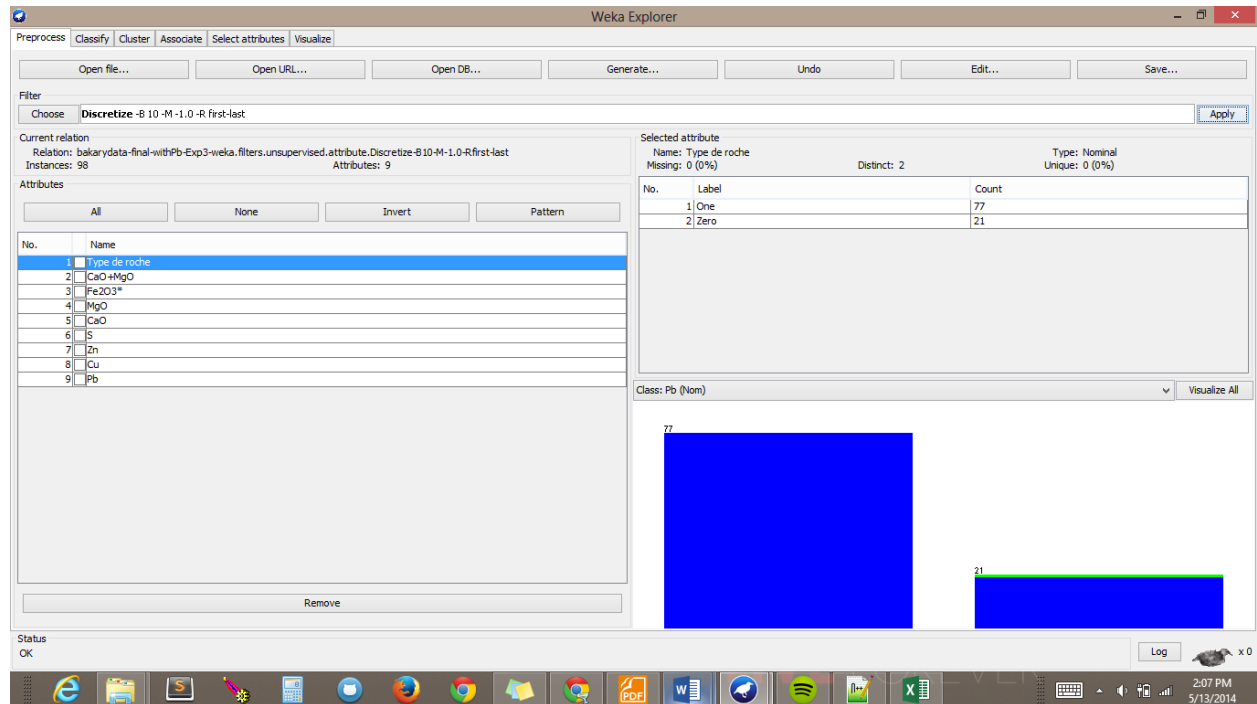
Log

Experiment 3

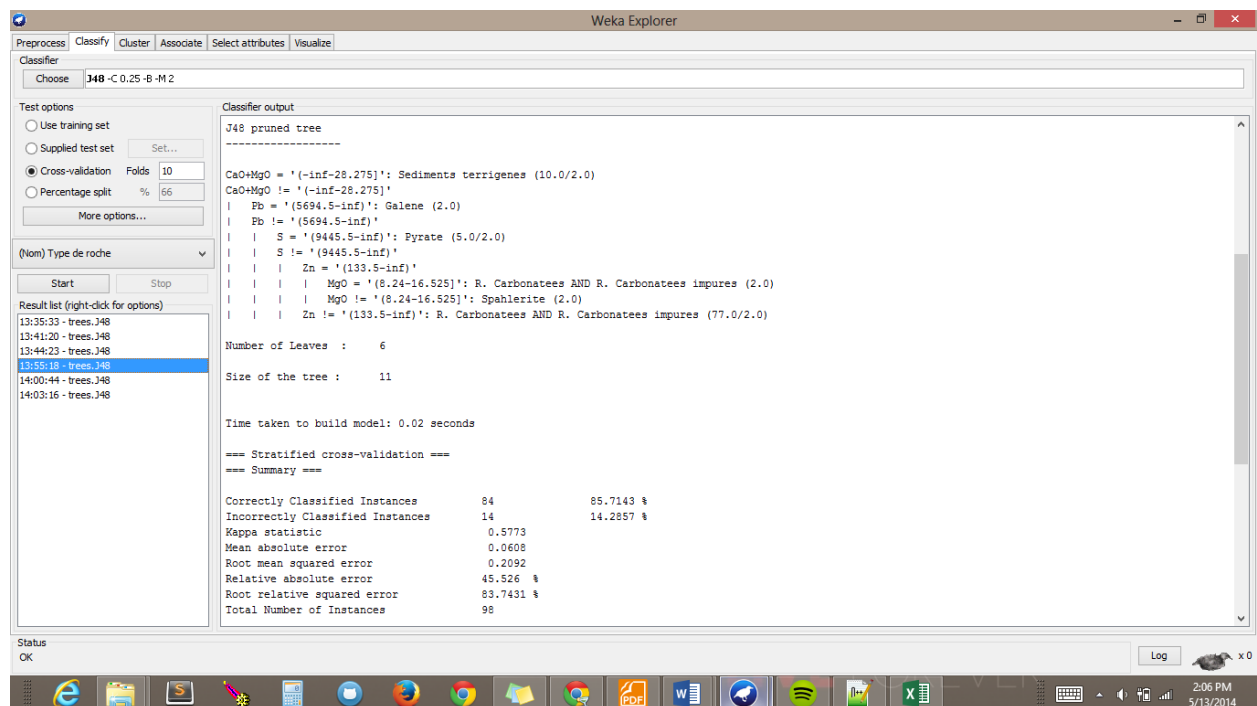
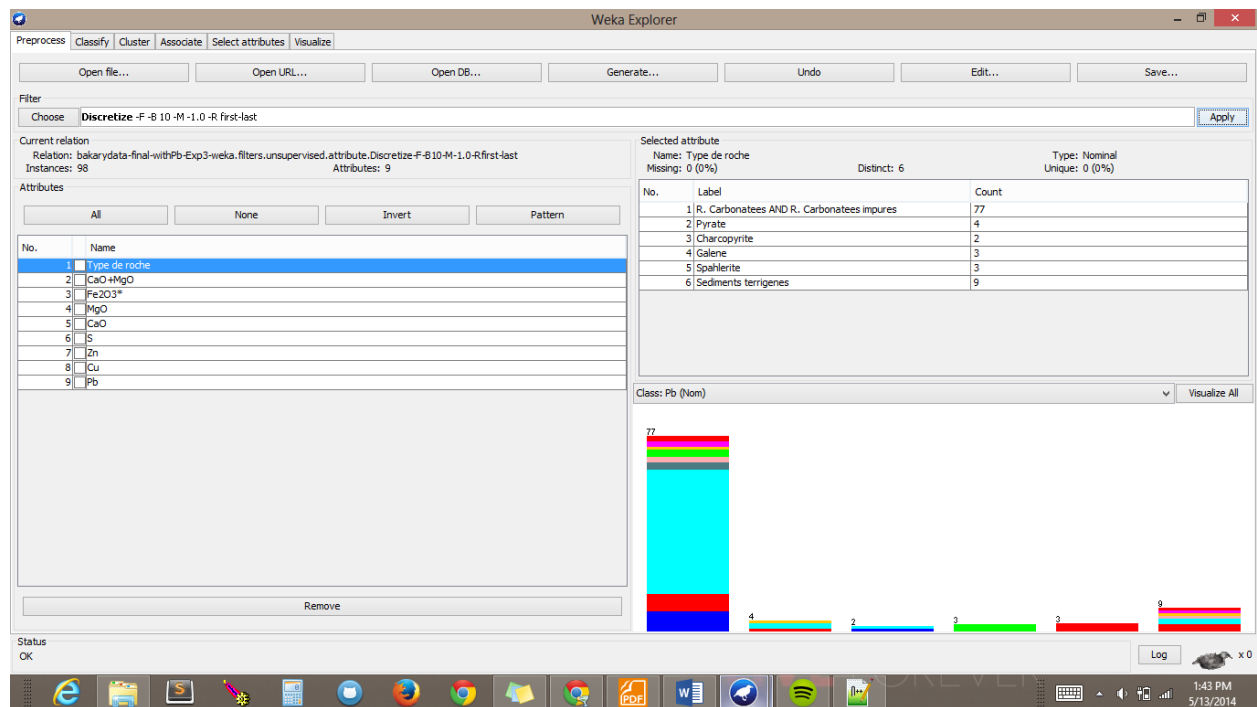
Source data has only the expert's attributes

3.1 Non Contrast Learning

Equal Width Binning:



Equal Frequency Binning



3.2 Contrast Learning

Equal Width Binning:

The screenshot shows the Weka Explorer interface with the 'Discretize' filter applied to the 'Type de roche' attribute. The 'Selected attribute' panel shows the attribute is nominal with 2 distinct values: 'One' (count 77) and 'Zero' (count 21). The 'Visualize All' button is visible. The 'Attributes' list on the left includes 'Type de roche', 'CaO+MgO', 'Fe2O3*', 'MgO', 'CaO', 'S', 'Zn', 'Cu', and 'Pb'. The status bar at the bottom indicates 'OK'.

The screenshot shows the Weka Explorer interface with the 'J48' classifier selected. The 'Classifier output' panel displays the following information:

```
==== Classifier model (full training set) ====  
J48 pruned tree  
-----  
S <= 1884.0  
| Fe2O3* <= 0.32: One (65.0)  
| Fe2O3* > 0.32  
| | CaO+MgO <= 26.67: Zero (3.0)  
| | CaO+MgO > 26.67  
| | | Zn <= 188.0: One (13.0/1.0)  
| | | Zn > 188.0: Zero (2.0)  
S > 1884.0: Zero (15.0)  
  
Number of Leaves : 5  
Size of the tree : 9  
  
Time taken to build model: 0 seconds  
  
==== Stratified cross-validation ====  
==== Summary ====  
  
Correctly Classified Instances 88 89.7959 %  
Incorrectly Classified Instances 10 10.2041 %  
Kappa statistic 0.697  
Mean absolute error 0.1011  
Root mean squared error 0.3015  
Relative absolute error 29.6847 %  
Root relative squared error 73.4167 %  
Total Number of Instances 98
```

The 'Result list' on the left shows several entries for 'trees.J48' with the most recent one selected. The status bar at the bottom indicates 'OK'.

Equal Frequency Binning

Weka Explorer

Preprocess | Classify | Cluster | Associate | Select attributes | Visualize

Open file... Open URL... Open DB... Generate... Undo Edit... Save...

Filter: Choose **Discretize -F -B 10 -M -1.0 -R first-last** Apply

Current relation: bakarydata-final-withPb-Exp3-weka.filters.unsupervised.attribute.Discretize-F-B10-M-1.0-R-first-last
Instances: 98 Attributes: 9

Attributes: All None Invert Pattern

No.	Name
1	Type de roche
2	CaO+MgO
3	Fe2O3*
4	MgO
5	CaO
6	S
7	Zn
8	Cu
9	Pb

Selected attribute: Name: Type de roche, Missing: 0 (0%), Distinct: 2, Type: Nominal, Unique: 0 (0%)

No.	Label	Count
1	One	77
2	Zero	21

Class: Pb (Nom) Visualize All

Status: OK

Weka Explorer

Preprocess | Classify | Cluster | Associate | Select attributes | Visualize

Classifier: Choose **J48 -C 0.25 -B -M 2**

Test options: Use training set, Supplied test set, **Cross-validation** (Folds: 10, Percentage split: 66), More options...

(Nom) Type de roche

Start Stop

Result list (right-click for options): 13:35:33 - trees.J48, 13:41:20 - trees.J48, 13:44:23 - trees.J48, 13:55:18 - trees.J48, 14:00:44 - trees.J48, **14:03:16 - trees.J48**

Classifier output

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

J48 pruned tree

```
CaO+MgO = '(-inf-28.275)': Zero (10.0)
CaO+MgO := '(-inf-28.275)':
| S = '(9445.5-inf)': Zero (6.0)
| S := '(9445.5-inf)':
| | Zn = '(133.5-inf)':
| | | MgO = '(8.24-16.525)': One (2.0)
| | | MgO := '(8.24-16.525)': Zero (3.0)
| | Zn := '(133.5-inf)': One (77.0/2.0)
```

Number of Leaves : 5
Size of the tree : 9

Time taken to build model: 0 seconds

=== Stratified cross-validation ===

=== Summary ===

Correctly Classified Instances	93	94.898 %
Incorrectly Classified Instances	5	5.102 %
Kappa statistic	0.8458	
Mean absolute error	0.0691	
Root mean squared error	0.2056	
Relative absolute error	20.3023 %	
Root relative squared error	50.058 %	
Total Number of Instances	98	

Status: OK