CO544 – Machine Learning and Data Mining

Lab 06 – Part 2

E/17/407

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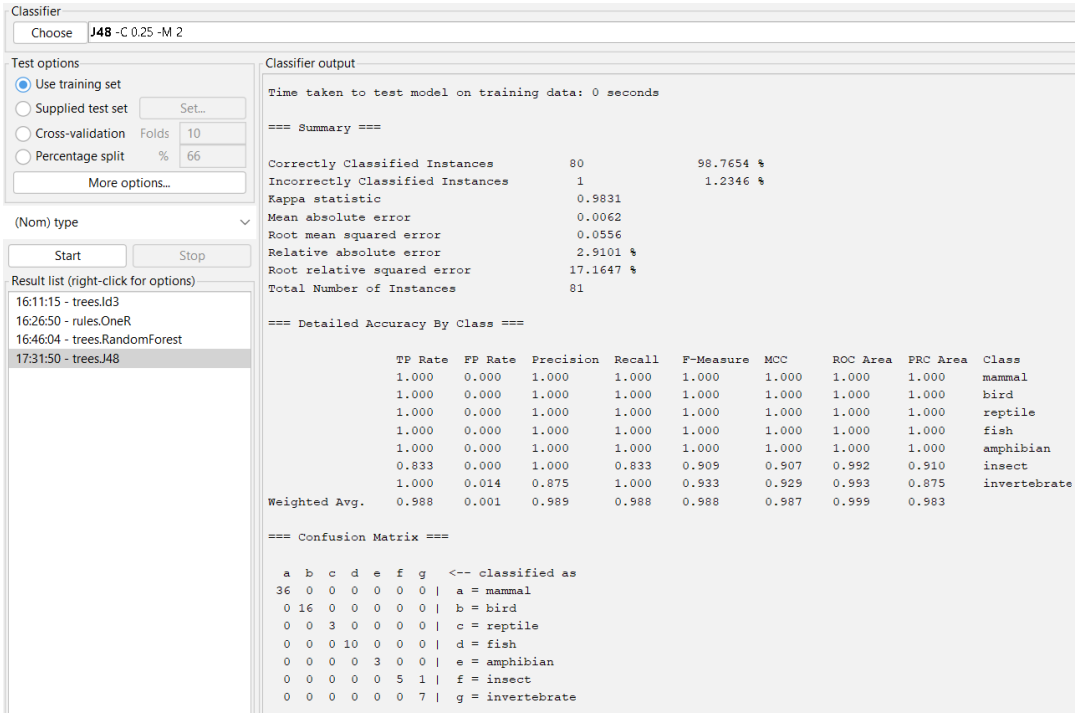
(01) attributes and values

Attribute	No of distinct records
animal	80
hair	2
feathers	2
eggs	2
milk	2
airborne	2
aquatic	2
predator	2
toothed	2

Attribute	No of distinct records
backbone	2
breathes	2
venomous	2
fins	2
legs	5
tail	2
domestic	2
catsize	2
type	7

Exercise

(01) output of the algorithm with training data set



Different error estimates

```
Kappa statistic                          0.9831
Mean absolute error                      0.0062
Root mean squared error                  0.0556
Relative absolute error                  2.9101 %
Root relative squared error             17.1647 %
Total Number of Instances               81
```

Percentage of classifications and misclassifications

```
Correctly Classified Instances          80               98.7654 %
Incorrectly Classified Instances         1                1.2346 %
```

Percentage of :

Classifications : 98.7654% (80 instances)

Misclassification : 1.2346% (1 instance)

```
=== Detailed Accuracy By Class ===

                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC      ROC Area  PRC Area  Class
                 1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     mammal
                 1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     bird
                 1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     reptile
                 1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     fish
                 1.000    0.000    1.000      1.000    1.000      1.000    1.000     1.000     amphibian
                 0.833    0.000    1.000      0.833    0.909      0.907    0.992     0.910     insect
                 1.000    0.014    0.875      1.000    0.933      0.929    0.993     0.875     invertebrate
Weighted Avg.    0.988    0.001    0.989      0.988    0.988      0.987    0.999     0.983
```

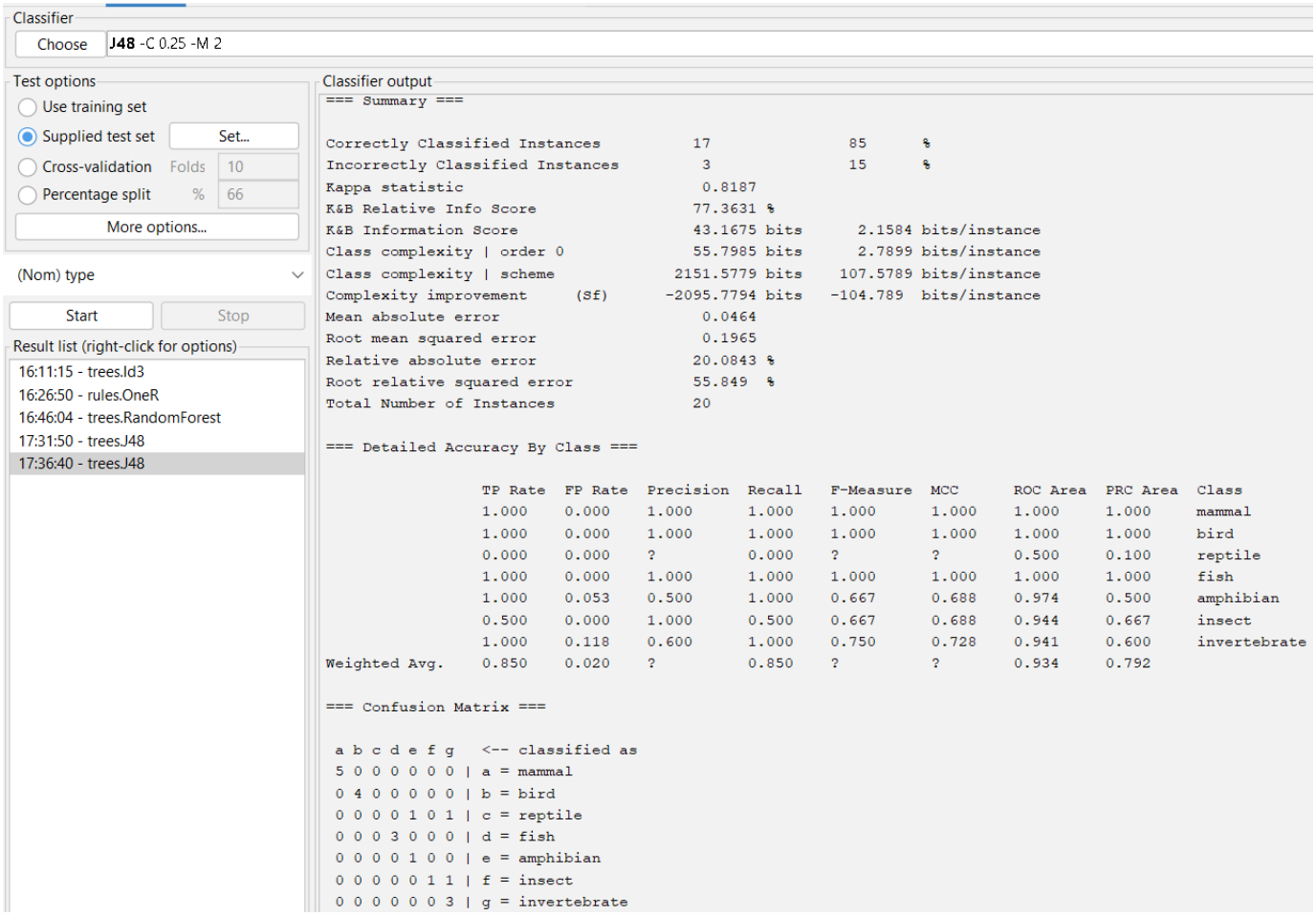
```
=== Confusion Matrix ===

  a  b  c  d  e  f  g   <-- classified as
 36  0  0  0  0  0  0 |  a = mammal
  0 16  0  0  0  0  0 |  b = bird
  0  0  3  0  0  0  0 |  c = reptile
  0  0  0 10  0  0  0 |  d = fish
  0  0  0  0  3  0  0 |  e = amphibian
  0  0  0  0  0  5  1 |  f = insect
  0  0  0  0  0  0  7 |  g = invertebrate
```

80 instances are correctly classified and only one instance is misclassified.

One instance which is actually an insect is misclassified as an invertebrate and it is circled in red colour.

(02) output of the algorithm with test data set



Different error estimates

```
Kappa statistic                          0.8187
Mean absolute error                      0.0464
Root mean squared error                  0.1965
```

Percentage of classifications and misclassifications

```
Correctly Classified Instances          17               85      %
Incorrectly Classified Instances         3               15      %
```

Percentage of :

Classifications : 85% (17 instances)

Misclassification : 15% (3 instance)

```
=== Detailed Accuracy By Class ===

                 TP Rate   FP Rate   Precision   Recall   F-Measure   MCC      ROC Area  PRC Area  Class
                 1.000     0.000     1.000       1.000    1.000       1.000    1.000     1.000     mammal
                 1.000     0.000     1.000       1.000    1.000       1.000    1.000     1.000     bird
                 0.000     0.000     ?           0.000    ?           ?        0.500     0.100     reptile
                 1.000     0.000     1.000       1.000    1.000       1.000    1.000     1.000     fish
                 1.000     0.053     0.500       1.000    0.667       0.688    0.974     0.500     amphibian
                 0.500     0.000     1.000       0.500    0.667       0.688    0.944     0.667     insect
                 1.000     0.118     0.600       1.000    0.750       0.728    0.941     0.600     invertebrate
Weighted Avg.    0.850     0.020     ?           0.850    ?           ?        0.934     0.792
```

```
=== Confusion Matrix ===

 a b c d e f g   <-- classified as
 5 0 0 0 0 0 0 | a = mammal
 0 4 0 0 0 0 0 | b = bird
 0 0 0 0 1 0 1 | c = reptile
 0 0 0 3 0 0 0 | d = fish
 0 0 0 0 1 0 0 | e = amphibian
 0 0 0 0 0 1 1 | f = insect
 0 0 0 0 0 0 3 | g = invertebrate
```

17 instances are correctly classified and 3 instances are misclassified.

One instance which is actually an insect is misclassified as an invertebrate.

Two reptiles are misclassified as an amphibian and an invertebrate.

(03) Comments on the two results obtained in above (1) and (2)

Accuracy on training data set is higher than the accuracy on test data set. (accuracy on train data = 98.7654% , accuracy on test data = 85%) . Only one instance is misclassified in the training data set and 3 instances are incorrectly classified in test data set.

(04) predictions

```
Time taken to build model: 0 seconds

=== Evaluation on test set ===

Time taken to test model on supplied test set: 0 seconds

=== Summary ===

Total Number of Instances                0
Ignored Class Unknown Instances                 20

=== Detailed Accuracy By Class ===

                 TP Rate  FP Rate  Precision  Recall  F-Measure  MCC  ROC Area  PRC Area  Class
                 ?        ?        ?          ?       ?          ?    ?         ?         mammal
                 ?        ?        ?          ?       ?          ?    ?         ?         bird
                 ?        ?        ?          ?       ?          ?    ?         ?         reptile
                 ?        ?        ?          ?       ?          ?    ?         ?         fish
                 ?        ?        ?          ?       ?          ?    ?         ?         amphibian
                 ?        ?        ?          ?       ?          ?    ?         ?         insect
                 ?        ?        ?          ?       ?          ?    ?         ?         invertebrate
Weighted Avg.    ?        ?        ?          ?       ?          ?    ?         ?

=== Confusion Matrix ===

 a b c d e f g   <-- classified as
 0 0 0 0 0 0 0 | a = mammal
 0 0 0 0 0 0 0 | b = bird
 0 0 0 0 0 0 0 | c = reptile
 0 0 0 0 0 0 0 | d = fish
 0 0 0 0 0 0 0 | e = amphibian
 0 0 0 0 0 0 0 | f = insect
 0 0 0 0 0 0 0 | g = invertebrate
```