Performance Results

Bagging:

Depth 3, Bags 5

```
$ python mawagle.py bag 3 5 datasets/mushroom

### Learning by Bagging ###

Bootstraping Sample and learning Decision Tree 0
Bootstraping Sample and learning Decision Tree 1
Bootstraping Sample and learning Decision Tree 2
Bootstraping Sample and learning Decision Tree 3
Bootstraping Sample and learning Decision Tree 4

Accuracy of the bagged learn in percentage: 74.9647058824

Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1561                532
Actual Positive                       0                 32
```

Depth 3, Bags 10

```
$ python mawagle.py bag 3 10 datasets/mushroom

### Learning by Bagging ###

Bootstraping Sample and learning Decision Tree 0
Bootstraping Sample and learning Decision Tree 1
Bootstraping Sample and learning Decision Tree 2
Bootstraping Sample and learning Decision Tree 3
Bootstraping Sample and learning Decision Tree 4
Bootstraping Sample and learning Decision Tree 5
Bootstraping Sample and learning Decision Tree 6
Bootstraping Sample and learning Decision Tree 7
Bootstraping Sample and learning Decision Tree 8
Bootstraping Sample and learning Decision Tree 9

Accuracy of the bagged learn in percentage: 74.9647058824
```

```
Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1561                532
Actual Positive                       0                 32
```

Depth 5, Bags 5

```
$ python mawagle.py bag 5 5 datasets/mushroom

### Learning by Bagging ###

Bootstraping Sample and learning Decision Tree 0
Bootstraping Sample and learning Decision Tree 1
Bootstraping Sample and learning Decision Tree 2
Bootstraping Sample and learning Decision Tree 3
Bootstraping Sample and learning Decision Tree 4

Accuracy of the bagged learn in percentage: 74.9647058824

Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1561                532
Actual Positive                       0                 32
```

Depth 5, Bags 10

```
$ python mawagle.py bag 5 10 datasets/mushroom

### Learning by Bagging ###

Bootstraping Sample and learning Decision Tree 0
Bootstraping Sample and learning Decision Tree 1
Bootstraping Sample and learning Decision Tree 2
Bootstraping Sample and learning Decision Tree 3
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Bootstraping Sample and learning Decision Tree 6
Bootstraping Sample and learning Decision Tree 7
Bootstraping Sample and learning Decision Tree 8
Bootstraping Sample and learning Decision Tree 9

Accuracy of the bagged learn in percentage: 74.9647058824
```

```
Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1561                532
Actual Positive                       0                 32
```

AdaBoost:

Depth 1, Trees 5

```
$ python mawagle.py boost 1 5 datasets/mushroom

### Learning by Boosting ###

Learning Iteration 0 | Alpha 0: 1.22117351768
Learning Iteration 1 | Alpha 1: -0.471152985508
Learning Iteration 2 | Alpha 2: -0.31517313966
Learning Iteration 3 | Alpha 3: -0.119485447257
Learning Iteration 4 | Alpha 4: -0.132377046871

Accuracy of the boosted learn in percentage: 76.6588235294

Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1597                496
Actual Positive                       0                 32
```

Depth 1, Trees 10

```
$ python mawagle.py boost 1 10 datasets/mushroom

### Learning by Boosting ###

Learning Iteration 0 | Alpha 0: 1.22117351768
Learning Iteration 1 | Alpha 1: -0.471152985508
Learning Iteration 2 | Alpha 2: -0.31517313966
Learning Iteration 3 | Alpha 3: -0.119485447257
Learning Iteration 4 | Alpha 4: -0.132377046871
Learning Iteration 5 | Alpha 5: -0.0811854570335
Learning Iteration 6 | Alpha 6: -0.0850567267786
Learning Iteration 7 | Alpha 7: -0.061444597662
Learning Iteration 8 | Alpha 8: -0.0629323540822
Learning Iteration 9 | Alpha 9: -0.0494088621177

Accuracy of the boosted learn in percentage: 25.0823529412
```

```
Confusion Matrix:
                    Predicted Negative Predicted Positive
Actual Negative                    533               1560
Actual Positive                     32                  0
```

Depth 2, Trees 5

```
$ python mawagle.py boost 2 5 datasets/mushroom

### Learning by Boosting ###

Learning Iteration 0 | Alpha 0: 2.0595185874
Learning Iteration 1 | Alpha 1: -0.0624115323638
Learning Iteration 2 | Alpha 2: -0.0587409380952
Learning Iteration 3 | Alpha 3: -0.0518346912871
Learning Iteration 4 | Alpha 4: -0.0465422042679

Accuracy of the boosted learn in percentage: 74.9647058824

Confusion Matrix:
                    Predicted Negative Predicted Positive
Actual Negative                   1561                532
Actual Positive                      0                 32
```

Depth 2, Trees 10

```
$ python mawagle.py boost 2 10 datasets/mushroom

### Learning by Boosting ###

Learning Iteration 0 | Alpha 0: 2.0595185874
Learning Iteration 1 | Alpha 1: -0.0624115323638
Learning Iteration 2 | Alpha 2: -0.0587409380952
Learning Iteration 3 | Alpha 3: -0.0518346912871
Learning Iteration 4 | Alpha 4: -0.0465422042679
Learning Iteration 5 | Alpha 5: -0.0423073677334
Learning Iteration 6 | Alpha 6: -0.0388225904018
Learning Iteration 7 | Alpha 7: -0.0358949539065
Learning Iteration 8 | Alpha 8: -0.0333952690966
Learning Iteration 9 | Alpha 9: -0.0312328211335

Accuracy of the boosted learn in percentage: 74.9647058824
```

```
Confusion Matrix:
                     Predicted Negative Predicted Positive
Actual Negative                    1561                532
Actual Positive                       0                 32
```

Weka Bagging

```
=== Run information ===

Scheme:       weka.classifiers.meta.Bagging -P 100 -S 1 -num-slots 1 -I
10 -W weka.classifiers.trees.REPTree -- -M 2 -V 0.001 -N 3 -S 1 -L -1 -I
0.0
Relation:
agaricuslepiotatrain1-weka.filters.unsupervised.attribute.Remove-R22-wek
a.filters.unsupervised.attribute.NumericToBinary-Rfirst-last
Instances:    6000
Attributes:   126
              [list of attributes omitted]
Test mode:    user supplied test set:  size unknown (reading
incrementally)

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

Bagging with 10 iterations and base learner

weka.classifiers.trees.REPTree -M 2 -V 0.001 -N 3 -S 1 -L -1 -I 0.0

Time taken to build model: 0.76 seconds

=== Evaluation on test set ===

Time taken to test model on supplied test set: 0.06 seconds

=== Summary ===

Correctly Classified Instances        1593               74.9647 %
Incorrectly Classified Instances       532               25.0353 %
Kappa statistic                          0.0812
Mean absolute error                      0.2504
Root mean squared error                  0.5004
Relative absolute error                 45.0609 %
Root relative squared error             90.0298 %
Total Number of Instances             2125
```

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

                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC
ROC Area  PRC Area  Class
                 0.746    0.000    1.000      0.746    0.854      0.206
0.873     0.996     0
                 1.000    0.254    0.057      1.000    0.107      0.206
0.873     0.057     1
Weighted Avg.    0.750    0.004    0.986      0.750    0.843      0.206
0.873     0.982

=== Confusion Matrix ===

    a    b   <-- classified as
 1561  532 |    a = 0
    0   32 |    b = 1
```

Weka Boosting

```
=== Run information ===

Scheme:       weka.classifiers.meta.AdaBoostM1 -P 100 -S 1 -I 10 -W
weka.classifiers.trees.DecisionStump
Relation:
agaricuslepiotatrain1-weka.filters.unsupervised.attribute.Remove-R22-wek
a.filters.unsupervised.attribute.NumericToBinary-Rfirst-last
Instances:    6000
Attributes:   126
              [list of attributes omitted]
Test mode:    user supplied test set:  size unknown (reading
incrementally)

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

AdaBoostM1: Base classifiers and their weights:

Decision Stump

Classifications

ring-type-pendant_binarized = 0 : 0
ring-type-pendant_binarized != 0 : 1
ring-type-pendant_binarized is missing : 1
```

```
Class distributions

ring-type-pendant_binarized = 0
0     1
0.925 0.075
ring-type-pendant_binarized != 0
0     1
0.08372093023255814     0.9162790697674419
ring-type-pendant_binarized is missing
0     1
0.44266666666666665     0.5573333333333333


Weight: 2.44

Decision Stump

Classifications

gill-size-broad_binarized = 0 : 0
gill-size-broad_binarized != 0 : 1
gill-size-broad_binarized is missing : 0

Class distributions

gill-size-broad_binarized = 0
0     1
0.9094567404426556      0.09054325955734452
gill-size-broad_binarized != 0
0     1
0.2921857304643336      0.7078142695356664
gill-size-broad_binarized is missing
0     1
0.5144927536231906      0.4855072463768095


Weight: 1.27

Decision Stump

Classifications

stalk-surface-above-ring-smooth_binarized = 0 : 0
stalk-surface-above-ring-smooth_binarized != 0 : 1
stalk-surface-above-ring-smooth_binarized is missing : 0
```

```
Class distributions

stalk-surface-above-ring-smooth_binarized = 0
0     1
0.9770242774274274     0.022975722572572688
stalk-surface-above-ring-smooth_binarized != 0
0     1
0.4404126362631463     0.5595873637368537
stalk-surface-above-ring-smooth_binarized is missing
0     1
0.6355847283892667     0.3644152716107333


Weight: 0.9

Decision Stump

Classifications

ring-number-one_binarized = 0 : 1
ring-number-one_binarized != 0 : 0
ring-number-one_binarized is missing : 0

Class distributions

ring-number-one_binarized = 0
0     1
0.0   1.0
ring-number-one_binarized != 0
0     1
0.8106594465149118     0.18934055348508813
ring-number-one_binarized is missing
0     1
0.7352744190616733     0.26472558093832665


Weight: 1.57

Decision Stump

Classifications

ring-type-pendant_binarized = 0 : 0
ring-type-pendant_binarized != 0 : 1
ring-type-pendant_binarized is missing : 1
```

```
Class distributions

ring-type-pendant_binarized = 0
0     1
0.8170812627253697     0.18291873727463026
ring-type-pendant_binarized != 0
0     1
0.28603508029924923     0.7139649197007508
ring-type-pendant_binarized is missing
0     1
0.4438633514685619     0.5561366485314382


Weight: 1.07

Decision Stump

Classifications

odor-creosote_binarized = 0 : 1
odor-creosote_binarized != 0 : 0
odor-creosote_binarized is missing : 0

Class distributions

odor-creosote_binarized = 0
0     1
0.3989205732188056     0.6010794267811944
odor-creosote_binarized != 0
0     1
1.0   0.0
odor-creosote_binarized is missing
0     1
0.5566303136271901     0.4433696863728099


Weight: 0.87

Decision Stump

Classifications

gill-color-white_binarized = 1 : 1
gill-color-white_binarized != 1 : 0
gill-color-white_binarized is missing : 0
```

```
Class distributions

gill-color-white_binarized = 1
0     1
0.037798573617570226    0.9622014263824298
gill-color-white_binarized != 1
0     1
0.7640127895261258     0.23598721047387422
gill-color-white_binarized is missing
0     1
0.6858863409008307     0.3141136590991693


Weight: 1.3

Decision Stump

Classifications

cap-surface-fibrous_binarized = 1 : 0
cap-surface-fibrous_binarized != 1 : 1
cap-surface-fibrous_binarized is missing : 1

Class distributions

cap-surface-fibrous_binarized = 1
0     1
0.7237867852944497     0.2762132147055504
cap-surface-fibrous_binarized != 1
0     1
0.2579893866898242     0.7420106133101758
cap-surface-fibrous_binarized is missing
0     1
0.4435669500381783     0.5564330499618216


Weight: 1.02

Decision Stump

Classifications

odor-creosote_binarized = 0 : 1
odor-creosote_binarized != 0 : 0
odor-creosote_binarized is missing : 1
```

```
Class distributions

odor-creosote_binarized = 0
0     1
0.39729600797747255    0.6027039920225273
odor-creosote_binarized != 0
0     1
1.0   0.0
odor-creosote_binarized is missing
0     1
0.48879414646600694    0.5112058535339932


Weight: 0.68

Decision Stump

Classifications

ring-type-pendant_binarized = 0 : 0
ring-type-pendant_binarized != 0 : 1
ring-type-pendant_binarized is missing : 0

Class distributions

ring-type-pendant_binarized = 0
0     1
0.8614166348952604     0.13858336510473948
ring-type-pendant_binarized != 0
0     1
0.43997470472348754    0.5600252952765125
ring-type-pendant_binarized is missing
0     1
0.6144860294037353     0.38551397059626474


Weight: 0.78

Number of performed Iterations: 10


Time taken to build model: 0.36 seconds

=== Evaluation on test set ===
```

```
Time taken to test model on supplied test set: 0.04 seconds

=== Summary ===

Correctly Classified Instances        1611               75.8118 %
Incorrectly Classified Instances       514               24.1882 %
Kappa statistic                          0.0847
Mean absolute error                      0.2452
Root mean squared error                  0.4889
Relative absolute error                 44.1395 %
Root relative squared error             87.9716 %
Total Number of Instances             2125

=== Detailed Accuracy By Class ===

                 TP Rate  FP Rate  Precision  Recall   F-Measure  MCC
ROC Area  PRC Area  Class
                 0.754    0.000    1.000      0.754    0.860      0.210
0.994     1.000     0
                 1.000    0.246    0.059      1.000    0.111      0.210
0.994     0.571     1
Weighted Avg.    0.758    0.004    0.986      0.758    0.849      0.210
0.994     0.993

=== Confusion Matrix ===

    a    b   <-- classified as
 1579  514 |    a = 0
    0   32 |    b = 1
```