

# Homework 8

CS 6243 – Spring 2005  
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assigned March 31, 2005  
due April 7, 2005

Running three algorithms on the glass dataset had the following results:

- J48

```
Fold = 1, Error Rate = 5.0/22.0
Fold = 2, Error Rate = 4.0/22.0
Fold = 3, Error Rate = 8.0/22.0
Fold = 4, Error Rate = 9.0/22.0
Fold = 5, Error Rate = 7.0/21.0
Fold = 6, Error Rate = 8.0/21.0
Fold = 7, Error Rate = 7.0/21.0
Fold = 8, Error Rate = 8.0/21.0
Fold = 9, Error Rate = 9.0/21.0
Fold = 10, Error Rate = 6.0/21.0
```

- AdaBoostM1 using J48, 10 rounds of boosting.

```
Fold = 1, Error Rate = 4.0/22.0
Fold = 2, Error Rate = 5.0/22.0
Fold = 3, Error Rate = 3.0/22.0
Fold = 4, Error Rate = 7.0/22.0
Fold = 5, Error Rate = 7.0/21.0
Fold = 6, Error Rate = 7.0/21.0
Fold = 7, Error Rate = 7.0/21.0
Fold = 8, Error Rate = 5.0/21.0
Fold = 9, Error Rate = 4.0/21.0
Fold = 10, Error Rate = 6.0/21.0
```

- Bagging with J48, 10 base classifiers.

```
Fold = 1, Error Rate = 2.0/22.0
Fold = 2, Error Rate = 7.0/22.0
Fold = 3, Error Rate = 6.0/22.0
Fold = 4, Error Rate = 8.0/22.0
Fold = 5, Error Rate = 4.0/21.0
Fold = 6, Error Rate = 7.0/21.0
Fold = 7, Error Rate = 7.0/21.0
Fold = 8, Error Rate = 10.0/21.0
Fold = 9, Error Rate = 5.0/21.0
Fold = 10, Error Rate = 6.0/21.0
```

1. (50 pts.) Find 95% confidence intervals for the error rates using two different methods. Use the error rate method discussed in the lecture notes (based on total number of errors and examples). The second method finds the average  $u$  and standard deviation  $s$  of the 10 error rates from the 10 folds and produces the interval

$$u \pm \frac{2.262s}{\sqrt{10}}$$

2. (50 pts.) Compare the algorithms pairwise using the paired-difference  $t$  test.
3. (100 pts., shared extra credit) Is there a significant improvement if the number of rounds in boosting is changed from 10 to 100? Is there a significant improvement if the number of base classifiers in bagging is changed from 10 to 100? The difficulty of this problem is that the Weka code does not print out the results from the individual folds; you need to modify the code to get these results.