Homework 5, due October 3rd, 11:59pm

Download and install the WEKA library from

`http://www.cs.waikato.ac.nz/ml/weka/`

The program is in Java, so it runs on any platform. Preferably download the kit that includes the Java VM. If you have a 64 bit machine, download the 64bit version since it can use more memory. In runweka.ini change the heap size to at least 1024mb otherwise you will run out of memory. For the experiments, you could use the Weka Explorer since it has a nice GUI.

1. Use the `covtype` dataset from Blackboard to compare a number of learning algorithms. Split the data into training and test sets as specified in the syllabus (training set contains first 11,340 +3,780 observations, test set contains the remaining 565,892 observations). You will have to modify the files to make them compatible with Weka as follows:

- Add a first row containing the variable names (e.g. X1, X2, ... Y)
- Change the class labels from numeral (1,2,3,4...) to literal (e.g. C1, C2, C3...)

Train the following models on the training set and use the test set for testing. Report in a table the obtained misclassification errors on the training and test sets and the training times (in seconds) of all algorithms.

a) A decision tree (J48). (1 point).

b) A Random Forest with 100 trees and one with 300 trees. (1 point).

c) Logistic Regression. (1 point)

d) Naive Bayes. (1 point)

e) Adaboost with 20 weak classifiers that are J48 decision trees, and one with 100 trees. (1 point)

f) LogitBoost with 10 decision stumps, and one with 100 stumps. (1 point)

g) LogitBoost with 100 stumps and weight trimming (pruning) at 95%. (1 point)

h) LogitBoost with 25 M5P regression trees. (1 point)

i) An SVM classifier (named SMO in Weka). Use an RBF kernel and try different parameters to obtain the smallest test error. Report the parameters that gave the smallest test error. Note: You should be able to obtain one of the smallest errors among all these methods. (1 point)

j) Using the miscalssification error table, draw a scatter plot of the test errors (Y) vs log training times (seconds, on X axis) of all the algorithms from above. (1 point)