E0 370 Statistical Learning Theory **Assigned: Aug 30, 2011**

Assignment 1

Lecturer: Shivani Agarwal **Due Date: Sep 27, 2011**

[20 points]

We have covered in class (and will cover in the next few lectures) a number of methods for obtaining high confidence bounds on the generalization error of a function learned by a learning algorithm. The following two papers discuss additional methods for bounding the generalization error and supplement what we have seen so far. The assignment is to read both papers, and for one of them, to write a 4-6 page expository note that explains the setting, formulation, main results, proof techniques, and implications/applications of the paper, and wherever appropriate, provides connections/comparisons with other methods we have studied. When writing the note, think of how you would present the material if it were to be another lecture in the class (think of preparing lecture notes for such a lecture). This means the note should be able to distill the main ideas of the paper, should be able to connect the material with previous lectures, and should follow the same notation we have been using (translating the notation of the papers to the notation used in class is a small but important step in really understanding the papers). A template file for typesetting your note (which should be prepared in LaTeX) is available on the course webpage. The papers below (as well as pointers to some additional related papers that may be helpful) are also available from the course webpage. Please let me know by email before the next class on Tue Sep 6 which of the two papers you plan to write a note on. Final writeups will be due before the class on Tue Sep 27.

Note on academic honesty: You are allowed – and in fact encouraged – to discuss the papers with your colleagues. You can also refer to additional papers and notes that may help you understand the material in the papers below. However **the writeup must be written entirely on your own**, and **all sources of help (including discussions with your colleagues, any papers you refer to, and any other notes from some other class or written by someone else) must be clearly acknowledged in your writeup**. **Note also that if you use language taken directly from any other source, you must clearly quote the source.** Inclusion of such acknowledgments will be treated positively and will have no effect on your grade (which will be based only on the clarity and correctness of the writeup); on the other hand, failure to acknowledge any source will result in a failing grade and a warning note to your advisor.

[1] David McAllester. Simplified PAC-Bayesian Margin Bounds. In *Proceedings of the 16th Annual Conference on Learning Theory* (COLT), 2003.

[2] Ralf Herbrich and Robert C. Williamson. Algorithmic Luckiness. *Journal of Machine Learning Research*, 3:175–212, 2002.