

Assignment 2

Lecturer: Shivani Agarwal

Due Date: Oct 30, 2011

[20 points]

We have covered in class the notions of uniform convergence, stability, and learnability. The following two papers extend these concepts in different ways: the first extends the study of stability and associated generalization bounds to non-iid data; the second brings the three concepts together and studies in more detail the relationships between them. 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 are also available from the course webpage. Please let me know by email by Sun Oct 9 which of the two papers you plan to write a note on. Final writeups will be due by email on or before Sun Oct 30.

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] Mehryar Mohri and Afshin Rostamizadeh. Stability Bounds for Stationary ϕ -mixing and β -mixing Processes. *Journal of Machine Learning Research*, 11:789–814, 2010.
- [2] Shai Shalev-Shwartz, Ohad Shamir, Nathan Srebro, and Karthik Sridharan. Learnability, Stability and Uniform Convergence. *Journal of Machine Learning Research*, 11:2635–2670, 2010.