Meeting: 1000, Albuquerque, New Mexico, SS 15A, Special Session on Probabilistic and Geometric Methods in Learning Theory

1000-60-141 **Peter L Bartlett*** (`bartlett@stat.berkeley.edu`), Department of Statistics, University of California at Berkeley, 367 Evans Hall, Berkeley, CA 94720-3860. *Local Rademacher averages and empirical minimization.*

We consider empirical minimization—choosing a function from a class to minimize the sample average of a loss function, which is important for pattern classification and other prediction problems. We present bounds on the risk (expected loss) of the empirical risk minimizer under mild assumptions on the function class. The first bound we present is governed by the fixed point of the function

$$\xi(r) = \mathbb{E} \sup \left\{ |\mathbb{E}f - \mathbb{E}_n f| : f \in F, \, \mathbb{E}f = r \right\},$$

where $\mathbb{E}_n$ is the expectation under the empirical distribution. We show that it is possible to estimate this fixed point from data, using Rademacher averages. We then prove that the bound on the empirical minimization algorithm can be improved further by a direct analysis, and that the correct error rate is the maximizer of $\xi(r) - r$. We give examples showing that the difference between these estimates can be significant, but that the improved bound cannot be estimated from data (using only the coordinate projections). The method of proof we use is based on Talagrand's concentration inequality for empirical processes.

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