



THE UNIVERSITY OF
CHICAGO

Department of Statistics
STATISTICS COLLOQUIUM

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**Minimax Estimation of High-dimensional Predictive
Densities**

MONDAY, February 11, 2013, at 4:00 PM

133 Eckhart Hall, 5734 S. University Avenue

Refreshments following the seminar in Eckhart 110

ABSTRACT

Over the last decade, operational analytics in fields such as weather forecasting, financial investments and sports betting, have been undergoing a gradual evolution from point prediction towards probabilistic forecasting. Reliable predictive systems for these occurrences can be built on efficient predictive density estimates of the associated high-dimensional parametric models. Recently, decision theoretic parallels have been established between predictive density estimation in Gaussian models and the comparatively well-studied problem of point estimation of the multivariate normal mean, thus opening up new directions in statistical probability forecasting.

Building on these parallels we present a frequentist perspective on the roles of shrinkage and sparsity in predictive density estimation under Kullback-Leibler loss. Studying the problem of minimax estimation of sparse predictive densities we find new phenomena which contrast with results in point estimation theory, and are explained by the new notion of risk diversification. We also generalize the uncertainty sharing idea to explain the nature of optimal shrinkage in unrestricted parameter spaces. Motivational stories and examples from the world of sports, stock markets and wind speed profiles will be used to illustrate the implications of our results.

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