Department of Statistics

DISSERTATION PRESENTATION AND DEFENSE

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Department of Statistics
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Topics on the Empirical Bayes Normal Means Problem

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Jones 303, 5747 S. Ellis Avenue

ABSTRACT

The normal means problem plays a fundamental role in many areas of modern statistics, both in theory and practice. And the Empirical Bayes (EB) approach to solving this problem has been shown to be highly effective, again both in theory and practice. Indeed, the parallel nature of EB appears to be particularly suited to solve the large-scale data problems prevalent in modern scientific investigations. Here we present new extensions and applications of this important framework. We design visualization tools for existing EB methods to diagnose their model adequacy in estimating the prior distribution. We devise an EB-based approach to model a certain type of stochastic ordering and to detect the difference between two groups of signals from noisy observations. We also develop new EB methods for solving the normal means problem that take account of unknown correlations among observations. We provide practical software implementations of these methodologies, and illustrate them using realistic numerical experiments and real data problems.

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