Empirical Bayes and high dimensional inference.

Abstract

We discuss the relevance of Empirical Bayes to high dimensional inference, especially inference that follows model selection. Empirical Bayes techniques are useful in correcting the selection bias.

The usefulness of Empirical Bayes is demonstrated in the classical problem of estimating the vector of normal means under a squared error loss, and also through the following problem. Let $Y_i \sim N(\mu_i, 1), i = 1, \ldots, n$, be independent normally distributed random variables and let $C$ be a constant. We study the problem of estimating the quantity $S = \sum_{i:C<Y_i} \mu_i$. The case where $n$ is large, the vector $(\mu_1, \ldots, \mu_n)$ is sparse, and the value of $C$ is large, is emphasized. We use a non-parametric empirical Bayes approach, where $\mu_i$ are assumed to be independent identically distributed with unknown distribution function.

The talk combines a collaboration with Larry Brown, and a collaboration with Junyong Park, and Ya'acov Ritov.