

Yale SCHOOL OF PUBLIC HEALTH

Biostatistics

Adventures in sparsity and shrinkage with the normal means model

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ABSTRACT

Ever since the pioneering work of James and Stein, the normal means model has been the canonical model for illustrating the ideas and benefits of shrinkage estimation and has been the subject of considerable theoretical study. By comparison, practical applications of the normal means model are relatively rare, and it has generally been overshadowed by methods like L1-regularization as a way of inducing sparsity.

Here we argue that this should change: we describe some recently-developed Empirical Bayes ways to solve the normal means model, and describe how they can be applied to induce shrinkage, sparsity and smoothness in a range of practical applications, including False Discovery Rates, non-parametric regression, sparse regression, and sparse principal components analysis or factor analysis.