

Optimal Shrinkage Estimation in Heteroscedastic Hierarchical Models: beyond Gaussian

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ABSTRACT

Hierarchical models are powerful statistical tools widely used in scientific and engineering applications. The homoscedastic (equal variance) case has been extensively studied, and it is well known that shrinkage estimates, the James-Stein estimate in particular, offer nice theoretical (e.g., risk) properties. The heteroscedastic (the unequal variance) case, on the other hand, has received less attention, even though it frequently appears in real applications. It is not clear of how to construct "optimal" shrinkage estimate. In this talk, we study this problem. In particular, we consider hierarchical linear models and models beyond Gaussian. We introduce a class of shrinkage estimates, constructed by minimizing an unbiased risk statistic. We show that this class is asymptotically optimal in the heteroscedastic case. We apply the estimates to real examples and observe competitive numerical results.

Key words: quadratic variance function, exponential family, location-scale family, linear regression, hierarchical linear model, asymptotic optimality

Full workshop schedule: <http://ims.nus.edu.sg/events/2018/wstat/wk2.php>