



The University of Chicago  
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**Robustness, Sparsity and Skewness in  
High-Dimensional Data**

**THURSDAY, August 11, 2011, at 4:00 PM**  
110 Eckhart Hall, 5734 S. University Avenue

**ABSTRACT**

We propose a robust procedure for constructing a sparse estimator of a multivariate regression coefficient matrix that accounts for the skewness and dependence of high-dimensional response variables. Robustness to outliers is achieved using heavy-tailed skew  $t$ -distributions for the multivariate response, and shrinkage is introduced by adding to the negative log-likelihood  $\ell_1$  penalties on the entries of both the regression coefficient matrix and the precision matrix of the responses. Taking advantage of the stochastic representation of a skew  $t$ -distribution as the scale mixture and the EM algorithm, the optimization problem is solved iteratively where at each EM iteration suitably modified *multivariate regression* with covariance estimation (MRCE) algorithms proposed by Rothman et al. (2010) are used. Estimating the skewness parameters and degrees of freedom when penalizing the entries of the matrices presents new computational challenges. We motivate and demonstrate some of these challenges, particularly accommodating the skewness, through the analysis of a 24-dimensional Australian electricity spot prices. Some key words: Lasso; Cross-validation; Multivariate linear regression; Sparsity; EM algorithm; Regularization; Multivariate  $t$ ; Maximum likelihood.

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For further information and about building access for persons with disabilities, please contact Laura Rigazzi at 773.702.8333 or send email ([lrigazzi@galton.uchicago.edu](mailto:lrigazzi@galton.uchicago.edu)). If you wish to subscribe to our email list, please visit the following website: <https://lists.uchicago.edu/web/arc/statseminars>.