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### **Sparse and Parsimonious Models for the Covariance Matrix of Correlated Data**

Finding an *unconstrained* and *statistically interpretable* reparameterization of a covariance matrix is still an open problem in statistics. Its solution is important in writing sparse and parsimonious models for the large covariance matrix of longitudinal, panel and functional data in biostatistics, finance, data mining, etc. From the perspectives of generalized linear models (GLMs) and regularization, we review the pros and cons of the existing methods corresponding to, (i) the identity link (linear covariance models), (ii) inverse link (Gaussian graphical models) and (iii) log link (log-linear covariance models). Two new GLMs inspired by techniques from time series analysis will be introduced using reparameterizations involving the Cholesky decomposition and partial correlations. A systematic and data based procedure for formulating and fitting parsimonious/sparse models which guarantees the positive-definiteness of the covariance matrix estimate will be presented. It reduces the unintuitive task of modelling covariance matrices to that of a sequence of (auto)regressions. A penalized normal likelihood with lasso-type penalty used for estimation guarantees sparsity of (aspects) of the estimated covariance matrix.

**About the speaker:** Mohsen Pourahmadi is Professor at the Department of Statistics, Texas A & M University. He is interested in prediction theory and time series analysis, with applications to analysis of financial data. Other areas of interest include multivariate statistics (longitudinal and panel data), data mining, and modelling covariance matrices.

**Time:** 4pm, Friday, 17th July

**Location:** Room RC4082

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