Generalized Linear Models for the Covariance Matrix of Correlated Data

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Finding an *unconstrained* and *statistically interpretable* reparameterization of a general covariance matrix is still an open problem in statistics. Its solution is crucial for parsimonious and sparse modeling, and guaranteeing the positive-definiteness of an estimated covariance matrix in all areas of statistics dealing with correlated data, including finance and the longitudinal (panel, functional, repeated measure, ...) data. In this presentation, pooling together ideas and techniques from regression and time series analysis, I will discuss a data-based, general-purpose method extending the framework of generalized linear models (GLMs) to covariance matrices, where a link function is introduced through the Cholesky decomposition. It reduces the difficult and unintuitive task of modeling a covariance matrix to that of modeling a sequence of (auto) regressions. Therefore, all existing regression machineries and approaches such as parametric, semiparametric, nonparametric, Bayesian, shrinkage (Ridge, Lasso, ...), etc. can be brought to the service of modeling covariance matrices.