

Modeling Structured Correlation Matrices

Mohsen Pourahmadi

Department of Statistics

Texas A&M University

Abstract: There has been a flurry of activity in the last two decades in reparametrizing Cholesky factors of correlation matrices using hyperspherical coordinates where the ensuing angles as the new dependence parameters are hard to interpret statistically. The situation is rectified somewhat by expressing these angles in terms of the moving average coefficients, and a new notion of ordered partial correlation coefficients for a sequence of random variables. In spite of the lack of broadly accepted statistical interpretation, we demonstrate that these angles are quite flexible and effective for guaranteeing the positive-definiteness and parsimonious modeling of large structured correlation matrices commonly encountered in finance, environmental and biological sciences. Asymptotic normality of the maximum likelihood estimates of the angles is established. Real examples will be used to demonstrate the flexibility and applicability of the methodology. (Joint work with Ruey Tsay, U of Chicago)