Mathematics, Statistics, and Computer Science **@ UIC**

Special Colloquium

Constrained Factor Models for High-Dimensional Matrix-Variate Time Series

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Abstract: In many scientific fields, including economics, biology, and meteorology, high dimensional matrix-variate data are routinely collected over time. To incorporate the structural interrelations between columns and rows and to achieve significant dimension reduction when dealing with high-dimensional matrix-variate time series, Wang et al 2017 proposed a matrix factor model that is shown to be effective in analyzing such data. In this paper, we establish a general framework for incorporating domain or prior knowledge induced linear constraints in the matrix-variate factor model. The constraints can be used to achieve parsimony in parameterization, to facilitate interpretation of the latent matrix factor, and to target specific factors of interest based on domain knowledge. Fully utilizing the constraints results in more efficient and accurate modeling, inference, dimension reduction as well as a clear and better interpretation of the results. In this paper, constrained, multi-term, and partially constrained factor models for matrix-variate time series are developed, with efficient estimation procedures and their asymptotic properties. We show that the convergence rates of the constrained factor loading matrices are much faster than those of the conventional matrix factor analysis under many situations. Simulation studies are carried out to demonstrate the finite-sample performance of the proposed method and its associated asymptotic properties. We illustrate the proposed model in three applications, where the constrained matrix-factor models outperform their unconstrained counterparts in the power of variance explanation under the out-of-sample 10-fold cross-validation

Tuesday, January 23 at 3:00 PM in SEO 636

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