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Inference for multiview network data in the presence of latent variables with an application to commodities trading

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In this presentation, we introduce a new class of latent space models to analyze the import/export trade data between a number of European countries. We assume that the probability of having a commercial relationship between two countries often depends on some unobservable (or not easy-to-measure) factors, like socio-economical conditions, political views, level of the infrastructures. To conduct inference on this type of data, we introduce a novel class of latent variable models for multiview networks, where a multivariate latent Gaussian variable determines the probabilistic behavior of the edges. We label our model the Graph Generalized Linear Latent Variable Model (GGLLVM) and we base our inference on the maximization of the Laplace-approximated likelihood. We call the resulting M-estimator the Graph Laplace-Approximated Maximum Likelihood Estimator (GLAMLE) and we study its statistical properties. Using simulations and the real data application, we demonstrate that our novel approach can be very computationally advantageous and that it can well capture many features of interest from the network.

Keywords

Latent space models, multiview networks, trade networks, laplace approximation

Topics

- Multilayer, Multiplex, Multilevel and Multimode networks

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