Two-Mode Network Autoregressive Model for Large-Scale Networks

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Abstract: A two-mode network refers to a network where the nodes are classified into two distinct types, and edges can only exist between nodes of different types. In analysis of two-mode networks, one important objective is to explore the relationship between responses of two types of nodes. To this end, we propose a network autoregressive model for two-mode networks. Different network autocorrelation coefficients are allowed. To estimate the model, a quasi-maximum likelihood estimator is developed with high computational cost. To alleviate the computational burden, a least squares estimator is proposed, which is applicable in large-scale networks. The least squares estimator can be viewed as one particular type of generalized methods of moments estimator. The theoretical properties of both estimators are investigated. The finite sample performances are assessed through simulations and a real data example.