

Dealing with Sparsity and Efficiency via Bagging-based Algorithm for Spatio-temporal Autoregressions

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Abstract: We consider a class of spatio-temporal models with sparse (autoregressive) coefficient matrices. It extends popular econometric spatial autoregressive panel data models by allowing the neighbourhood influence for each individual (or panel) different from each other. To estimate the model and overcome the innate endogeneity, we propose a class of generalized methods of moment (GMM) estimators to estimate the coefficient matrices. A novel bagging-based estimator is further developed to conquer the over-determined issue which also occurs in Chang et al. (2015) and Dou et al. (2016). An adaptive forward-backward greedy algorithm is proposed to learn the sparse structure of the coefficient matrices. A new BIC-type selection criteria is further developed to conduct variable selection for GMM estimators. Asymptotic properties are also studied. The proposed methodology is illustrated with extensive simulation studies. A social network dataset is analyzed for illustration purpose.