CONCENTRATION OF MEAN ADJACENCY AND LAPLACIAN MATRICES FOR LAZY NETWORK-VALUED STOCHASTIC PROCESSES WITH APPLICATIONS

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Network-valued time series are currently a common form of network data. However, the study of the aggregate behavior of network sequences generated from network-valued stochastic processes is relatively rare, most existing works focusing on the simple setup where the networks are independent across time. In this paper, we study concentration properties of mean adjacency and Laplacian matrices of network sequences generated from lazy network-valued stochastic processes. We demonstrate the usefulness of these concentration results in proving consistency of standard estimators in community detection and change point estimation problems involving dependent network sequences. We also conduct a simulation study to understand the effect of the laziness parameter, which controls the degree of temporal dependence, on the accuracy of community and change point estimation.