

Network Response Regression

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Abstract: Multiple-subject network data are fast emerging in recent years, where a separate network over a common set of nodes is measured for each individual subject, along with rich subject covariates information. Existing network analysis methods have primarily focused on modeling a single network, and are not directly applicable to multiple-subject networks with subject covariates. In this talk, we introduce a new network response model, where the observed networks are treated as matrix-valued responses, and the individual covariates as predictors. We formulate the parameter estimation as a non-convex optimization problem, and develop an efficient alternating gradient descent algorithm. We establish the non-asymptotic error bound for the actual estimator from our optimization algorithm. Built upon this error bound, we derive the strong consistency for network community recovery, as well as the edge selection consistency. We demonstrate the efficacy of our method through two brain connectivity studies.