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Prediction of the Average Degree of a Network using Network Sampling: A Model Assisted Approach

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Abstract

We study the prediction of the average degree (or edge density) of a large network, which is incompletely observed by using a network sampling scheme. We derive the limiting distribution of the sample network based average degree predictor, and study the effect of various network sampling schemes. We use a model assisted framework, where the joint randomness of the model and the sampling design is taken into account, and in this specific case, we use a Stochastic Block Model (SBM) for the underlying population network. We also discuss the challenges in estimating the variance of such sample-based predictors. This is a joint work with A. Bhattcharya (Washington Univ. at St. Louis) and T. Bandyopadhyay (DA-IICT, Gandhinagar).

Keywords:
Network; Sampling; Average Degree; Stochastic Block Model; Variance Estimation.