

Evaluating Policy Effects under Network Interference without Network Information: A Transfer Learning Approach

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Abstract

This paper develops a sensitivity analysis framework that transfers the average total treatment effect (ATTE) from source data with a fully observed network to target data whose network is completely unknown. The ATTE represents the average social impact of a policy that assigns the treatment to every individual in the dataset. We postulate a covariate-shift type assumption that both source and target datasets share the same conditional mean outcome. However, because the target network is unobserved, this assumption alone is not sufficient to pin down the ATTE for the target data. To address this issue, we consider a sensitivity analysis based on the uncertainty of the target network's degree distribution, where the extent of uncertainty is measured by the Wasserstein distance from a given reference degree distribution. We then construct bounds on the target ATTE using a linear programming-based estimator. The limiting distribution of the bound estimator is derived via the functional delta method, and we develop a wild bootstrap approach to approximate the distribution. As an empirical illustration, we revisit the social network experiment on farmers' weather insurance adoption in China by Cai et al. (2015).

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