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Title: Nonparametric regression for multiple heterogeneous networks

Abstract:
Network data, and particularly collection of heterogeneous networks with covariate information, are commonly observed in a wide variety of applications. This has led to a growing interest in probabilistic models which not only offer generative mechanisms but are also easily estimable using existing methods. In the setting where multiple networks are observed on the same set of nodes, it is key to understand how interactions between nodes evolve within the collection. To answer questions under this setting, we propose a natural extension of the graphon model to simultaneously allow node level as well as network level heterogeneity, via a new multi-graphon function. We show how information from multiple networks can be leveraged to allow the use of standard nonparametric regression techniques for estimation of the multi-graphon function, without necessarily restricting to communities or network histogram estimators as in the existing literature. Application to two real network datasets illustrate this approach.

Joint work with P.A. Maugis (Google).