gwdegree: Improving interpretation of geometrically-weighted degree estimates in exponential random graph models

Michael A Levy

University of California, Davis; Department of Environmental Science and Policy

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Summary

Exponential random graph models (ERGMs) are maximum entropy statistical models that provide estimates on network tie formation of variables both exogenous (covariate) and endogenous (structural) to a network. Network centralization – the tendency for edges to accrue among a small number of popular nodes – is a key network variable in many fields, and in ERGMs it is primarily modeled via the geometrically-weighted degree (GWD) statistic (Snijders et al. 2006; Hunter 2007). However, the published literature is ambiguous about how to interpret GWD estimates, and there is little guidance on how to interpret or fix values of the GWD shape-parameter, θ_S. This Shiny application seeks to improve the use of GWD in ERGMs by demonstrating:

1. how the GWD statistic responds to adding edges to nodes of various degrees, contingent on the value of the shape parameter, θ_S;
2. how the degree distribution of networks of various size and density are shaped by GWD parameter and θ_S values;
3. how GWD and GWESP – an ERGM term used to model triadic closure – interact to affect network centralization and clustering.

References

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