Nonparametric bootstrap inference for network degree distribution.

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Motivated by a plethora of modern large network applications and rapid advances in computing technologies, the area of statistical network modeling is undergoing a vigorous developmental boom, spreading over numerous disciplines, from statistics to engineering to social and environmental sciences. We propose a new nonparametric "patchwork" resampling approach to network inference based on the adaptation of "blocking" argument, developed for bootstrapping of time series and re-tiling for spatial data, to random networks. In contrast to block bootstrap in time series, our primary focus is on mirroring the asymptotic distribution of certain statistics of interest rather than on recreating the data generating process. We focus on uncertainty quantification for network mean degree as well as probabilities of observing a certain degree, under the assumption that both network degree distribution and network order are unknown. We further elaborate the resampling and bootstrap procedures to perform computationally efficient estimates for large networks. The approach is illustrated with simulations and real data examples.