Spectral properties and the accuracy of mean-field approaches for epidemics on correlated power-law networks

Trabalho #10

> Apresentação Oral
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We present a comparison between stochastic simulations and mean-field theories for the epidemic threshold of the susceptible-infected-susceptible (SIS) model on correlated networks (both assortative and disassortative) with power-law degree distribution $P(k) \sim k^{-\gamma}$. We confirm the vanishing of the threshold regardless of the correlation pattern and the degree exponent γ. Thresholds determined numerically are compared with quenched mean-field (QMF) and pair quenched mean-field (PQMF) theories. Correlations do not change the overall picture: QMF and PQMF provide estimates that are asymptotically correct for large size for $\gamma < 5/2$, while they only capture the vanishing of the threshold for $\gamma > 5/2$, failing to reproduce quantitatively how this occurs. For a given size, PQMF is more accurate. We relate the variations in the accuracy of QMF and PQMF predictions with changes in the spectral properties (spectral gap and localization) of standard and modified adjacency matrices, which rule the epidemic prevalence near the transition point, depending on the theoretical framework. We also show that, for $\gamma < 5/2$, while QMF provides an estimate of the epidemic threshold that is asymptotically exact, it fails to reproduce the singularity of the prevalence around the transition.

Comentários adicionais

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