Abstract

In this communication we present results concerning a generalization of the preferential attachment (PA) model to heterogeneous complex networks. The PA model by Barabási and Albert constitutes a minimal account of the mechanisms sufficient for the emergence of scale-free networks, characterized by a power-law scaling in their degree distribution. We define a class of heterogeneous PA models, where node intrinsic properties are described by fixed states in an arbitrary space, and introduce an affinity function that biases the attachment probabilities of links in the attachment kernel. By analytical and numerical means we show that their degree densities exhibit a richer scaling behavior than their homogeneous counterparts, and that the power law scaling in their degree distribution is robust in presence of heterogeneity. We also numerically show that the introduction of heterogeneity renders a richer behavior of their clustering distribution and average network clustering.

Keywords: heterogeneous networks, preferential attachment, power-laws

References


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