A scale-free random graph model

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To describe large real-world networks several random graph models have been proposed (see [2], [3], [5], [1], [4]). It is well-known that many networks are scale-free ([2]). A random graph is called scale-free if its asymptotic degree distribution has a power-law tail.

In this paper, we propose a random graph evolution method. The evolution of our random graph is a combination of the preferential attachment rule and the uniform choice of vertices. In our model a vertex is characterized by three parameters: by its degree and two weights. The weights of any vertex describe the number of its interactions. The first weight is the number of those interactions when the given vertex is the center while the second weight is the number of interactions when the vertex is on the periphery. The asymptotic properties of the graph are studied. Both mathematical results and numerical evidence are presented for the power-law distribution.

References

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