Evolution of a modified binomial random graph

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Abstract

Many random graphs arising in the real world are inhomogeneous in the sense that not all vertices have the same characteristics and these may influence the connection probability between pairs of vertices. The classical random graph models, in particular $G(n, p)$ is homogeneous. Thus, if the aim is to study some of these inhomogeneous real networks, new models must be analyzed. We propose a random graph model of super-vertices which is constructed from the Erdös-Rényi random graph by agglomeration, and it is a special case of an inhomogeneous random graph. We consider a initial configuration of subsets of vertices that we will call a configuration of super-vertices, then, from it an inhomogeneous random graph model is defined by letting that two super-vertices be connected if there is at least one edge between them in $G(n, p)$. Note that we are not assuming that the vertices in the super-vertices should be all connected, so they are not necessarily cluster in $G(n, p)$.

Our main result is about connectivity, however, we also analyze phase transition for the emergency of the largest component and degree distribution.