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A dynamic network in a dynamic population: asymptotic properties

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Abstract

We derive asymptotic properties for a stochastic dynamic network model in a stochastic dynamic population. In the model, nodes give birth to new nodes until they die, each node being equipped with a social index given at birth. During the life of a node it creates edges to other nodes, nodes with high social index at higher rate, and edges disappear randomly in time. For this model we derive criterion for when a giant connected component exists after the process has evolved for a long period of time, assuming the node population grows to infinity. We also obtain an explicit expression for the degree correlation ρ (of neighbouring nodes) which shows that ρ is always positive irrespective of parameter values in one of the two treated submodels, and may be either positive or negative in the other model, depending on the parameters.