

1 Overview

Here I give an overview on how I simulate friendship-constrained gossiping in mobile social networks. Even though our target is to mathematically model the phenomenon, simulation can still give us much guidance in this initial stage.

2 Simulation Settings

It is well-known that the friendship among people forms a scale-free structure. So I take the famous Barabasi-Albert model to describe the friendship connections among people. The parameter in this model is m , and the number of new edges added with the insertion of a new node. The number of friends follow a distribution $P(k) = 2m^2k^{-3}$, and the mean is $2m$. [CityUEE6605]

Learning from existing literature that the mean of inter-contact time is about 5hrs, here I use a Poisson process with rate $\lambda = 0.02$ to model the contacts between any specific pair of friends. So a time step is about 0.1hr. In addition, the number of nodes is set to 1000. Based on the above, I'm able to get the relationship between the average number of friends and the broadcast time of the system.

3 Result

Also for the sake of comparison, I also do a simulation in condition that the friendship forms a classical random graph (Erdos-Renyi Model). The result is shown below.

Here the red line corresponds to classical random graphs while the blue one depicts the situation of BA graphs. For each parameter setting, simulation runs 10 rounds and the 95% confidence intervals are plotted. It is interesting to note that when the number of friends is small, the performance of a scale-free network is not that satisfactory. Also the figure tells us that the delay may have an exponential relationship with the number of friends. To get more accurate description, the simulation may need to run more rounds.

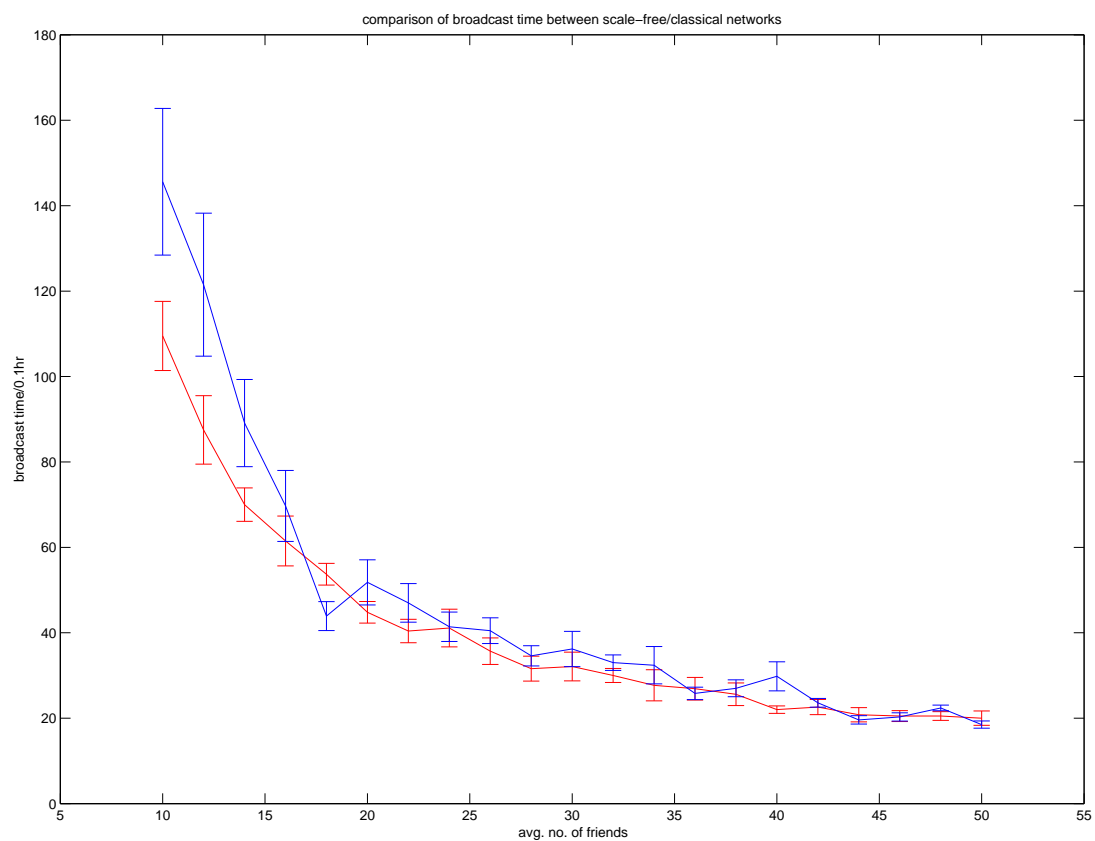


Figure 1. broadcast time in classical and scale free networks