

Prisoner Dilemma Game on Complex Network

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Social dilemma has been widely used as the main paradigm to understanding why selfish individual can cooperate with each other [1]. Evolutionary game theory provides a complete theoretical framework for addressing the subtleties of cooperation [3]. Recent works has revealed that the evolution of the strategies alone may be unable to explain the cooperate behavior. It is reported that the spatial structure and the heterogeneity can promote the cooperation rate. Here we use the Prisoner Dilemma as the game framework and to do some simulation on complex network. We found that the heterogeneity truly promote the cooperation rate. And we also intend to gain some theoretical analysis about the game by using the replicator equation [2] on the complex network.

References

- [1] Gyorgy Szabo and Csaba Toke, Evolutionary prisoner dilemma game on square lattice, *Physical Review E*, Volume 58, Number 1 (1998)
- [2] Hisashi Ohtsuki and Martin A. Nowak, The replicator equation on graphs. *Journal of Theoretical Biology* 243 (2006) 86-97
- [3] Gyorgy Szabo and Gabor Fath, Evolutionary game on graphs. *Physics Reports* 466 (2007) 97-216