Simulating Games on Networks with R. Application to coordination in dynamic social network under heterogeneity

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April 1, 2008

Most of the existing theoretical contributions to understanding mechanisms of co-evolution of social networks and individual behavior assume that actors are homogeneous (e.g. Buskens et al., 2008; Jackson and Watts, 2002). The consequences of relaxing this assumption (Galeotti et al., 2006) are not yet fully understood. Under which conditions will the differences between actors result in higher segregation levels than in the homogeneous case? In this paper we study the interrelated dynamics of social networks and behavior when actors' interests differ. As a framework for analysis we propose a baseline model in which actors simultaneously choose their behavior and manage their personal relations with others. The population of actors is composed of two types and interactions are modeled with asymmetric two-person games. The heterogeneity is represented by three elements:

1. The degree to which actors' interests behavioral options differ.
2. The severance of "mis-coordinating".
3. Complementary or substitutable character of relations with actors of the other type.

To address the posed problems and evaluate the role of the three above mentioned components we employ both analytical and computer simulation methods.

This paper presents the results of computer simulation study prepared and executed in R. The implementation relies on the framework proposed in package simecol (Petzoldt and Rinke, 2007) which was fine-tuned for use in our setting.

The results identify stable network architectures that emerge if actors actively try to improve their position by making behavioral and relational choices. We also investigate the dynamics of selected structural characteristics which, among other, include network

segregation, centralization and transitivity. Examples of the dynamics of the system are shown with network visualizer SoNIA[1].

References

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[1] http://www.stanford.edu/group/sonia/