1107-92-439 **Min Wang**, **Wen Zhou** and **Zhijun Wu*** (zhijun@iastate.edu), 462 Carver Hall, Department of Mathematics, Iowa State University, Ames, IA 50011. *Evolution of Population over Social Network.* Preliminary report.

Species make social contacts and form social networks. The latter may have great impacts on the evolution of a population, such as preserving certain genetic features, sharing knowledge and information, preventing invasions, etc. In this paper, we show that the evolution of a population over a social network can be modeled as a symmetric evolutionary game. Its equilibrium states can therefore be obtained and analyzed by solving an optimization problem called the generalized knapsack problem. We show that an equilibrium state often corresponds to a social clique, when the population is distributed evenly on the clique. However, an equilibrium state may or may not be evolutionarily stable, whether it is on a clique or not. Only those stable ones may be observable or sustainable in nature. We analyze several different types of equilibrium states and prove a set of conditions for their stabilities. We show in particular that the equilibrium states on cliques are evolutionarily stable except for special circumstances, while non-clique equilibrium states are unstable in general. Therefore, the optimal clique strategies should have an evolutionary advantage over the non-clique ones. (Received January 20, 2015)