AKSOE 3 Evolutionary Game Theory

Zeit: Freitag 16:30–18:00 Raum: TU P-N203

AKSOE 3.1 Fr 16:30 TU P-N203

Iterated prisoners dilemma on networks with adaptive topology under perfect rationality — •Christoly Biely and Stefan Thurner — Complex System Research Group, Medical University of Vienna - HNO Bauteil 86, Waehringer Guertel 18-20, A-1090 Vienna, Austria

Up to now analysis of the actions chosen by agents playing the iterated prisoners dilemma game on networks has concentrated on the time evolution of the respective system with constant link structure and rules based on imitation.

In contrast, we present the results of a model which determines the time evolution of the draws in a system with variable link structure and update rules based on perfect rationality. The model is based on the conception that defecting players are sanctioned by the potential termination of the game by their co-players. Conversely, cooperating agents are implicitly rewarded by the possibility to acquire new co-players for the subsequent games.

Conducted simulations show that in spite of the rationality of the respective actors - which would result in the nash equilibrium of overall defection in a system of constant network-topology - cooperation emerges. Choosing appropriate model-parameters we obtain time-dependent networks, which are characterized by high density of cooperating agents and isolation of defecting players.

AKSOE 3.2 Fr 17:00 TU P-N203

Stochastic gain in population dynamics — •Arne Traulsen, Torsten Röhl, and Heinz Georg Schuster — Institut für Theoretische Physik und Astrophysik, Christian Albrechts Universität Kiel, Leibnizstraße 15, D-24098 Kiel

A standard approach to model evolutionary games is the replicator dynamics. We introduce an extension of the usual replicator dynamics to adaptive learning rates [A. Traulsen, T. Röhl, and H. G. Schuster, Phys. Rev. Letters 93, 028701 (2004)]. Is is shown that a population with a dynamic learning rate can gain an increased average payoff in transient phases. It can also exploit external noise, leading the system away from the Nash equilibrium, in a reasonance-like fashion. The payoff versus noise curve resembles the signal to noise ratio curve in stochastic resonance. Seen in this broad context, we introduce another mechanism that exploits fluctuations in order to improve properties of the system. Such a mechanism could be of particular interest in economic systems.

AKSOE 3.3 Fr 17:30 TU P-N203

Transition to Cooperative Behaviour in a Route Choice Game — •Martin Schönhof[1], Dirk Helbing[1], Hans-Ulrich Stark[1], and Janusz Hołyst[2,3] — [1]Institute for Transport & Economics, Dresden University of Technology, Andreas-Schubert-Str. 23, D-01062 Dresden, Germany — [2]Faculty of Physics and Center of Excellence for Complex Systems Research, Warsaw University of Technology, Koszykowa 75, PL-00-662 Warsaw, Poland — [3]Max Planck Institute for Physics of Complex Systems, Nöthnitzer Str. 38, D-01187 Dresden, Germany

We present experimental results of humans playing a certain iterated normal form game. The game is related to the route decision problem of commuters trying to minimize their mean travel time over many days by choosing one of two possible routes. The focus is on whether and how the participants are able to find a cooperative and fair nonstationary strategy leading to the system-optimal road usage. The dynamics of the decisions has been modelled by a new model of reinforcement learning, furthermore some system properties can be described analytically.