AKSOE 9: Social, information-, and production networks I

Time: Tuesday 14:00–15:30 Location: EW 203

AKSOE 9.1 Tue 14:00 EW 203

Zipf law in the popularity distribution of chess openings — Bernd Blasius[1] and •Tönjes Ralf[2] — [1]ICBM, University of Oldenburg — [2]Institute of Physics, University of Potsdam

Human fascination with the game of chess is long-standing and pervasive. However, despite a large body of theoretical investigations, a quantitative understanding of playing behavior remains elusive. Here we demonstrate, based on an analysis of extensive chess databases, that there are simple statistical laws underlying the choice of opening moves in games of chess grandmasters and amateur players. We find that the frequencies of chess openings are distributed according to a power-law with an exponent that increases linearly with the game depth. Thus, in their initial phase the majority of chess games are concentrated among a small number of fashionable openings, whereas with increasing game depth rarely used move sequences are dominating. We present a simple stochastic process that is able to capture the observed playing statistics, providing a universal mechanism for the generation of Zipf's law. Our findings are of relevance in general composite decision processes and long tail economics.

AKSOE 9.2 Tue 14:30 EW 203

On recent trends to model and study social networks — •Pedro Lind[1] and Hans Herrmann[2] — [1]Institute for Computational Physics, Universität Stuttgart, Pfaffenwaldring 27, D-70569 Stuttgart, Germany — [2]Computational Physics, IfB, HIF E12, ETH Hönggerberg, CH-8093 Zürich, Switzerland

We describe and develop three recent novelties in network research which are particularly useful for studying social systems. First, we describe a simple model of mobile colliding agents, whose collisions define the connections between the agents which are the nodes in the underlying network, and develop some analytical considerations. In particular, we show that such an approach allows to reproduce all the fundamental features of social networks. Second, we address the particular feature of clustering and its relationship with global network measures, namely with the distribution of the size of cycles in the network. Since in social bipartite networks it is not possible to measure the clustering from standard procedures, we propose an alternative clustering coefficient that can be used to extract an improved normalized cycle distribution in any network. Third, we describe two properties to characterize the propagation of information in networks. We focus on gossip propagation which impose some restrictions in the propagation rules and find that there is an optimal non-trivial number of friends for which the spread factor is minimized.

AKSOE 9.3 Tue 15:00 EW 203

A Model to Test How Diversity Affects Resilience in Regional Innovation Networks — •Sergi Lozano[1] and Alex Arenas[2] — [1]ETH Zurich, Swiss Federal Institute of Technology, Zurich, Switzerland. — [2]Universitat Rovira i Virgili, Tarragona, Spain.

Research about resilience on complex systems has been commonly addressed from a structural point of view, relating this concept to the preservation of the connectivity against the suppression of individual nodes or links. This perspective coherently encompasses the analysis of resistance of networked infrastructures to structural damage (e.g. power grids, transportation and communication networks), but not necessarily other sort of socio-economical systems. Here we associate the resilience concept to the capability of a social organization to keep acceptable levels of functionality against external socio-economic disrupting factors that do not imply necessarily destruction of existing links.

As a particular case of study, we show how diversity of the organizational characteristics (both structural and related to individual*s behavior) improves resilience of regional innovation systems to uncertain socio-economic scenarios. We reanalyze the conclusions of a classical text about regional development (Saxenian 1994), comparing the evolution of two industrial districts, by first making a qualitative analogy in terms of resilience and, second, building up a simplified model of innovation systems that support quantitatively our argumentation.

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