The PIIK: 1st Symposium on Network Science

(Preliminary program)

Date: Wed 23rd November 2016.
Place: Zurich, Switzerland.

Schedule:

Coffee break
9:00-10:00

Welcome and opening: Prof. Dr. Claudio J. Tessone, University of Zurich (URPP)
10:00

Keynote: Prof. Dr. Jordi Bascompte, University of Zurich.

10:05-10:50

Coffee break
10:50-11:10

Presentation 1: Abel Camacho Guardian, University of Zurich (URPP).
11:10-11:40

Presentation 2: Prof. Dr. Claudia Neri, University of St Gallen.

11:40-12:10

Presentation 3: Dr. Paola Zappa, University of Lugano.
12:10-12:40

Lunch and Informal discussion:
12:30-14:45

Keynote: Prof. Dr. Tiago de Paula Peixoto, University of Bath.
14:45-15:30

Coffee break
15:30-15:45

Presentation 4: Dr. Matúš Medo, University of Freiburg.
15:45-16:15

Presentation 5: Dr. David Schoch, University of Konstanz.
16:15-16:40

Presentation:

Title: Networks of mutual cooperation in ecology and beyond.
Author: Jordi Bascompte, University of Zurich.

Abstract: The mutualistic interactions between plants and the animals that pollinate them or disperse their seeds can form complex networks involving hundreds of species. These coevolutionary networks are highly heterogeneous, nested, and built upon weak and asymmetric links among species. Such general architectural patterns maximize the number of coexisting species and increase the range of variability that these mutualistic networks can withstand before one or more species goes extinct. Therefore, mutualistic networks can be viewed as the architecture of biodiversity. However, because pylogenetically similar species tend to play similar roles in the network, extinction events trigger non-random coextinction cascades. This implies that taxonomic diversity is lost faster than expected if there was no relationship between phylogeny and network structure. I will conclude by exploring the similarities between these ecological networks and socioeconomic cooperative networks such as those between manufacturers and contractors.

Title: Efficient Bayesian inference of large-scale network structures
Author: Tiago P. Peixoto.

Abstract: A principled approach to characterize the hidden structure of networksis to formulate generative models, and then infer their parameters fromdata. When the desired structure is composed of modules or"communities", a popular choice for this task is the stochastic blockmodel, where nodes are divided into groups, and the placement of edgesis conditioned on the group memberships. In this talk, I will present anonparametric Bayesian inference framework based on a microcanonical formulation of the stochastic block model. I show how this simple model variation allows simultaneously for two important improvements over more traditional inference approaches: 1. Deeper Bayesian hierarchies, with noninformative priors replaced by sequences of priors and hyperpriors, that not only remove limitations that seriously degrade the inference of large networks, but also reveal structures at multiple scales; 2. A very efficient inference algorithm that scales well not only for networks with a large number of nodes and edges, but also with an unlimited number of groups. I show also how this approach can be used to sample group hierarchies from the posterior distribution, perform model selection, and how it can be easily be generalized to networks with edge covariates and node annotations.

Title: Surviving Troubled Times: Emergence and Evolution of Market Microstructures in the Aftermath of Exogenous Market Shocks
Author: Paola Zappa

Abstract: One of the main assumptions underlying the view of markets as social structures of exchange relations is that microstructures of time-ordered transactions can be used to explain the evolution of the market macrostructure over time. Although relatively uncontentious, this assumption has been scantly exploited to investigate changes in the market macrostructure due to exogenous shocks which increase market uncertainty and modify contextual conditions. To address the issue, this paper examines the effect of an exogenous shock on market structure by observing emergence and evolution of microstructures of transactions.We situate our study in the context of the EU interbank money market. By examining the complete set of lending events observed on the e-MID trading platform among the registered banks during the recent global financial crisis, we: (1) reveal the emergence of self-organizing sequences of money transactions; (2) document how patterns of self-organization endure or change in order to deal with exogenous shocks; (3) distinguish between changes which anticipate and changes with respond to shocks.

Title: Re-conceptualizing centrality in social networks
Author: David Schoch

Abstract: Networks are commonly used to represent relationships between social actors, be they individuals or aggregates. The structural importance of these actors is assessed in terms of centrality indices which are commonly defined as graph invariants. Many such indices have been proposed, but there is no unifying theory of centrality. Previous attempts at axiomatic characterization have been focused on particular indices, and the conceptual frameworks that have been proposed alternatively do not lend themselves to mathematical treatment.We show that standard centrality indices, although seemingly distinct, can in fact be expressed in a common framework based on path algebras. Since, as a consequence, all of these indices preserve the neighbourhood-inclusion pre-order, the latter provides a conceptually clear criterion for the definition of centrality indices.

Title: Models and algorithms for growing information networks
Author: Matus Medo

Abstract: Complex networks have been successfully used to represent a wide range of real systems. We will focus on growing information networks in particular where time plays a crucial role and which are relevant in diverse fields such as bibliometrics (to model citations among scientific papers), e-commerce (to model users and their purchases on Amazon.com, for example), and information filtering in general (to model links among web sites, for example). We will first show that to model these systems, the classical preferential attachment model needs to be augmented by introducing node fitness and aging. We will show how the model can motivate the development of new metrics and algorithms, leading to better ranking and recommendation in complex networks.

Title: Social Learning in Networks
Author: Claudia Neri

Abstract: Social learning is a crucial component of human interaction. Among the many possible mechanisms by which individuals learn from others, observational learning describes the process of individual inferences on the information held by other people based on the observation of their behavior. Understanding how individuals make and update their behavior after observing the behavior of others and which long run aggregate outcomes such learning generates has important implications for economic policy. We propose a general model of boundedly-rational observational learning, which is based on the concept of Quasi-Bayesian updating. When observing a set of actions being chosen by other agents, the observer assumes that each action is optimal given only the private information of the agent who chose it. The Quasi-Bayesian approach addresses the weaknesses of the two alternative models proposed in the literature: Bayesian and non-Bayesian. We consider the theoretical long run implications of Quasi-Bayesian updating in a model of repeated interaction in social networks and we provide evidence in support of the Quasi-Bayesian approach from data collected in a laboratory experiment.

Title: On statistical network analysis, communities and fat tails
Author: Abel Camacho Guardian

Abstract: What is permissible to conclude in cross-sectional studies with a single network? Statistical evidence provided with one of the most popular network model (ERGM) is often grounded on p-values. Although, the construction of the p-values leans on the mathematical results of central limit theorem that is valid under weak-independence conditions, it does not necessary holds for network data where variables are strongly correlated. Thus, we present a statistical framework based on ERGM and community structure, called C-ERGM. For C-ERGM, p-values are grounded in observing networks with several communities. Introducing community structure to ERGM enriches the modelling power as it helps to decouple the small sample size problem and the problem of misspecified models. Further, we address the problem observed in empirical and simulation studies showing that ERGM puts often too much probability on a few networks (near-degeneracy). Motivated by the near-degeneracy problem and the microscopic assumptions for constructing C-ERGM, we present a class of models that aim to solve near-degeneracy. We show how our model can put more probability on the tails of the distribution and we compare our model with a Bernoulli random graph in several Swiss-school networks. Our empirical results show that placing more probability on the tails increase the probability mass placed on the observed networks.

Venue

The event will take place in

- URPP Social Networks
- University of Zurich
- Andreasstrasse 15
- (Room AND-3-46, 3rd floor, West wing of the building)
- CH-8050 Zurich