SOE 13: Opinion Formation, Segregation, and Language Dynamics

Time: Wednesday 15:00–16:30 Location: MA 001

SOE 13.1 Wed 15:00 MA 001

Data-driven modeling in continuous opinion dynamics — •Jan Lorenz[1] and Thomas Metz[2] — [1]Jacobs University Bremen, Germany — [2]Albert-Ludwigs-Universität Freiburg, Germany

Models of continuous opinion dynamics as the bounded confidence model or related models with continuous opinions show interesting transitions and bifurcation patterns regarding their stable opinion distributions. The consensus transition which divides stable consensus from stable bipolarization at a critical bound of confidence is of course an interesting phenomena with analogies to real-world phenomena, but full consensus (polarization) on one (two) single point(s) in a continuum is probably not a state reached very often in groups and societies. A major model improvement overcoming this unrealistic convergence was the introduction of noise in the sense that agents sometimes start from scratch with a new random opinion. Nevertheless, all these models of continuous opinion dynamics models have rarely been compared with opinion landscapes from real-world processes of opinion dynamics. We present results from data-driven modeling of continuous opinion dynamics which start with the identification of stylized facts of opinion landscapes from large scale representative surveys and panels. Opinion landscapes indeed often show some clustering which bounded confidence models are able to produce, but the models typically do not reproduce the structure of real-world clustering patterns. We present simple modeling ideas which could bring models and data closer together.

SOE 13.2 Wed 15:15 MA 001

Flow-networks methods: applications to opinion dynamics — •Liubov Tupikina and Jürgen Kurths — Potsdam Institute for Climate Impact Research, P.O. Box 601203, 14412 Potsdam, Germany

Networks were successfully applied to describe complex systems, such as, brain, climate, processes in society. Recently a socio-physical problem of opinion-dynamics was studied using network techniques. We present the toy-model of opinion-formation based on the physical model of advection-diffusion. We assume that the opinion of each person (state of the node in network) in society is binary, i.e. can be only 0 or 1. Opinion can be spread from one person to another if they know each other, or in the network-terminology, if they are connected. The assumptions for the model can be formulated as the following: -the node-states are influenced by the network structure in such a way, that opinion can be spread only between adjacent nodes (the advective term of the opinion-dynamics), -the network structure can have two scenarios: network topology is not changing with time; additional links can appear or disappear with fixed probability (elements of the adaptive networks theory). Considering these assumptions for our opinion spreading model and applying them to the advection-diffusion system we obtain the description of our model as the system. We investigate the behaviour of the suggested model. We study the "waiting time" of the system to get to the stable state and the stability of the model regimes for different extreme values of the model parameters.

SOE 13.3 Wed 15:30 MA 001

Random allocation policies in segregative dynamics — •Julien Randon-Furling[1] and Aurélien Hazan[2] — [1]SAMM - Université Paris-1 Panthéon-Sorbonne, Paris, France — [2]LISSI - Université Paris-Est Créteil, Lieusaint, France

Schelling-type multi-agent systems in which a fraction f of spatially-fixed agents are able to switch groups were recently introduced (see eg EPJB 86:421). We present some of their properties together with new results derived from their application, focusing on:

(i) their ability to exhibit more complex patterns of group segregation and mixing than standard Schelling-type systems;

(ii) the benefits of random, non-preferential allocation policies (eg by housing associations) — a type of policies for the investigation of which the new model was designed;

(iii) comparisons with data from social housing and mixity within the twenty "Arrondissements" of central Paris.

SOE 13.4 Wed 15:45 MA 001

Zoonivers; Crowd-sourced science — •Taha Yasseri — University of Oxford, Oxford, UK

In this work we will investigate uses of the Zooniverse, by far the most successful citizen science project with nearly 900,000 users contributing to 20+ projects, which have led to more than 60 scientific papers across the sciences and humanities during its 4 year history. However, its community of volunteers, the features and characteristics of their contribution patterns, their motivations and objectives, the ways that they satisfy them through different types of contributions, and many other social aspects of it are still unknown. We study the transactional records of the users' activities in order to create an accurate picture of the community of contributors. By performing numerical analyses on the activity logs we produce a typology of users based on temporal features of their activity. We perform time series analysis to extract the modes of contribution and its dynamic characteristics. This will help us understand the incentives for and participation patterns on the Zooniverse and could help directly design a more efficient contribution platform and enhance engagement on the Zooniverse, as well as in other Citizen Science projects.

SOE 13.5 Wed 16:00 MA 001

Universality and Variation in Language — •Martin Gerlach and Eduardo G. Altmann — Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

Natural language is a remarkable example of complex dynamical systems which combines variation and universal structure. This combination can be studied in detail looking at the statistical analysis of word frequencies in written texts. On the one hand, there are universal laws (e.g., Zipf's and Heaps' laws) which are extremely robust with respect to language, topic, and time. On the other hand, all languages are constantly changing and word frequencies show a strong variation across time and topics. Starting from large records of written texts we investigate the statistical and dynamical processes underlying the co-existence of variation and universality in word statistics. Our findings find applications in problems of information retrieval and language change (e.g., the adoption of new words).

[1] M. Gerlach and E. G. Altmann, "Scaling laws and fluctuations in the statistics of word frequencies", New J. Physics 15, 113010 (2014)
[2] F. Ghanbarnejad, M. Gerlach, J. M. Miotto, and E. G. Altmann, "Extracting information from S-curves of language change", J. R. Soc. Interface 11, 20141044 (2014)
[3] M. Gerlach and E. G. Altmann, "Stochastic model for the vocabulary growth in natural languages", Phys. Rev. X 3, 021006 (2013)

SOE 13.6 Wed 16:15 MA 001

On the failure of nations — •Hermann Rampacher — Seehaldenstraße 10 88662 Überlingen

To avoid a nation's failure the collective cooperation must be optimized. To measure the actual Level of cooperation first a set ofnorms {n(k)} must be investigated, where every n(k) prohibits an interaction i(k)tied to one of the largest risksfor the planet' survival. The ideal cooperation worldwide woulb be achieved if and wheb all the n(k) are obeyed. In the real world subsets of {n(k)} are violated. Secondly those probabilities p(k' will be investigatedbelonging to those n(k')which are violated. The more People suffering from violence - including killing and imprisonment of the state - the larger is the social temperature t. The more rapidly the t will increase, the larger the risk of a nation' failure. Violation of n(k') causes a damage s(k').The expectation value of s(k') equals perdefinition the rank r(k') of r(k') and n(k'). Now the expectation value ofa nation's actual cooperation is inlinear Approximation the sum of all p(k#)x n(k'). Every violation of n(k') activates until now latent correlation among both the i(k') and the n(k'). This leads to the violation of additional n(k"), a process like an epidemic or or pandemic.