SOE 5: Agent-Based Modeling

Time: Tuesday 12:15–13:00 Location: H45

SOE 5.1 Tue 12:15 H45

Co-evolving networks for opinion and social dynamics in agent-based models — •Soeren Nagel[2], Quang Nuh Vu[1], and Nataša Djurdjevac Conrad[1] — [1]Zuse Institue Berlin — [2]Department of Mathematics and Computer Science, Institute of Computer Science, Freie Universität Berlin

The coevolution of public opinions and social interactions is a fundamental aspect of social systems, yet existing models often fail to include this feedback loop. While many studies explore how opinions influence social ties, The reversed influence is however often overlooked. To bridge this gap, we introduce a novel stochastic agent-based model (ABM) that integrates opinion dynamics and social mobility within a shared "social space."

The feedback loop between opinion and social dynamics generates emergent phenomena such as consensus and echo chambers, whose dynamics we analyze through a network-based order parameter. The model exhibits critical transitions for both noise intensity and relative size of opinion and social network.

Our findings demonstrate the potential of coevolutionary models to capture the transient dynamics of social clustering and opinion polarization.

Applying the model to empirical data from the General Social Survey, we investigate opinion distributions on politically charged issues, and demonstrate, that the model is capable of capturing real-world dynamics.

SOE 5.2 Tue 12:30 H45

An Agent-Based Model to Investigate Geder Bias in Peer Review — •Sophie Lake and Jens Christian Claussen — University of Birmingham, Edgbaston, UK

Fairness in the refereeing process is a challenging goal but essential to ensure the quality of the scientific publication landscape. Selfishness, various biases, friendship networks as well as time efficiency influence the behaviour of researchers when making decisions on refereeing manuscripts. A longstanding challenge is the under-representation of women in many scientific disciplines and therefore in editorial boards and referee pools. We build on a model by Thurner and Hanel (2011, EPJB 84:707) that introduced different referee strategies. Here we extend the model by gender-specific strategies, and use agent-based simulations to analyze the impact of evaluation bias, homophilic editors and friendship networks.

SOE 5.3 Tue 12:45 H45

Do weekends matter in agent-based models for epidemiology? — •Aleksandr Bryzgalov — Institut für Medizinische Epidemiologie, Biometrie und Informatik (IMEBI) Medizinische Fakultät der Martin-Luther-Universität Halle-Wittenberg, Deutschland

German Epidemic Micro-Simulation System (GEMS) is an agent-based framework that was recently developed to study and analyse the consequences of the COVID-19 pandemic.

Using GEMS we focused on a study of weekend impact on developing the infection spread throughout the population. We compared the dynamics in two cases: considering only regular days (people have constant contact rates) and considering workdays-weekends(contact rates are specific for workdays and weekends). The total number of contacts was the same in both cases. We used the transmission parameters related to the Omicron (B.1.1.529) pathogen. In our simulations, we varied the distribution of workplace sizes, but the household structure was fixed.

The results show the dependence of total attack rate of workplace size distribution: smaller workplaces in combination with workdays-weekend periodicity produce more infections than the same with only regular days. On the opposite, bigger workplaces in combination with workdays-weekend periodicity produce fewer infections than the same with only regular days.

[1] J. Ponge et al 2023 Winter Simulation Conference (WSC), San Antonio, TX, USA, 2023, pp. 1088-1099, doi: 10.1109/WSC60868.2023.10407633.