

Tutorial Outline

Social Artificial Intelligence

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For AI scientists and social scientists, the challenge is how to achieve better understanding of how AI technologies could support or affect emerging social challenges, and how to shape and regulate human-centered AI ecosystems that help mitigate harms and foster beneficial outcomes oriented at the social good. This tutorial will discuss this challenge from two sides. First, we will look at the network effects of AI and their impact on society. Examples range from urban mobility, with travellers helped by smart assistants to fulfill their agendas, to the public discourse and the markets, where diffusion of opinions as well as economic and financial decisions are shaped by personalized recommendation systems. In principle, AI can empower communities to face complex societal challenges. Or it can create further vulnerabilities and exacerbate problems, such as bias, inequalities, polarization, and depletion of social goods. We will investigate the role of AI in these situations based on data based simulations that can be used to study the network effects of particular AI driven individual behavior. Secondly, we will look at the use of behavioral models as an addition to the data based approach in order to get further grip on emerging phenomena in society that do not only depend on e.g. social media, but also depend on physical events for which no data are readily available. An example of this is tracking extremist behavior in order to prevent violent events. An extreme event such as the storming of the capitol in January 2021 can be traced back in twitter, but not every potential extremist hashtag in twitter leads to violent behavior. There are also physical contacts, influences and group structures outside social media that play a big role in the process. We will look at some case studies in depth and discuss approaches to analyse them with the appropriate tools.

Outline

Part I – Lecturer: Dino Pedreschi

The challenges of Social AI (2h)

- The Schelling segregation model
- Complex networks, emerging properties and network effects.
- A quick primer on social network analysis: small worlds, giant components, hubs. The emergence of connectivity and inequality.
- Putting AI into the picture: recommendations and decision-making support
- Polarization in opinion diffusion networks.
- Polarization/congestion in mobility networks
- Effects of profiling and target advertising in e-commerce platforms
- Towards a social-aware AI.

Barabási, Albert-László (2018). *Network science*. Cambridge University Press. Available online at <http://networksciencebook.com/>

Sîrbu A, Pedreschi D, Giannotti F, Kertész J (2019) Algorithmic bias amplifies opinion fragmentation and polarization: A bounded confidence model. *PLoS ONE* 14(3): e0213246. <https://doi.org/10.1371/journal.pone.0213246>

Pedreschi D (2020) Artificial Intelligence (AI): new developments and innovations applied to e-commerce. In-depth study for the European Parliament. Published on line at https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_IDA%282020%29648791

Lab on Network Diffusion with the NDLib simulation platform (2h)

Giulio Rossetti, Letizia Milli, Salvatore Rinzivillo, Alina Sîrbu, Dino Pedreschi & Fosca Giannotti. NDLIB: a python library to model and analyze diffusion processes over complex networks. *Int J on Data Science and Analytics* 5, 61–79 (2018). <https://doi.org/10.1007/s41060-017-0086-6>

Part II – Lecturer: Frank Dignum

Presentation: Learning from data on social media: finding extremists on Twitter, Parler and other social media. (1 hour)

Wei, Y., Singh, L., & Martin, S. (2016). Identification of extremism on Twitter. *Proceedings of the 2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, ASONAM 2016*, 1251–1255. <https://doi.org/10.1109/ASONAM.2016.7752398>

Exercise based on a real use case of the events around the storming of the Capitol in the USA (1 hour)

Presentation: Simulating extremism (behavior models) (0.5 hour)

Mijke van der Hurk and Frank Dignum. Towards fundamental models of radicalization. *International conference on Social Simulation*, September 2019, Mainz.

Presentation: Models of Human Behavior to simulate Real World Phenomena (0.5 hour)

Frank Dignum, Virginia Dignum, Paul Davidsson, Amineh Ghorbani, Mijke van der Hurk, Maarten Jensen, Christian Kammler, Fabian Lorig, Luis Gustavo Ludescher, Alexander Melchior, René Mellema, Cezara Pastrav, Lois Vanhee, Harko Verhagen. *Analysing the Combined Health, Social and Economic Impacts of the Corona-virus Pandemic Using Agent-Based Social Simulation*, *Minds and Machines*, volume 30, Springer, 2020.

Exercise based on real use case (1 hour)