

Methods in Computational Social Science: From Digital Traces to Social Dynamics

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How can we study how people express, connect, and collectively generate social and emotional dynamics online? In this talk, I present four complementary methodological pillars for computational social science: i) psycholinguistic NLP for analyzing content, emotions, moral concerns, and psychological responses; ii) complex network analysis for studying relationships and diffusion; iii) computational social dynamics for examining how communities, narratives, and collective meanings evolve; and iv) generative social simulation for exploring the mechanisms through which such dynamics can emerge and spread.

Drawing on examples from the research conducted at the Institute for Complex Networks (Vienna University of Economics and Business) and Faculty of Informatics (University of Vienna) related to psycholinguistics, collective narratives, and responses to crises, I will illustrate these approaches through examples from our work. These include a large-scale study of grievances expressed on YouTube, the use of psycholinguistic and computational narrative methods to examine how collective narratives develop following terrorist attacks, and the analysis of social media communication related to presidential elections. Across these examples, I show how computational methods can be applied at different levels of analysis – from individual expressions and interactions to collective patterns and emergent social dynamics. Particular attention will be given to how computational methods can be combined with theory-driven approaches to move beyond identifying patterns in large-scale digital traces toward explaining how those patterns emerge, transform, and stabilize, as well as the mechanisms that drive them.

About the speaker



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Ema Kahr is a computational social scientist and researcher at the Institute for Complex Networks at Vienna University of Economics and Business (WU). Her work sits at the intersection of computational social science, narrative analysis, social psychology, and natural language processing. At the focus of her research is how individuals and collectives construct, transform, and stabilize narratives in response to crises and major social events. Her research program combines computational text analysis with theory-driven approaches from social psychology and narrative research. She has worked extensively with large-scale social media and online communication data, applying methods including NLP, topic modeling, emotion analysis, Gaussian mixture modeling, network analysis, and large language models. A central theme of her work is the computational identification of collective narratives and the psychological functions they serve. She received several awards for her research and authored several journal publications, some of which are published in A-ranked journals, including *Information Processing & Management*, *Computers in Human Behavior*, and *IEEE Internet Computing*. She currently serves as a technical committee member for the Elsevier's journal *Online Social Networks and Media*. She has served as a Program Chair for the International Conference on Complexity, Future Information Systems and Risk and as a technical committee member for several conferences in the fields of social network analysis and computational social science.