

Towards the Digital City: AI, data and network science for smart, efficient, and healthy city

Dr. Stanislav Sobolevsky will present his prior research as well as the project to start at MUNI under a recent MASH award

The growing scale, complexity, and dynamics of urban systems pose tremendous challenges within urban planning and operations. The urban population becomes exposed to congestion, pollution, health risk, and stress at unprecedented levels. At the same time, the increasing pervasiveness of digital technology in facilitating urban activities generates a vast amount of data. This big urban data creates fresh opportunities to gain an unparalleled understanding of complex urban systems and respond to urban challenges, mitigating unwanted exposures and optimizing urban operation through smart digital solutions. While recent network analysis and AI techniques help address the complexity and interconnectedness of the urban data.

I will introduce the network analysis techniques used by my teams at NYU and MIT to study the spatio-temporal transactional data on human mobility and interactions, as well as their applications to smart urban planning, transportation innovation, and urban analytics.

I further present the cross-disciplinary research program I look forward to implementing at MUNI: the **Digital City Engine** - a unified, scalable analytic framework for multi-layered urban data and its methodological core - **Urban Network AI** - a novel fusion of network science and deep learning techniques. We shall discuss the methodological foundations of Urban AI as well as applications to predictive modeling and detection of patterns, impacts, and emergent phenomena in spatio-temporal networks of urban activity and/or quantifying populational exposure to urban stressors.



About the presenter

Stanislav Sobolevsky started his career in Belarus in fundamental mathematics, earning a Ph.D. (1999) and a Doctor of Science habilitation degree (2009) in Belarus, studying the branching of the differential equations solutions. Has held faculty and leadership positions at the Belarusian State University at that time. Later transitioned to applied cross-disciplinary research in data and network science, joining MIT SENSEable City Lab to co-lead a team of researchers and urban innovators. Since 2015 joined the faculty at the New York University as an Associate Professor of Practice. Established an Urban Complexity Lab studying urban activity through big urban data leveraging network analysis, machine learning, and AI. Authored over 100 research publications in top-tier journals and conferences, collecting thousands of citations. Applied projects of the Urban Complexity Lab on transportation modeling, trajectory mining, anomaly, pattern, and vulnerability detection in temporal urban networks attracted support from federal agencies, private and public sectors.