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Towards Smart, Resilient, and Sustainable Mobility Systems with Spatiotemporal Big Data Sensing and Mining

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Seminar Details

April 9, 2024
2:30pm – 4:00pm

UH Campus: Agrawal Engineering Research Building (AERB) 100

Online via Zoom
https://us02web.zoom.us/j/87646397133

ABSTRACT

Climate change and population growth pose unprecedented challenges to the human mobility system. Meanwhile, the proliferation of crowdsensing techniques, such as mobile phones, vehicles, social media, and cameras, has generated vast spatiotemporal data for understanding human activities and their interaction with the infrastructure and environment. Effectively managing such massive, multi-structured spatiotemporal data, extracting valuable human activity information, and tailoring solutions to various urban challenges are more crucial than ever. In this talk, I will first delve into my previous research on using raw location-based service data from ~150 million mobile phones across the US to build an end-to-end data-driven human mobility model. I will introduce a set of customized spatiotemporal artificial intelligence (AI) frameworks designed for forecasting human mobility in citywide and broader contexts. These frameworks are embedded into classical travel demand models, functioning at both individual and aggregated levels under both recurrent and non-recurrent conditions. Expanding on this foundational framework and incorporating additional crowdsourced data, I will then discuss various time-sensitive and multidisciplinary collaborations in areas such as community resilience, public health, social equity, and transport decarbonization, for broader and longer-lasting impacts.

BIOGRAPHY

Dr. Songhua Hu is a postdoctoral researcher at the Massachusetts Institute of Technology Senseable City Lab. He holds a Ph.D. degree in civil engineering (transportation) from the University of Maryland, College Park. His research centers on modeling human mobility using digital footprints crowdsourced from cellphones, vehicles, social media, cameras, etc. Based on customized spatiotemporal AI, network science, cloud computing, and advanced statistics, he aims to monitor, learn, and forecast how each person moves in the city, and to understand how these movements interact with the infrastructure, environment, and community. In all these topics, his work considers both recurrent and non-recurrent (pandemic, disaster, extreme weather, etc.) situations. His research has contributed to projects funded by NSF, NIH, USDOT, and USDOE, resulting in over 20 journal papers published in PNAS, Transportation Research Part A/C/D, etc. He is a recipient of the 2023 University of Maryland CEE Best Doctoral Research Award and several best paper awards from international conferences.