Next Generation Travel Demand Models for Smart and Connected Cities

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Abstract:
The smart and connected city movement, which aims at developing an efficient transportation system and reducing environmental footprint, has received traction worldwide. The emergence of smart city technologies and connected infrastructure has generated various smart mobility options, such as flying cars, automated vehicles, ridesharing (e.g., Uber, Lyft). Consequently, future transportation will be dominated by on-demand, shared, and automated mobility services, which will reshape traditional travel patterns and city-wide transportation demand. This talk will include a discussion of how next-generation travel demand models and machine learning algorithms are incorporated for developing “smart solutions for smart cities” including flying cars.

First, a data-driven approach to model the dynamics of mode choice behaviour will be presented. These probabilistic choice models harness the power of both dynamic programming and the random utility maximization principle. The estimated dynamic discrete choice model outperforms conventional myopic models (a model that only considers past events) by incorporating future expectations. The empirical model reveals that users of newly introduced mobility services (e.g., Uber, Lyft) tend to have different mode choice patterns, time expenditure choices, and value of travel time savings than non-users of these services.

Next, the enhancement and application of an agent-based modelling framework for urban-level analyses will be presented, which will assess behavioural changes in response to urban air mobility (UAM). The broad goal of the research is to investigate the impacts of UAM services on transportation in the context of North American cities, and to quantify UAM demand and in particular, its relationship with service pricing, operational configurations and other city-specific characteristics.

Bio:
Dr. Md Sami Hasnine is currently working at MIT as a postdoctoral fellow. He received his Ph.D. from the Civil and Mineral Engineering Department at the University of Toronto in 2019, and his MASc from the same school in 2015. Dr. Hasnine received BSc in Civil Engineering with Honours from Bangladesh University of Engineering and Technology (BUET) in 2013. Dr. Hasnine’s research interests include mobility for smart and sustainable cities with the aim of reducing emissions and energy consumption, the impact of connected and autonomous vehicles (CAV) on individuals’ day-to-day lifestyle, econometrics, advanced travel demand modelling, machine learning, and big-data analytics.