Transportation Center Seminar

“Adaptive Routing in Stochastic Time-Dependent Networks with Real-Time Information”

Dr. Song Gao
Associate Professor of Civil & Environmental Engineering
University of Massachusetts Amherst

Thursday – October 24, 2013
4:00 - 5:00 pm
Refreshments available at 3:30 pm

Location:
Transportation Center, Chambers Hall
Lower Level, 600 Foster St., Evanston

Abstract: Transportation systems are inherently uncertain due to disruptions such as bad weather and incident, and the randomness of traveler’ choices. Real-time information allows travelers to adapt to actual traffic conditions and potentially mitigate the adverse effect of uncertainty. Both algorithmic and behavioral studies of adaptive routing are presented in this talk. A series of optimal adaptive routing problems are investigated, where time-dependent travel times are modeled as correlated random variables and various assumptions on the real-time information accessibility are made. Sufficient and necessary conditions for Bellman’s equations to be applicable are discussed, and exact and approximate algorithms are designed and tested. Behavioral models of adaptive route choice are developed based on stated preferences data and it is found that travelers can plan ahead for traffic information not yet available. Two modeling paradigms for route choice under unreliable travel time, utility maximization based on the prospect theory and non-compensatory heuristic, are compared. The non-compensatory heuristic is found to be potentially a suitable alternative to the conventional utility maximization approach.

Bio: Dr. Gao’s research focuses on optimization in stochastic networks, econometric and psychological models of travel behavior, equilibrium analysis of stochastic networks with traveler information, with applications in intelligent transportation systems (ITS), transportation planning under both normal and emergency conditions, and sustainable transportation systems. Prior to joining the faculty of the University of Massachusetts Amherst in 2007, Dr. Gao worked as a transportation engineer at Caliper Corporation, Newton, MA for three years, and developed advanced traffic assignment modules for TransCAD, a GIS-based transportation planning software and provided consultancy to transportation demand forecasting projects of state, regional and local planning agencies. Dr. Gao was a member of the winning team of the 2010 MacArthur Digital Media and Learning Competition. She received an honorable mention (second place) in the INFORMS (Institute for Operations Research and Management Science) Transportation Science and Logistics Dissertation Prize Competition in 2005. Dr. Gao is a member of the Transportation Research Board (TRB) Committees on Travel Behavior and Values (ADB10) and Transportation Network Modeling (ADB30) and on the editorial board of the Journal of Intelligent Transportation Systems. Dr. Gao received her Ph.D. and M.S. in Transportation from Massachusetts Institute of Technology in 2005 and 2002 respectively. She received her B.S. in Civil Engineering from Tsinghua University of China in 1999.