IE Decision Systems Engineering Fall '21 Seminar Series

Incentive Design for Promoting Ridesharing

Friday, November 12, 2021, 12:00PM (AZ time)
Via Zoom: https://asu.zoom.us/j/8120740932

Abstract

Traffic congestion has become a serious issue around the globe, partly owing to single-occupancy commuter trips. Ridesharing can present a suitable alternative for serving commuter trips. However, there are several important obstacles that impede ridesharing systems from becoming a viable mode of transportation, including the lack of a guarantee for a ride back home as well as the difficulty of obtaining a critical mass of participants. This study addresses these obstacles by introducing a Traveler Incentive Program (TIP) to promote community-based ridesharing with a ride-back home guarantee among commuters. The TIP program allocates incentives to (1) directly subsidize a select set of ridesharing rides, and (2) encourage a few, carefully selected set of travelers to change their travel behavior. We formulate the underlying ride-matching problem as a budget-constrained min-cost flow problem, and present a Lagrangian Relaxation-based algorithm with a worst-case optimality bound to solve large-scale instances of this problem in polynomial time. We further propose a polynomial-time budget-balanced version of the problem. Numerical experiments suggest that allocating subsidies to change travel behavior is significantly more beneficial than directly subsidizing rides. Furthermore, using a flat tax rate as low as 1% can double the system's social welfare in the budget-balanced variant of the incentive program.

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Bio

Neda Masoud is an Assistant Professor of Civil and Environmental Engineering at the University of Michigan. She holds a Bachelor's of Science Degree in Industrial Engineering and a Master's of Science degree in Physics. She received her PhD in Civil and Environmental Engineering from University of California Irvine. Her research focuses on devising operational and planning tools to facilitate the transition into the next generation of mobility systems, which are envisioned to be connected, automated, electrified, and shared.

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