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# Optimized real-time management for on-demand ride sharing services.

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## Abstract

Ridesharing on demand is considered nowadays an effective personal mobility service for reducing traffic congestion and pollutions. In the recent years by growing smartphone technologies and inexpensive cellular communications, a more individualized mode of transport in urban mobility has led companies like Uber, Lyft and Via to focus on developing demand responsive services, called Mobility on Demand (MoD). Furthermore, considering ride sharing benefits and its potential, the companies adjusted their services with sharing options. In the other hand with rising automated driving technologies, automated ride-sharing services would be an attractive mobility service in the near future. Optimization of ride-sharing services has attracted researchers to formulate it as vehicle-routing problem and dynamic pick-up and delivery problem. In the current work, we mainly focus to apply different optimization techniques to solve on-demand ridesharing services in a real-time framework. In addition, we evaluate various management strategies, by application of different decision variables and cost functions. Furthermore, the sensitivity of the strategies to different ride sharing capacities will be investigated. By developing an event-based simulation engine, we provide a real-time taxi ride-sharing search algorithm. The main task of the algorithm is to quickly decide between available taxi candidates, which satisfy both user inquiries and cost function constraints. Additionally, we validate the feasibility of the simulation engine by utilizing millions of real trip data from the New York City taxi dataset. Moreover, by variation of different parameters and implementing different cost functions, we study the result of various strategies.

**Keywords:** Capacitated ridesharing, Simulation, Mobility on demand

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