Empty Vehicle Repositioning in Ride-hailing systems (Draft version. CONFIDENTIAL NOT TO DISTRIBUTE)

Pengbo Zhu

Nikolas Geroliminis

STRC conference paper 2022 **May 12, 2022**

STRC | **22nd Swiss Transport Research Conference**
Monte Verità / Ascona, May 18-20, 2022

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Pengbo Zhu
Urban Transport Systems Laboratory (LUTS)
EPFL
Station 18 CH-1015 Lausanne
pengbo.zhu@epfl.ch

Nikolas Geroliminis
Urban Transport Systems Laboratory (LUTS)
EPFL
Station 18 CH-1015 Lausanne
nikolas.geroliminis@epfl.ch

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Abstract

Ride-hailing is an emerging service within urban scenarios which shows its potential to reduce congestion at the same time optimize service quality for customers. A critical operational challenge is the problem of imbalance between supply and demand. In this paper, This empty vehicle fleet management problem is solved as a coverage control problem, which can be carried out by each vehicle to generate its own node-level moving actions. It differentials our methods with previous approaches which give zone-level guidance. In addition, we investigate a hierarchical structure for vehicle repositioning and introduce a Earth Mover Distance based upper controller in order to operate the fleet more efficiently leveraging aggregated subregion information. Verified by real taxi data and city map of Shenzhen, China, our proposed methods can serve more passengers with less waiting time compared to baselines.

Keywords

Vehicle Rebalancing/Reposition, Ride-hailing systems, Coverage control.

Suggested Citation

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