ABSTRACT

Bike-sharing systems, where people rent bikes typically for last-mile commuting, have gained great popularity in recent years due to the rapid development of mobile networks. Station-based bike-sharing systems have been widely studied in both academia and industry, where problems like bike rental demand prediction and bike redistribution have been discussed. In contrast, not much attention has been paid to the routing algorithms for shared-bike riders.

A routing solution consists of two stations, suggesting where to rent and return a bike. Existing routing works generally target a single rider. However, during rush hours, there often exist routing requests from multiple riders simultaneously, which has not been carefully investigated before.

This project concentrates on routing problems for multiple shared-bike riders with hardness analyses and approximation algorithms. The challenge lies in how to allocate the limited resources (bikes/docks at the stations) among the competing riders. This project shows that this problem is NP-hard, and thus proposes two heuristics. This project also proposes an optimization technique on routing plan generations, to improve the efficiency of the algorithms.

"Transportation is a cornerstone of modern society, and the rental vehicle industry plays a pivotal role in meeting diverse travel needs. Although, It is based on the dynamics of rental vehicles, exploring their significance, evolution, and impact on mobility. Our analysis encompasses the business models, technological advancements, and sustainability initiatives within the rental vehicle sector. By understanding these factors, This aims to provide insights into the future of mobility and the challenges and opportunities that lie ahead."