Mining Riding Patterns in Bike-Sharing System Connecting with Public Transportation

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Abstract : With the fast growing road traffic and increasingly severe traffic congestion, more and more citizens choose to use the public transportation for daily travelling. Meanwhile, the shared bike provides a convenient option for the first and last mile to the public transit. As of 2016, over one thousand cities around the world have deployed the bike-sharing system. The combination of these two transportations have stimulated the development of each other and made significant contribution to the reduction of carbon footprint. A lot of work has been done on mining the riding behaviors in various bike-sharing systems. Most of them, however, treated the bike-sharing system as an isolated system and thus their results provide little reference for the public transit construction and optimization. In this work, we treat the bike-sharing and public transit as a whole and investigate the customers' bike-and-ride behaviors. Specifically, we develop a spatio-temporal traffic delivery model to study the riding patterns between the two transportation systems and explore the traffic characteristics (e.g., distributions of customer arrival/departure and traffic peak hours) from the time and space dimensions. During the model construction and evaluation, we make use of large open datasets from real-world bike-sharing systems (the CitiBike in New York, GoBike in San Francisco and BIXI in Montreal) along with corresponding public transit information. The developed two-dimension traffic model, as well as the mined bike-and-ride behaviors, can provide great help to the deployment of next-generation intelligent transportation systems.

Keywords : riding pattern mining, bike-sharing system, public transportation, bike-and-ride behavior
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