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Abstract

Bike-sharing is emerging as a convenient transfer mode for metros. While increasing attention paid on the use of bike-sharing, few attempts have been made to understand how built environment attributes affect the synergy of metro with bicycles. This study aims to examine the refined relationship between the integrated usage and built environment within the catchment areas of the metro stations. Inspired by the idea in text mining, this study proposes a topic-based data mining algorithm to unravel bike-sharing usage patterns and land use functions at station level. Specifically, the term frequency-inverse document frequency (TF-IDF) method is adopted to extract key built environment; then the Latent Dirichlet Allocation (LDA) is employed to identify underlying land use functions with their probabilities. Meanwhile, based on the daily tendency of the integrated travel, the latent bike-sharing usage patterns are also estimated using LDA. At last, multivariate regression model is applied to explore the correlation between station-level land use functions and bike-sharing usage patterns, and scrutinize the built environment effects on the integrated usage. This study is helpful in developing a bike-friendly built environment that facilitates the seamless connection between bike-sharing and the metro.

Keywords

Bike-sharing, Metro station, Built environment, Topic modeling, Data mining