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ACCEPTED MANUSCRIPT

Human mobility in space from three modes of public transportation

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Abstract

The human mobility patterns have drew much attention from researchers for decades, considering about its importance for urban planning and traffic management. In this study, the taxi GPS trajectories, smart card transaction data of subway and bus from Beijing are utilized to model human mobility in space. The original datasets are cleaned and processed to attain the displacement of each trip according to the origin and destination locations. Then, the Akaike information criterion is adopted to screen out the best fitting distribution for each mode from candidate ones. The results indicate that displacements of taxi trips follow the exponential distribution. Besides, the exponential distribution also fits displacements of bus trips well. However, their exponents are significantly different. Displacements of subway trips show great specialties and can be well fitted by the gamma distribution. It is obvious that human mobility of each mode is different. To explore the overall human mobility, the three datasets are mixed up to form a fusion dataset according to the annual ridership proportions. Finally, the fusion displacements follow the power-law distribution with an exponential cutoff. It is innovative to combine different transportation modes to model human mobility in the city.

Keywords: Human mobility, Exponential distribution, Power-law, Displacement, Travel time

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