

# Visualizing Spatiotemporal Trajectory of Mobile Social Networking Using Space-Time Cube

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## Abstract

The implementations of social network applications on mobile platforms have sent the activity levels of mobile social networking skyrocketed. Mobile social networking offers a channel for recording human's spatiotemporal behaviors, if location-detecting capabilities of devices are activated. It also promotes time geography study, which has long suffered from the scarcity of georeferenced individual-level movement data (Neutens et al. 2011). In this paper, we reported our exploration of using georeferenced tweets to layout the spatiotemporal trajectories of user's daily lives. We use space-time cube to visualize georeferenced tweets in a three-dimensional manner, with a two-dimensional geographic surface and a third time dimension. Comparing to the traditional methodologies for time geography study, such as travel diary, the using of social media data presents some challenges related to big data: high velocity, large volume, and extreme variety. In order to improve the computing efficiency for data processing, we adopted an asynchronized mechanism, which archives data for periodical batch processing. Large data volume is more of a blessing than a curse as large number of study subjects is preferred. For every 30 minutes, we recorded the activities of about 70,000 Twitter users in a geographic region covering New York City to Washington, DC. These subjects behaved dramatically different in tweeting frequency and spatial movement. We adopted centrophoric measures to summarize the spatiotemporal patterns of tweets. Through this first study, we demonstrated that tweets from mobile platforms can provide ample information about the spatiotemporal behaviors of users, and offer promises to future time geographical study.

## Keywords

Mobile social networking, time geography, space-time cube, big data

## Reference

Neutens, T., Schwanen, T., and Witlox, F. (2011). The Prism of Everyday Life: Towards a New Research Agenda for Time Geography. *Transport Reviews* 31(1): 25-47.