

## Spatio-temporal footprints in online social networks

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Society is comprised of many different types of social networks on various levels. Social networks play a critical role in achieving goals and solving problems. While traditional social networks only existed within a very limited geographical distance (e.g., villages) constrained by temporal factors, modern technology—especially the growth of the Internet and cell phones—has greatly reduced the spatio-temporal limitations on human communication. People who live on different continents in different time zones can interact with each other using phones, emails, and websites. Particularly, online social networks provide an effective channel to enhance existing social networks and to initiate new ones. Facebook, for example, offers services to create profiles, add friends, and exchange information. Twitter, on the other hand, provides a platform to share and discover “what is happening right now?” Social network websites have been an alternative and complementary form of social networks with a growing number of users.

Human activities usually take place in particular locations at specific times within a social network; the activities in online social networks may reflect activities in the physical world. For instance, people may comment on an event that they are currently experiencing, such as a football game or a fire. I am interested in the spatio-temporal footprints inferred from the data created in online social networks, using Twitter as an example.

The study on the temporal patterns of tweets as related to the spatial distribution of tweets may shed light on people’s daily activities. From tweet analysis we may collect data on places people have been to, how long they stay at a particular place, etc. For smart phone users, Tweet contents may provide a real-time record of people’s activity episodes that is even more accurate than a travel diary recorded from memory recall. Besides, this data collection is non-intrusive, so subjects don’t need to write down purposely what they are doing and at what time, because the time of a tweet is recorded automatically by the online service. Traditionally, travel behavior is usually studied using travel diaries that are a part of a travel survey—which is very expensive in terms of time and labor. On the other hand, online social networks provide a possible channel to collect data on people’s daily activities and to study activity-based modeling without circulating questionnaires. Although data collected from online social networks provide a promising way to study travel behavior, we also need to note that it is not randomly designed and the studied sample is self-selective. Therefore, it is also interesting to study the relationship between tweet users and their socioeconomic characteristics, such as age, gender, income, occupation, etc.

Who are frequent users of online social networks?

Who are likely to disclose their locations and activities?

Are tweet activities different between people in large cities and rural areas?

How is the distribution of tweets related to land use within an area?

How is the tweet pattern correlated to socioeconomic characteristics?

How is the distribution of tweets within a day, on different days of a week, and around a major event?

Do young people tweet more?

Do people in big cities tweet more?

Is the number of tweets related to the type of jobs or life style?