

Understanding Human Mobility During Events in Foursquare

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Abstract. Social events can generate high influxes of people transitioning various locations in a city. They can be considered to have a considerable impact on the local economy, whether they are sport events, concerts or festivals. These events are capable of generating sudden changes in the activity landscape of a city, with the neighborhoods that host events becoming unusually busy and active compared to times of regular citizen activity. While event and anomaly detection more generally has been a topic of study in recent years, as also has been event recommendation for mobile users, progress has been slower towards building systems that are able to capture the sudden shift appropriately in this setting. In this work we exploit data from the location-based service Foursquare to study mobility during events in Chicago, and later expand our study to other cities as well. Our aim is to identify what differences emerge in terms of user mobility during events versus regular periods of human activity.

Social events are inherent to urban lifestyle and attract hundreds, even thousands of people at a designated location, typically for a short period of time. Recent studies show that the movement landscape in a city alters tremendously during events [1]. There is a lack of frameworks in the literature of human mobility modeling that are specifically designed to *react* in this context, thus adapt and tune mobility models so they remain effective in event and non-event contexts.

We perform an analysis and comparison of user mobility patterns during event and regular (non-event) periods in Chicago extracted from Foursquare LBSN as follows:

-Spatio-temporal event detection: Initially we apply a method for detecting events through time by observing anomalies in the popularity of places exploiting statistical measurements like *z-scores* in terms of standard deviations from historic popularity.

-Event mobility analysis: Having isolated the scope of events across spatial and temporal dimensions, we perform a comparative analysis of mobility during event and regular times with measures for the geographic dispersion of users across space and time.

Results have shown that while the general trends in human movement, such as preferring nearby places to distant ones, are preserved, there are significant shifts in the ways users move during events. They tend to move faster, visit more popular places and cover longer distances compared to regular times of mobility.

References

1. Petko Georgiev, Anastasios Noulas, and Cecilia Mascolo. Where businesses thrive: Predicting the impact of the Olympic Games on local retailers through location-based services data. *ICWSM*, 2014.