Summary of the addition reading

Paper Title: Understanding How Visual Representations of Location Feeds Affect End-User Privacy Concerns

1. Summary

Although a lot of past works has been done at how to design privacy configuration UIs for sharing current location, but there is a little research on how visual representations of historical locations can influence end- user privacy. That’s what this paper is focus on. And the authors examined three visualization types (text-, map-, and time-based) for social sharing of past locations.

Nowadays location-based services (LBSs) is almost embedded into every mobile devices, which provides a great chance for LBSs shifting away from simply consuming location to sharing locations, and results the appearance of the location-sharing applications (LSAs). For example, there are a lot of LSAs like Google Map, twitter that take use of text-based location visualization, which might causes some concerns on end-users’ privacy. In order to explore users’ privacy preferences and attitudes towards location visualizations, this paper focus on the following research problem:

1. Sharing Location Feeds.

2. Automated Generation of Location Visualizations.

3. Privacy Sensitivities towards Location Visualizations.

4. Privacy Reasoning towards Sharing Visualizations.

Also, this paper finds that a lot of people are willing to share their location, but it depends on different type of visualization. For example, the participants prefer sharing map-based visualizations mostly and are willing to share location is this type of visualization.

Then the paper explains some properties of their work. First of all they describes different dimensions of location feeds and how they represented them in their study. With these different dimensions of location feeds, the paper compares how users interpret and react to them from a privacy perspective. When comes to the location visualization, this paper focuses on seven features are following:

1. Spatiality: a place’s physical location, in absolute terms (GPS coordinates) or where a place is located relative to a known landmark (e.g., “in south LA”)

2. Label: how a user refers to the place (e.g., the user at “Starbucks”, “a coffee house”, or simply “in LA”)

3. Arrival: when a user arrives at a place

4. Departure: when a user leaves a place

5. Duration: how long a user stays at a place

6. Sequence: the order in which a user visited each place

7. Frequency: how often a user visits a place

The second of properties is Generating Location Labels, which presents an interesting layer of complexity that is worth describing in more detail.

There are three main types of visualizing locations as I mentioned before: Text-Based Representations, Map-Based Visualizations, and Time-Based Visualizations. In text-based representations, each row has a timestamp showing arrival and the length of stay. And Map-Based Visualizations marks a user’s location using a pushpin at specific GPS coordinates. This style is conducive for describing locations with geographic labels. In Time-Based visualizations, the paper uses a timeline and color-coded blocks to show when a user arrives and leaves a place. Similarly colored blocks indicate that the user has returned to a particular location. For each of threes types visualization, the paper varies the location labels (general or specific, geographic or semantic). Within the map- and time-based visualizations, the paper also varies the marker type (the traditional marker style or a halo).

The paper also designs a rule to generate location labels automatically by querying a publicly available database and then using zip code to look for the nearest neighborhood. Certainly there might be some problems that some places might not have a GPS readings, then the Skyhook’s API is used to translate the Wi-Fi readings into GPS coordinates. However there are still many perspectives that the location labels are susceptible to errors:

1. Sensing Errors

2. Triangulation Errors

3. Interpolation Inaccuracies

4. Sparse and/or Stale Databases

Also the authors asked the participants to do the User Validation of Location Labels.

Finally, the paper identifies 139 unique places, with each participant visiting, on average, 11.6 unique places (σ=3.1). And the results suggest that, when there are potential power dynamics involved, participants prefer the lowest granularity. When with more intimate relationships, they are comfortable sharing a more descriptive location, which shows the issue of power dynamics and users’ fear of unknowingly being tracked.

2. Discussion

Certainly, there are some cons and pros of this study. One of the pros is that this study is based on the users’ actual location traces with real high correctness, which could reflect the user’s attitude on sharing location in a perfect way. And one of the cons is that the sample size of this study is really small, which might not be able to reflect the reality in the best way.

In short, this study has focused on users’ perceptions of different visualizations (three types of visualizations: text-, map-, and time-based) for sharing location feeds, which might be the first step of the further study on location-based service, especially the location-based applications.

In my opinion, the location-based applications is the trend in the future, currently almost every famous applications or website would have the functionality based on the location like Yelp would recommend the restaurant, Facebook would recommend the friends all based on the location. We even could have the augmented reality game based on the location in the future. So the privacy of using this kind of location-based application would certainly be the first concern in the future. As a user, I do not want any of my personal information is leaked during the use of location-based application and I also do not want anyone else could get my privacy through the historical information in these location-based applications.

Further more, we might have some other issues beyond the technical point of view on the location-based service. Nowadays, there is an often-stated argument that national security comes before the personal privacy, for instance in the case of tracking criminals and terrorists would take advantage of the location-based service. So how to deal with the relationship between national security and personal privacy would be another problem to be considered in the area of the location-based service and applications.