

# Fleeting Social Ties

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## ABSTRACT

Fleeting Social Ties addresses the need for real time location-based services for gaining a local's perspective about a particular city. Tourist guides are often clichéd and do not address the genuine business traveler's or vacationer's desire to experience local and authentic culture as individuals native to that location. This application seeks to bridge this gap by creating fleeting social ties with locals in a particular city to facilitate a genuine communication experience.

## Categories and Subject Descriptors

H.5.2 [User Interfaces]: User-centered design, Screen design, Graphical user interfaces (GUI), Evaluation/methodology.

## General Terms

Design, human factors

## Keywords

Tourism, mashup, user interfaces, social ties, fleeting, local interaction, reverse geocoder, visualization, social network.

## 1. INTRODUCTION

Today's digital population is on-the-move and desires to remain connected. Social context plays an important role in a society burdened by information overflow. GPS co-ordinates are readily available and can be used to find an individual's sense of place, the social space inhabited and an omnipresent communication link to close social and locative networks.

In Fleeting Social Ties (FST), context information in the form of GPS co-ordinates will be captured by extracting place data and utilizing this data to form the basis for creating new social and interactive ties to the world. Thus by combining the environment with location, we alleviate the participant's sense of isolation, keeping old and familiar locations in the vicinity and meanwhile bridging the gap to encourage new social fleeting ties and context data in other strange locations.

## 2. SCENARIO

Business travelers or vacationers make frequent visits around the world to either explore leisurely or for work. Consider the busy work traveler, who is constantly on the move around major cities

and visits foreign places regularly but never really has the time to see her surroundings. She may get one afternoon prior to her business work week to spend time getting to know the strange city. However, she has no time to view all the tourist attractions or get the clichéd tour guides of the city. She wants to get the quick highlights and genuine traditions from the "locals" while spending her short free time in the foreign city. She may be interested in finding the best local restaurants around town, the must-see authentic architectures, the best hotels and the best area to stay in but from a local's perspective. She may want to use Wikipedia, Flickr, Wondir, Yahoo Answers, Wiki Ref Desk or Twitter to find out this information from other locals in that area to prepare for her short hiatus before the busy work week.

She logs into the Fleeting Social Ties application once she arrives at her destination. If she chooses to enable her GPS receiver, she immediately initializes the application with her location's data. However, this location data is not stored to track her or used in any way to reveal her location to others. Based on her location, the application gets the nearby cities and what services are available for her to explore the new surroundings. She quickly gathers her sense of place in the foreign city. As she navigates the 3D map, she selects a nearby city of interest and the application brings further location information about nearby places using Wikipedia, local photos from Flickr taken by actual visitors or people living in that area and lastly, a Twitter view of what people nearby are doing in that area. She gathers a real-time view of what's going on in her surroundings and can quickly understand a sense of what's happening in this community.

Having explored the immediate surroundings, she becomes interested in other towns of interest nearby. For instance, if her business meeting is located in Newark NJ, she may be keen on visiting NYC which is only a 20 minute commute via subway. She clicks on the NYC location and is quickly able to get factual data from Wikipedia about the major highlights of this city, a Flickr view of recent photos taken by others in the city and a Twitter view to provide a sense of what's happening in the city and what others are doing there. Based on the real-time data provided, she gets an honest perspective of the city and has supplemented her knowledge beyond what a tourist guide can provide. She may also directly interact with other locals in the vicinity or browse other recent chats or events posted by other locals to find answers to the best authentic cuisine and must-see events occurring at that instant in time. The communication she creates with other locals is fleeting and is only relevant in real time. Her interaction is unique and cannot be recreated even if she revisits the same location again in the next hour. She is able to get a real sense of what's happening around the city from a local's perspective.

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### 3. CONTRIBUTION AND BENEFITS

Current social software utilizing location metadata are currently one-way flows of information e.g. Twitter. Participants reveal what they are currently doing but there is no interaction among the participants. Similarly, other services such as Flickr allow photo uploads with optional geotags but the data is largely unmanaged and fairly difficult to get auto-location updates. This project proposes to bring these services (Flickr, Twitter, Wikipedia, etc.) together as factual data and also to provide an interactive means of communication with others about this data using the context of location derived from a GPS device. No interface today collectively ties these services together to enhance the communication experience for the participant. In addition, the information provided is presented in real time with no history trail and no archiving of data.

The interactions created at any instant in time cannot be recreated even at the same location. Past research has focused on tracking location metadata from the individual to better inform, suggest or manage an individual's schedule, time or activities. This project does not store any location data, history trails or personal information. Instead, the application is designed to create informal social fleeting ties with locals in the area to better inform an individual about real time happenings in a city.

### 4. PRIOR WORK

#### 4.1 comMotion

In comMotion [1], participants are tracked using GPS and they identify important destinations that are most relevant to their lives such as home, Grandma's house and work. Locations are learned by the system and created by the user in an incremental and adaptive manner. Based on these learned locations, reminders, to-do lists, e-mails and web content are delivered based on their specific location, date and time. Routes are also developed to help predict user's destination where comMotion suggests alternative routes for getting other activities done while ending at the same destination. However, in Fleeting Social Ties, no user input will be required to seed the application and neither will location data be stored to predict or sync user's calendars or routes. The goal of the Fleeting Social Ties project is to provide a sense of community in new surroundings while at the same time maintaining old contacts. No tracking of personal data is proposed here.

#### 4.2 Urban Tapestries

Urban Tapestries [2] creates an interactive personal history trail based on location-specific multimedia such as local history information, personal pictures, movies and sound clips. Location-content threads are uploaded to the system and used to create an organic archive of a community's memory and history. This collective data thus enhances social knowledge to enrich the local environment. Application examples include tourist information, local library, school or museum. GPS or GPRS embedded in mobile phones or public wireless hotspots are used to get location data. Participants access and publish to the system by creating social threads which are placed above a 2D map of street names. Urban Tapestries focused on public authoring where participants created personal threads and history which can be accessed by others in the community.

Fleeting Social Ties does not intend to have an interactive element of authoring and will not save tracking data to create personal history trails. Instead, the location tracking will be fleeting and used only to provide affordances to communicate with others in real time. The information presented will be based on more factual data rather than personal logs. Factual data includes Wiki articles, Flickr photos of nearby locations and some personal experience data to give the participant a sense of place and current "to-do" events nearby based on Twitter. Unlike Urban Tapestries, the data is not collected into history threads so that the threads can be revisited. The data in my application is relevant in real time and is fleeting; content changes with time and cannot be retrieved in exactly the same way twice when the application is revisited later.<sup>1</sup>

#### 4.3 Trace

Count et al [3] created a social networking system allowing event attendees to digitally link to one another based on their convergence to an event in one location. A web based e-mail prototype called Trace was built to enable people to make connections during ad hoc social events. By linking virtual and physical networking, the authors hoped that participants will follow up with their new contacts. Participants received an e-mail with links and profiles to all other event attendees. Its value and usage was tested to determine the extent and ways people would make use of this system. 17 of 66 participants responded to questionnaires and 6 were able to find new contacts. Even less participants felt connected to other people at the events and suggestions included making profiles available before and after events. Count's paper focused on creating new friendship through mutual events. The goal of Fleeting Social Ties is not to create lasting contacts but rather to use location-based data to link people to a shared knowledge of local happenings. The interaction is intended to be transitory, less invasive but useful and is based on event facts or personal suggestions about local happenings or places in real time.

#### 4.4 Location-linked Notes System

A location-based annotation system was built by Tungare et al [4] to let people post and read other's notes at any location. Its goals were similar to the concept of post-it notes on office doors or desks that serve as self reminders or messages to others. However, remote authoring and remote access was also provided to allow users to get messages from one location while they were at another location. Location was used more as metadata or as a placeholder and was not the subject of interest in the message. Fleeting Social Ties has key differences in that the information displayed is about the current location and location is used as grounded data to develop the subject matter. The information is created for other people interested in that location and authored by others currently at that location.

#### 4.5 In-situ Authoring

Weal et al [5] described an investigation into creating an in-situ authoring application to create a novel visitor experience to a historic library of early women's literature. Digital tour guides are authored by domain experts but does not include stakeholders, curators or visitors and become quickly outdated. A field trip of

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<sup>1</sup> Real time information is provided by services such as Flickr, Twitter, Wikipedia, Upcoming Events, News and del.icio.us where content is dynamic.

children aged 10-11 were observed exploring the grounds of a historic house and authoring stories to create a location aware literary experience. These experiences informed the design of an in-situ authoring tool for revisiting, editing, refining and reorganizing the authored content. So instead of having just a curator's guided tour of the grounds, the tour was now split into separate clips, each clip authored by both visitors and other curators, all who had different approaches to describing the grounds. Fleeting Social Ties does involve in-situ authoring; however the content is neither saved nor reused for recreating those experiences. Instead the interaction is short-lived, useful and relevant only for that period of time the data is pulled.

#### 4.6 Familiar Strangers

Paulos et al [6] described Familiar Strangers as people we observe and see regularly on the go but have no interaction with them, as in an urban setting such as a subway. They envisioned a personal wireless device used to build social connections to strangers. This device would integrate non-interactive familiarity with strangers for someone who has just moved into a city or for a local to explore new areas in a familiar city. These factors thus contribute to an individual's sense of belonging to that place and bring comfort, safety and inclusion. A Wizard of Oz prototype study was conducted to determine familiarity with person and place by using a mobile device as a unique trace to an individual's digital scent. An entry log of people and places are kept on the mobile device. While Fleeting Social Ties does try to bridge the familiarity gap in an unknown city, our definition of familiarity is different in that it focuses on activities in the city that contribute to a sense of local place. No attempts are made to track the location or routines of people. Neither do we attempt to create a sense of safety or familiarity with locals in a city.

#### 4.7 World Explorer

Ahern et al [7] developed an interactive visualization tool *World Explorer* to aggregate photos from Flickr's geo-referenced photo collection and user tags. Their map interface uses unstructured text metadata in addition to location metadata assigned to the photo as the basis for aggregating the collection. Using traditional IR methods for TF-IDF, the representative text tags for the area are shown on the map as the user zooms in and photos are displayed in the right pane based on the metadata selected. While Fleeting Social Ties uses Flickr as one of the services in its interface, the goal is not to show representative image metadata but rather to give a sense of local influence to a strange city. As such, several other services are chosen with information pulled in real time to create a genuine and timely local presence.

### 5. EVALUATION PLAN

An initial lightweight qualitative study was performed to determine how participants stay connected to their surroundings and felt a sense of place in a strange city. The following questions were asked:

1. How often do you go to a foreign city?
2. Do you visit for leisure or for work?
3. Do you research the city you are visiting before you arrive?
4. Where do you research the city? What information sources do you use?

5. How do you stay connected to local events happening around you? What are your sources to find out what's happening around you?

6. Do you use services such as Twitter, Jaiku, Wikipedia or Flickr?

7. What other services do you use?

8. How interested are you in finding out what others are doing in the nearby community where you plan to visit?

9. Do you wonder about what others in the world are doing (foreign to your daily activities)? Would you be interested in knowing about other people and cultures in the world? Not necessarily creating new lasting friendships but getting to know about their culture and what they do for fun.

10. What else would you want to learn from them?

11. Do you use GPS devices such as Navigator, GPS capability of mobile phones?

12. Would you consent to reveal factual data about places, experiences, events based on your current location? This location data will not be used to track you but rather provide location context for the information you provide.

The findings of this preliminary study were used to inform the design of the software prototype. Services used by the above participants were used as guidelines to determine the information displayed to help individuals feel a sense of place and a sense for what's happening in the foreign city.

A second usability study was conducted to evaluate the software prototype. The purpose of this study was to determine whether the real time interactions afforded by this interface actually provide useful insights for the business traveler or vacationer. In addition, the interface was evaluated to determine its ability to bring the "local" perspective to a foreign city. To gauge a qualitative experience, this study employed a think-aloud protocol, in which an active conversation with the participant provided some sense of what thoughts and creative fleeting social ties are formulated by the participant.

Participants were given two specific tasks to complete. Each participant was asked to select a foreign destination of choice – a location that has never been visited before by the participant or a location that the participant is planning to go on vacation. This task was designed to give the user a qualitative experience interacting with a foreign city. The participant explores the city using the two interfaces below to perform the task:

1. Web browser for the participant to find any information about that foreign city e.g. by using search engines such as Google, Yahoo, etc.

2. Fleeting Social Ties application where the participant can browse using a 3D map interface and select a foreign location on the map, see Figure 1.

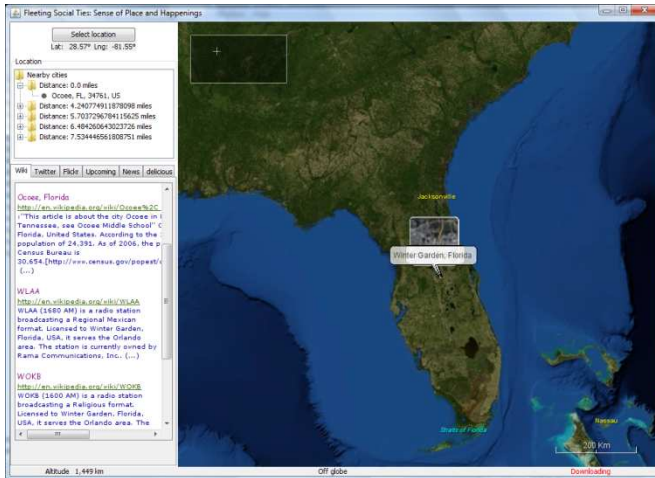


Figure 1. Fleeting Social Ties interface.

Five participants performed both steps 1 and 2 above. The order of the tasks was counterbalanced. This sequencing reduces the bias of ordering effects with the introduction of the new interface. Participants were given a brief overview of how each interface works to acquaint users with the respective tools and the specific task was administered. During the task, participants engaged in a think-aloud protocol. Notes were taken during the task to have a permanent record of the scope of the city that the participant explored. After the task was completed, a post-task interview was issued to find out specific details about the experience and feedback about the task. The following questions were asked to evaluate both interfaces: search engine using browser and the software prototype:

1. What did you like about using the web browser? What did you like about using the Fleeting Social Ties app?
2. What valuable information did you learn about the city using the web browser that you did not learn using Fleeting Social Ties app? Also, vice versa.
3. What did you like about the presentation layout of each application?
4. What additional information or features would you like to see in FST and the web browser (that's missing)?
5. Is the value of the data worth turning on your GPS device? Why or why not?
6. Did you feel that you gained a local's perspective of the city, more than what a tourist guide would provide?

Each participant completed the tasks including the interviews and quick tutorial in approximately ½ hour. No serious time restrictions were imposed though on the tasks for any of the participants (see Table 1).

Table 1. Events and Time to complete events

Events	Estimated Time/minutes
Tutorial	3
Specific task: (see above)	20
Post-evaluation interview	7

Data collection consisted of qualitative data written notes and the subjective perspectives of the participants. Additional notes were taken during the participant's think-aloud thoughts and the post-task interview.

## 6. REQUIREMENTS GATHERING

### 6.1 Participants

Six participants were interviewed to discuss the questions for the preliminary study outlined in the previous section. Four of the six interviews were done face-to-face while the remaining two were conducted using phone interviews. All participants were technically advanced in their fields with at least three years of working experience in IT. Five participants held degrees in Computer Science while the last participant majored in Information Systems. These participants were chosen because they were more likely to use online social networking services to keep in touch with friends or professional mentors.

### 6.2 Results

Responses are divided into the following categories to provide a sense of what these participants found useful in their business or leisure travels.

#### 6.2.1 Travel Frequency

All participants were asked how often they visited a foreign city where "foreign" meant a city they had never been to before. Each participant traveled at least once a year with one participant traveling every three to four months. Their travels were mainly leisure for foreign cities whereas their work travels took them to more familiar places. Each participant noted that they researched the foreign city prior to visiting and used information sources such as Google, official tourism websites, myhotels.com, AA Vacations, Amex Vacation, NY Times, city search, friend/family recommendations and major newspapers such as Reuters, cnn.com, MSNBC, BBC, CNET news and tbo.com. Three participants however said that if they knew a friend living in that city, they would do no prior research at all and trust their friends' judgments.

##### 6.2.1.1 A Local's Perspective

Five participants expressed a need to stay connected to local events. In general, participants wanted to know about the best restaurants, the major events and places or attractions to visit. The most popular interests were in local events calendars found in local newspapers, tourism guide websites and by word-of-mouth. Participant #1 wanted to know how the local people spent their time, what they think about, their religious beliefs, their opinions on news events around the world, their history and the significant local events they attend. She likened the experience to a Bed 'n' Breakfast accommodation where she's offered to sit and chat with the locals, eat with them and get to know more about their culture and traditions. Participant #2 is an avid photographer in his spare time and wanted to know more about the city's best architecture, scenery and the landscape environment. Participant #3 said he would check for big events happening locally but his interests were mainly in finding the impoverished communities and their sustainability models in order to identify social entrepreneurship initiatives and opportunities. He wanted to get a feel for the background culture and the socio-economic climate from the locals' perspective. Participant #6 wanted to get a local feel for their cultural differences and their pastimes.

### 6.2.1.2 Social Networking Services

None of the participants used Twitter or Jaiku even though two participants had heard about the service before and knew that it was a forum for finding out what people were doing. Wikipedia was identified as extremely useful for learning about a foreign city and is usually one of the first hits received after a Google search. Flickr was used by only one participant. Participants named other social networking services they currently use including MySpace (4 participants), Linked In (4), Facebook (4), Yahoo Messenger/MSN (4), Blogger (1), orkut (1), del.icio.us (1) and hi5 (1).

### 6.2.1.3 GPS Devices

Three participants currently use GPS Navigators for driving directions and Participant #1 said she would use this feature in her car even though she did not possess a GPS Navigator. None of the participants used the GPS capability on their mobile phones. Four out of six participants said they would consent to turning on a GPS device to find out their current location in a foreign city and their proximity to local events happening around them. However, they did not want the application to reveal or track their current location. The remaining two participants would not use a GPS device; they were still concerned about being tracked and did not trust an application to guarantee their privacy.

## 7. IMPLEMENTATION

Fleeting Social Ties was developed in Java using NASA's World Wind SDK [8]. GPS receiver data was integrated into the World Wind interface using RXTX [16] so that current location information, in the form of latitude and longitude coordinates, would initialize the application. A reverse geocoder [9] converted the latitude and longitude data into location information such as city, state, zip code and country. The following service APIs were then utilized with input as either latitude/longitude or city/state/zip to bring a local sense of place and happenings: Wikipedia [10], Twitter [11], Flickr [12], Upcoming [13], Yahoo! News [14] and del.icio.us [15]. Each service was implemented as a separate thread in the FST application to increase performance and to also not interfere with simultaneous interactions with the 3D map.

## 8. USER STUDY

Five participants were given the two tasks outlined above and all had previous experience using search engines. Their age ranges were as follows: two in the age range 20-29 and three were over 40 years of age. Two of the participants from the initial requirements gathering session were also included in this second study. Four participants selected a city that they were planning to visit for their summer vacation. One participant selected a foreign city he was interested in learning about but had no plans on visiting this year. Participants selected varied destinations including Vienna Austria (participant #1), Washington DC (participant #2); Venice Italy (participant #3), Seattle WA (participant #4) and Los Angeles CA (participant #5).

### 8.1 Web Browser

The first participant used the web browser first and since the tasks were counterbalanced, three participants used the web browser before the Fleeting Social Ties application.

#### 8.1.1 Search Engine Query

All participants selected Google as their search engine for finding city information. Two participants also mentioned that Wikipedia

was also their first source for gathering interesting facts. Google tended to pull Wikipedia links as one of its top results so participants started with Google rather than directly going to Wikipedia's webpage. Three participants directly typed in the city's name as the query to Google and the results generally provided local tourist city guides, Wikipedia links or local blog sites. The remaining two participants used more qualified searches such as "summer vacation in Italy" and "Los Angeles + jazz".

#### 8.1.2 Relevant City Results

All participants liked Google's ability to quickly pull relevant information about their city. Only participant #3 was not happy with the blogging results returned as one of the top links from her query to find information about Italy. Participants generally expressed interest in finding tourist city guide websites, culture, food, festivals, music, movies and cuisine. However, their specific requests differed depending on their interests and intent for visiting their destination city. Participant #1 wanted to see video presentations about Vienna as he planned to go to the European Soccer Championship as well as tour the city. Participant #2 expressed interest in finding pictures of places to visit in DC taken by other tourists or locals. Participant #3 wanted a planning tool for mapping out the recommended places to visit in Italy: Venice, Tuscany and Rome. She was looking for information on how to organize transportation, lodging and meals among the top highlighted cities. Participant #4 who did not plan on visiting Seattle this year had less specific requirements and just wanted to explore the city. Participant #5 was specifically interested in the upcoming jazz festivals in LA.

Even though all participants felt that they were able to find the information they needed from Google, four participants felt that getting the information required effort on their part. Participant #1 said he had to do all the work of figuring out the query and then browsing the links himself to find out where the European Championship will be held. He felt that there was no built-in intelligence for linking the city and the events. However, he commented that the top five links returned from Google were excellent resources about Vienna and after browsing several web pages, he was able to find the information he needed. Participant #2 felt that the pictures returned from Google were relevant but they were tourist views of the city. Participant #3 thought Google was very convenient and easy to use but felt that she gained general ideas about Italy such as places to visit and their pictures but she wanted a view that showed her the top cities she was interested in so that she may drill down and connect her planning among those cities only. Participant #4 immediately went to Wikipedia's link on Seattle and was satisfied with this query result. Participant #5 had four iterations of refining his query before he could find the summer jazz festivals in Newport Beach. Despite these setbacks, all participants agreed they eventually were able to find the information they were looking for.

## 8.2 Fleeting Social Ties (FST)

Services used by the FST application were Wikipedia, Twitter, Flickr, Upcoming Events, News and del.icio.us. These services were chosen based on the initial requirements gathering session and were intended to provide a local's perspective of the city and additionally a real time view of the city. Overall, four participants thought that FST gave them a local's perspective of the city, however the most useful services that provided this local view varied widely among the participants.

Two participants used the FST application first: participants #2 and #4. Participant #4 initially selected Havana Cuba as his destination choice but since the map resolution was too low, he decided to select another city.

## *8.2.1 Interface*

### *8.2.1.1 3D Map*

All participants welcomed the 3D map interface layout and thought that the presentation layout was much more intuitive. Participant #3 likened the map interface to playing with a toy and enjoyed zooming and panning into the globe. Three participants were able to visually and easily access their destination city. However, two participants had significant difficulties. Participant #1 did not know the exact location of Vienna and spent considerable time trying to find the city. After expressing his frustration six minutes later, he eventually used Google to determine its location before returning to the FST map interface. Participants #1 and #3 wanted the ability to just type the city's name and have the globe move to the desired city; they really did not want to spend time navigating the globe. Participant #3 was able to locate Italy with fair ease but while zooming into this country, she expected that the major cities such as Venice, Rome and Tuscany would automatically populate on the map. Instead she received two obscure cities that she was not interested in. Both participants #1 and #3 said that the map interface needed to give more details about city names during zooming. Furthermore, participant #1 wanted to clear all the annotations and pictures on the map after he had selected many cities trying to find Vienna and the globe became crowded with Wikipedia and Flickr annotations. This "clear annotations" feature was not yet available. Participant #4 was surprised that Seattle looked less green and instead looked like a great big concrete jungle. He explained that he was able to visually learn about the city with considerable ease that a search query would not provide.

### *8.2.1.2 Intuitive Interaction*

All participants felt that response times were sometimes slow and most importantly they did not get any feedback as to what the FST application was doing (when it was in fact getting data from the five services for city information). This resulted in users selecting a particular location several times on the map trying to get a quicker response and left users wondering if they had selected the location on the map correctly the first time. In addition, three of five participants had to be reminded to use the mouse's scroll wheel to zoom into the map. Three participants intuitively double-clicked on the map to bring up the details about that city and asked why no information populated on the left panels (showing the services). The remaining two participants used single-click even though single-click interaction was already reserved for panning the map. Overall, participants generally thought that the "Select Location" button on the top left corner took their focus away from the map interface and they just wanted to click on the map to get all the city information needed. Three participants requested that the left panel be larger as they did not like the scroll bars when Wikipedia articles were returned and did not immediately notice them either. All participants liked the built-in web browser pane when clicking on any of the links returned by the services.

### *8.2.1.3 GPS Device*

After interacting with FST, all participants said they would use a GPS device for this application. Participant #1 though, who said in the requirements gathering that he would not use a GPS device

at all, said that he would turn on a GPS device but only for the short period of time for finding out where he was located and what events are happening around him. He would immediately turn the device off once he notes his location. In addition, he said he would more readily use this application if offered on his PDA than on a laptop. All other four participants expressed great interest in using the application along with GPS in the event that they were lost in the city, safety reasons or if they had a change of plans and wanted to know other happenings are in the city at that time.

### *8.2.2 Wikipedia*

All participants found this service very relevant and useful. In addition, participants noted that Google usually returns Wikipedia as one of its top hits for any search query. Participant #2 liked the Wikipedia annotations on the map as she could see what the individual buildings were in DC and quickly learned the major attractions (such as Washington Memorial, White House, State Capitol) from a bird's eye view. She also stated that Wikipedia was more important than any of the other services provided.

### *8.2.3 Twitter*

Even though the initial requirements gathering session did not suggest that Twitter was a desired service, the reactions to tweets based on zip code were mixed. Three participants liked the Twitter service though did not necessarily find this service useful for learning about their city. Participant #4 thought that Twitter's service was the least useful among the other services for finding city information, however said that it was the most entertaining and should remain in the FST application. He also learned that based on one of the tweets, Randy's restaurant was quite popular in the Seattle area for hash browns and sausage breakfast. Participants #2 and #3 liked reading what other people were doing in the area even though the information provided was not crucial. Participant #5 was curious by what one tweet meant by "allergy juice" and felt that this service was not useful.

### *8.2.4 Flickr*

Four participants found that Flickr's service helped them to see the city better. Participant #2 did not find Flickr useful because there were only one or two authors taking similar pictures of their families repeatedly in the DC area. She noted that the pictures were not as relevant as those provided by Google. All participants noted several deficiencies in the interaction with the pictures. Participants tried clicking on the thumbnails on the Flickr service tab and wanted to know why a full resolution picture did not appear. They were very interested in seeing the picture in higher detail and also wanted to know its metadata such as place name, event and location. Participant #1 was interested in one of the pictures showing a monument so that he could learn more about its significance and why the locals and tourists visited the monument. Participant #3 found the Flickr's service to be the best because she wanted to see the three cities she planned to tour in Italy. Both participants #4 and #5 found Flickr to be helpful but wanted to see more pictures in that area. In addition, double-clicking on each picture should bring up a full resolution view including the picture's metadata. Additionally, participant #4 said that the thumbnails on the map were a bit blurry and did not show the entire thumbnail. Overall participants felt that Flickr was useful but more work could have been done to make the interaction better.

### 8.2.5 Upcoming Events

All participants shared the view that Upcoming events were valuable information especially when turning on their GPS device to find out where they were located. Participant #5 also wanted the application to give directions to local events based on the GPS location. Participant #4 said that finding local events on this tab was much simpler than searching online where web sites would require filters by event category. Participant #2 said the GPS would be especially useful for safety reasons in the event that she got lost in the city. Four participants ranked Upcoming events as one of the top two useful services (with Wikipedia also joining the ranks in the top two).

### 8.2.6 News

Three participants expressed interest in knowing the local news. Participant #1 said he would be interested in visiting this News service to find out what significant events were taking place – both positive and negative so that he may better plan his trip based on those circumstances. However, he did not think that News provided a local perspective. The remaining two participants (#3 and #4) did not use the service at all and only afforded a quick glance but spent no time browsing the articles. Participant #5 liked that the News service included a mix of both national and local newspapers and spent more time going through the news articles.

### 8.2.7 del.icio.us

None of the participants clicked on any of the del.icio.us bookmarks. In fact, participants #3 and #5 thought that the del.icio.us service would provide a link to the best local restaurants even after an explanation was given that this was a social bookmarking service. Overall, participants did not find this service useful. Moreover, participant #1 who suggested del.icio.us on the requirements gathering session said he would recommend removing this service and instead replacing it with the top 5 search links returned by Google. This way, he could get the official tourist guide online along with other top useful sites about the city.

## 9. DISCUSSION

Overall, the response was positive for the FST's goal of providing a local's perspective. Four of five participants said that they did get a local's perspective of the city. Participants enjoyed the convenience of having all the services on the left panel without having to do separate search queries to get the information they needed. In addition, participant #4 noted that FST provided a more interactive way to view a city and its events; the content was people-driven with a more contemporary view of real time data. This advantage was not provided with the web browser. Participant #4 also felt that Google's strongpoint was in finding a broad range of in-depth topics faster. Participant #5 also noted that searching LA on Google returned too many unsuccessful hits such as LA Fitness Center when he was more interested in finding the city. The overall response for FST was positive albeit several suggestions were made for improving the application. Participant #1 wanted the following improvements before he could say he got a local's perspective: the removal of del.icio.us and addition of top five hits from Google, better interaction with Flickr and a search option for typing a city name instead of zooming into a city on the globe.

Several setbacks were highlighted including the limitation of refined maps using the NASA World Wind interface. Participants who selected non-US cities noted that the resolution for zooming

into the city was very poor. Participant #4, who used the FST application first, switched destination cities several times, from Havana, Singapore, Montreal before finally settling on Seattle due to better visual maps.

Overall response time was quick for getting the local services results for U.S. cities. However, response time was especially slow for non-U.S. cities especially where all services did not return any data e.g. Twitter, Flickr, News or Upcoming Events. FST also did not provide feedback to the participant while it reached out to all the services to get city information.

When participants are unsure of the geographic location of a city, they had an extremely difficult time finding the city's location on the 3D map. Two participants spent considerable time looking for the city and began getting frustrated. Even though the map interface was intuitive, these two participants wanted a search query text box for typing in the city and expected the globe to zoom into that city.

Three participants felt that they had more control defining the city using the 3D map interface rather than by a search query. They expressed ease for finding nearby cities and had more control over the interaction of where they wanted to go which a search engine would not provide. The remaining two participants said they would feel they had more control provided the search text box was provided to type in the city name and the 3D map automatically zoomed to that location. The FST application today only provides this feature if the GPS device is located in the foreign city. In this case, the GPS device will return the current latitude/longitude coordinates and the application will initialize to the participant's location on the map and pull all the city information from the services provided. Additionally, as the user travels across the city, the data gets automatically refreshed whenever the participant enters a new zip code.

Based on participants' preferences, another important distinction is the services that each participant found useful. Wikipedia and Upcoming Events were the most popular where participants spent most of their time browsing city information. Other services such as Twitter, Flickr and News had mixed reactions. None of the participants felt that del.icio.us was helpful although it is worth noting that this tab was placed last on the interface and all participants were more absorbed in the prior services and hence did not visit this service for very long. Most participants spent their time on the following 3 services: Wikipedia, Upcoming Events and Flickr more than any of the other services.

## 10. FUTURE WORK

Many enhancements were proposed by the participants in order to make the city experience more localized and the interface more intuitive. Suggestions for the interface included a larger left panel or a way to pop-out the left panel into a larger window, functionality to clear annotations on a crowded map, annotation thumbnails on the map to be clearer pictures and to show the entire thumbnail, faster response times and feedback while FST was getting data from all the services. In addition, they preferred double-clicking on a city on the map to get services' details instead of moving their mouse to the "Selection Location" button on the upper left of the application. One participant also wanted an explanation of why certain map sections are blurry e.g. the State Capitol in Washington DC. Enhancements proposed to create a better local's perspective include: the removal of del.icio.us and addition of top five search hits from Google, better interaction with Flickr to display full resolution pictures along

with metadata, a search option for typing a city name instead of zooming into a city on the globe, the 3D map should show more major cities on zoom-in, and incorporating a planning tool to create a vacation for a tour of multiple cities.

## 11. CONCLUSION

Fleeting Social Ties is a mesh of several social networking services with the goal of providing a real time interaction and a local's perspective of a foreign city. Six main social networking services were utilized: Wikipedia, Flickr, Twitter, Upcoming Events, News and del.icio.us based on the initial requirements gathering session. A user study was carried out to determine whether the data provided would give a local's perspective and go beyond the information provided by a tourist guide. Overall, the response from four of five participants was that a local's perspective was indeed present. However, several enhancements were suggested for incorporation before the true benefits of a localized view could be realized.

## 12. ACKNOWLEDGMENTS

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