Beyond the Bar: The places where location-based services are used in the city

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Frank Bentley
Yahoo! Labs
fbentley@yahoo-inc.com

Henriette Cramer
Yahoo! Labs
henriette@yahoo-inc.com

Jörg Müller
TU Berlin
Joerg.mueller@tu-berlin.de

Abstract

Mobile services are integrating into the places and routines of daily life. But which types of places afford the use of various services, and how important are these places in our lives? Through several studies we have explored the types of places that are most important to people in their cities, and compare these to the place types where different location-based services are used. We find that services were used quite consistently between cities, but that between services places of personal salience, such as parks, are less common in the use of today's check-in services compared to location-based storytelling systems. Supported with data from the Storyplace.me service, we suggest that focusing on selective sharing and storytelling can facilitate use at these more personally meaningful places.

Keywords

Location-Based Services, Mobile, Maps, Venues, Cities.

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1 Introduction

Mobile computing is now a part of daily life in cities around the world. New applications and services are increasingly making use of location sensing capabilities of the phone and helping people to find each other, learn more about their surroundings, and support countless other tasks in the city. However, we have found that not all services are used in the same types of places in the city. As HCI researchers, we feel that understanding the types of places where a service is used is as important as understanding the interactions on the screen itself.

Cities not only harbor the majority of the world's population; they are crucial as meeting places for people, ideas and resources [5]. The study of how people use cities and their organization has been a topic of interest for some time, gaining increased popularity in the second half of the 20th century. In studying the topology of the city, Lynch [11] identified characteristics of urban space that led to increased or decreased use of particular neighborhoods. Milgram's study on mental maps of the city [12] showed that major landmarks, museums, and parks were the most frequent parts of people's images of their cities. Urban critics such as Jane Jacobs [8] and Jan Gehl [5] wrote extensively about the importance of good outdoor spaces and that the activities of life on the street make city life enjoyable. In enabling the full potential of cities, it is crucial that urban design focuses on the human encounters within cities, rather than just on its physical structures and landmarks. Mobile interaction design must also consider the types of use afforded by particular places and the types of social interactions that occur in those places.

We are interested in exploring and quantifying differences between the places where current services are used and the types of places that people feel are most salient to their personal experiences of the city. Understanding possible biases in where location-based services are used is especially important when considering the many possibilities of using location-based usage data in analyzing human behavior or commenting on local trends and differences [e.g. 4, 9]. Rather than starting by asking whether data is 'representative' of local activity, we should first understand what the data itself represents [13], and the types of interactions that lead to differences in usage data across services.

While a diversity of motivations underlie the use of location-based systems [10, 3], today's most popular location-based services such as foursquare and Google Places are centered on venues themselves and not on sharing particular, sometimes ephemeral, experiences that take place throughout the city. Other systems such as StoryPlace.me [2] explicitly focus on people sharing personal stories. In this paper, we explore whether such differences in focus are reflected in the data generated by their users, specifically the categories of places where each service is used.

2 The Data Sets

In order to analyze the place types where existing location-based services are used, we employ data from multiple sources. We chose a variety of applications that each enable different interactions using location data. Usage data comes from foursquare, Google Places, and the Serendipitous Family Stories/StoryPlace.me systems.

In addition, we compare these datasets of services in use to two studies that explore which places people report as influential in their view of, and affective experiences in, their cities. Data on people's perceptions of personally important places in their city come from a replication of the Milgram Map study and data on affective experiences come from an online survey which included an exploration of happy places in the city.

2.1 Chicago Map Study

In the summer of 2011, we conducted a replication of Milgram's Maps study [12] in Chicago with 87 participants (for more details, see [1]). The study recruited people in public spaces in the city and participants were asked to draw "their" view of the city and places that were important to their lives.

One interesting observation that was made was that the types of places commonly drawn on people's maps appeared to be quite different from the places where people use services like foursquare. This led us to our current investigation exploring the places where different location-based services are used.

2.2 Small Spaces Study

In the Spring of 2012, we conducted an online survey to investigate the places in cities that evoke particular emotions. The survey contained a number of questions asking participants to list places in their primary city that made them happy or sad, places they liked to walk, or places they explicitly chose not go to. Participants were able to describe the place in open-ended text as well as upload photos of the location.

In this paper, we are interested in the question on the places in the city "that make you smile or happy," as we would like to see which types of services are used more often in these happy places. 63 participants in the survey answered this question. Participants lived in cities mostly in Western Europe and North America and had an average age of 31.

2.3 StoryPlace.me

StoryPlace.me [2] is a location-based service that was originally designed to afford the sharing of family stories between generations. The system allowed users to record videos and save them to real world locations where they could be discovered by recipients using a mobile application. There are three data sets relating to

StoryPlace.me that we used in the analysis for this paper. The first is from a pilot study of the concept discussed in [2] where ten parents and grandparents recorded stories about events in their lives in Chicago for their children and grandchildren to find when walking around the city.

The second data set in this group comes from privately shared stories in the StoryPlace.me system. While we do not have access to the content of the videos, we do have access to the location of each story and the title. Based on this, we have classified 139 stories into location categories.

The current version of the system also supports professional content, and content owners, such as WTTW and WNET (public TV stations in Chicago and NYC), the Chicago Office of Tourism and Culture, and The Points of Light Foundation in Washington DC, have contributed content to the system for others to discover. This dataset contains the view counts on the 261 videos provided by these sources.

2.4 Foursquare Data

Foursquare is a popular location-based service with over 20 million registered users. It allows users to "check in" to venues in the world to indicate to their friends that they are there and to earn points and badges. We used a one-week block of anonymous check-in data from New York City and San Francisco as this represents two large cities where foursquare use is quite popular. The data was obtained by the Wall Street Journal [14], and we mapped their 80 sub-categories into foursquare's 12 main top-level categories.

2.5 Google Places Data

The final set of data comes from the Google Places service. We captured the 60 most "prominent" places from each of the 50 most populous cities in America using their public API . Each venue in Google Places has a list of "types" that categorize the venue and we mapped these types into the simpler foursquare taxonomy.

This data set is slightly different than the others, which cover all usage (e.g. all checkins for a city). Because this data was not available for Google Places, we used the most prominent places as determined by check-in and search ranking. Therefore types with fairly few venues such as museums and stadiums might be over-represented while those with many places such as restaurants could be under-represented. As seen below, even with this sampling bias, categories such as restaurants still dominate.

2.6 Comparability of Data Sets

Due to the limited nature of datasets available on the places of use for a variety of location-based systems, our data does not all come from the same cities. It is important to note that the findings we present in this paper are from data collected from American cities only, and further research is needed to see if they are replicable to cities outside of the US. We analyzed the differences in use for each

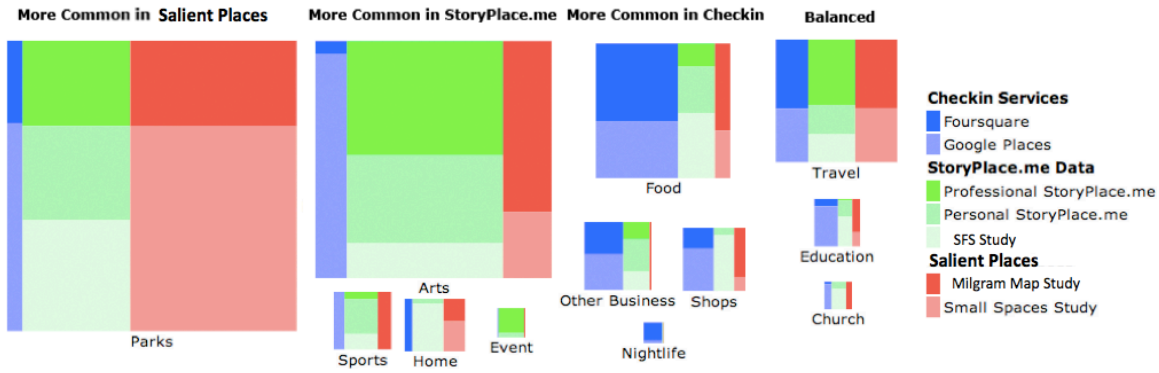
category across all cities in each dataset that contained more than one location. This ensured that the places of use were represented in similar percentages across the cities in each data set.

In the foursquare data set, the average within-category difference between NYC and San Francisco was 1.1%, with the largest category difference being food (25% for NYC and 30% for SF). The Google Places data was also quite similar between cities with the average standard deviation per category being 3.5%. All differences that will be discussed below will be well above these small inter-city differences and highlight more fundamental differences in the place types where each service is used. We feel confident that these differences are more universal regardless of city. For example, the smallest difference discussed below will be an 8% difference between data sets, with most falling in the 15+% range, far away from any differences that arise due to the cities represented in the data sets.

Besides the cities covered, the data sets also reflect slightly different types of use. Because each mobile service is used in a different way (checking-in, searching, creating videos, consuming videos, etc.), the actions recorded in the data sets are by definition different. Each dataset focused on the actions of the end users of each system. While the foursquare data covers all check-ins, the personal content in StoryPlace.me includes the locations of the stories that were created. The professional StoryPlace.me dataset includes all views on the professionally produced videos, since that was the action the end user was performing in the system.

It was also necessary to map the disparate categories of place types reported by each service into a common set. We chose the high-level categories of foursquare as they were a small number of easily classifiable place types. Most other services did not have an explicit hierarchy of place types, so for these services, we used our best judgment to place venues into each high-level category. For example, Google Places had categories such as “meal_takeaway” and “bakery” that were placed under “Food.” For StoryPlace.me data, we had the coordinates of the place and any metadata from the story entry. We viewed the coordinate for each story manually in Google Maps and identified the venue that it covered, using the title to help in places where multiple venues were present in the same location/building. All stories were able to be easily classified into the foursquare place categories.

While many transformations to the data had to occur so that the datasets could be directly compared, we believe that the differences between cities represented and place type categorizations do not significantly effect the comparisons that will be discussed below.



	parks and outdoors	arts and entertainment	travel	sports	food	shops	education	church	other business	event	nightlife	home
Foursquare (NY+SF)	2.6%	1.1%	10.5%	0.0%	27.9%	6.0%	2.2%	0.4%	10.8%	0.5%	9.3%	4.7%
Google Places	6.5%	17.7%	8.2%	6.4%	20.3%	11.9%	11.6%	3.9%	11.7%	0.0%	1.8%	0.0%
Professional StoryPlace.me	18.5%	43.8%	14.8%	2.6%	3.7%	0.0%	0.3%	0.0%	4.0%	12.5%	0.0%	0.0%
Personal StoryPlace.me	20.4%	33.6%	6.6%	11.7%	7.3%	1.5%	2.9%	2.2%	7.3%	2.2%	0.7%	3.6%
SFS Study	24.0%	13.5%	6.3%	5.2%	10.4%	10.4%	5.2%	6.3%	4.2%	0.0%	0.0%	14.6 %
Chicago Maps	28.6%	20.5%	14.1%	7.7%	5.8%	5.6%	3.8%	3.6%	1.7%	1.7%	0.6%	6.2%
Small Spaces Study	68.3%	7.9%	11.1%	0.0%	3.2%	1.6%	1.6%	0.0%	0.0%	0.0%	0.0%	6.3%

Figure 1: Location categories and their relative prevalence in a variety of datasets. Each square is proportional to its presence in the datasets. Differences, especially in the Parks, Food, and Nightlife categories can be seen between the different types of data. A difference can be seen between the places that are most salient and the places where current check-in services are most commonly used.

3 Findings

Our primary interest is in the place types where different location-based services are used and their relation to the types of places that people report as most emotionally salient or characteristic of their cities. Figure 1 shows the results from the data sets mentioned above. In this section we will discuss several categories where we observed significant differences between these seven data sets.

3.1 Parks/Outdoors

The most striking differences appear in the Parks/Outdoors category. In the map study (28% from this category) and StoryPlace.me datasets (20%) these were the places where people drew picnics or described dates with their significant others. The majority (68%) of the answers in the small spaces study belonged to this category. Parks were liked for their atmosphere and for the activities going on there. Outdoor regions were also liked for their vistas, the buzz, and public art. Common across both parks and outdoor places was the connection with strong personal memories.

Most notably, the Parks/Outdoors category were much less common in the datasets from other location-based services such as foursquare (3%) or Google Places (7%). These services are not as focused on these less-frequently visited yet memorable outdoors places, but more on the day-to-day activities of eating and drinking as seen below.

Good parks, as Jane Jacobs noted [5], contain a variety of uses. A participant in the small spaces study liked " I like the parks. Particularly Washington Square Park, Central Park and Prospect Park. They're beautiful, comparatively clean and full of happy, relaxed people whose happiness/sense of relaxation can rub off on you. Many happy dogs and children as well. It's healthy to walk around, it's a nice place to read or just lay around." This combination of uses creates the potential for many memorable life events to occur in these park and outdoor venues over time.

Personal memories of dating and growing up were quite prevalent in these categories. From the small spaces study, one user recounted, "Long Wharf (Boston MA) is where my girlfriend and I first kissed, I also like the view of the Customs House building from there. I like the mix of old and new Boston." Likewise, in the Serendipitous Stories study, a grandparent left a story at an old amusement park about a date she went on as a teenager. These strong personal memories in the city are tied to specific real-world places and create some of the most emotional responses when passing by even decades later.

Other outdoor locations that provided happy experiences were related to views. One small spaces study participant enjoyed looking at the skyline at night: "Many of the buildings were built in the 80s and have a strange color that I enjoy. It looks like the skyline from a Nintendo racing game." The views from outdoor spaces were also frequent in the stories shared in the Serendipitous Family Stories study. Parents and grandparents shared stories about seeing the city skyline from a boat in the lake, seeing the window displays outside of a department store at Christmas time, and of the people that could be seen at a local amusement park. These places often make for memorable interactions with others and with the city that are remembered for years later.

3.2 Food/Nightlife/Travel

Foursquare is most often used in Food, Nightlife, and Travel locations, together accounting for 47% of all checkins. While these might be the most frequent places people visit, we can contrast them (especially the food and nightlife categories) with the places that are most salient to people when asked to describe their cities or to list the places that make them the happiest. While 28% of foursquare checkins and 20% of top Google Places were for food, only 6% of map elements and 3% of "happy" places were from the food category. Nightlife is another example of this disparity with 9% of foursquare checkins but accounting for less than 1% of map elements and zero mentions in the "happy" places in the city data.

This discrepancy highlights a key difference between frequently visited places and places that people report as most salient to their lives in the city. The most visited places were not often thought of when describing places with significant life memories or when telling stories. This does not imply that nightlight spots, for example, are unimportant to people's affective experience of their cities, but perhaps that the existence of a variety of such places are more influential than one specific venue or experience alone.

3.3 Arts/Entertainment

Arts and Entertainment are well represented in all data sets except for foursquare (1% of check-ins) with the highest usage in the StoryPlace.me data sets. Much of the professional content in StoryPlace.me was focused on the arts (44%), and these were also the most frequent places where people created their own personal stories (34%). In the Serendipitous Family Stories study, elders described memorable family trips to science or art museums, going with extended family to a Broadway show, attending concerts of famous artists such as Frank Sinatra, or attending the taping of a TV show. In the small spaces study, a participant for example told us about "Museo Quimbaya. I feel happy in that place because there are various possibilities like … exhibitions about the precolombian cultures … and appreciating one of the Salmona's buildings."

While for most people visits to arts and entertainment venues may be less frequent than restaurants or nightlife, it seems that the social nature of the events and the opportunities to experience something new leave a lasting impact on the attendees and these spots become salient and quite memorable places in the city. This is confirmed by the high percentage of places from the map study that contained Arts/Entertainment venues (21%) compared to the percentage of Foursquare checkins in these places (1%).

4 Discussion

Different location-based services are used in different place types in the city. Not every service needs to address the same spots; some can be focused on the frequent venues of daily life, others on more personally memorable places we don't go to every day, or a combination of these. However, we should be aware of how differences in service or interaction design create differences in the places and times where a system will be used.

4.1 Importance vs. quantity of posts

First, we believe that quantity of posting does not equal importance; nor do we believe that systems focusing on day-to-day places are less important. However, systems that encourage checking in everywhere a person goes, with little distinction between checking in at a soon-to-be-memorable event or for the morning coffee, do not allow others to see a clear picture of which places have the most emotional

attachment to people. In contrast, today's check-in services allow for more discovery in 'using' cities and finding specific types of venues. Some places with significant events might only be visited once or quite infrequently despite their emotional importance. Both types of services are important and useful, but for different types of exploration. As the daily checkin applications are now widely used, we see an opportunity for more applications that focus on the salient and emotional places in life. And that in so doing, we can better know which places are most influential in people's affective experience of their cities and move beyond the places that they go to most often.

4.2 Beyond 'places'

Cities are not simply collections of destinations. Cities have character, and there is 'life between buildings' [5]. Experiencing a city does not consist of just visiting the coordinates of the venues within it. It is the experience of traversing its streets, its sounds, smells, sights, and interactions between people.

While focusing on venues and 'end-points' is often a practical decision, aspects of the journey and experiences along the way like the view of the night skyline from the train or the many spots in a park that invite a sequence of interactions mentioned above, may not be easily captured in systems that focus on specific points.

4.3 Telling a story

System design features, wording of 'instructional' elements and emerging usage cultures (see [10, 3]) all contribute to how a system is used in practice. For example, foursquare uses the word 'tips', within its mobile app asking users to 'Leave a tip to let other people know what's good', rather than to leave a personal story. As a result, most users leave short textual tips, useful to strangers, such as the best item to order on a menu. In contrast, StoryPlace.me, whose use more closely tracks the categories from the "salient places" data, affords sharing more memorable life events. Using video as a means of sharing means that the user must feel that they have something worth recording and sharing with a friend. They need to have a story to tell, and a story that they think their friends will find interesting. Also, sharing generally occurs to a small number of specific people and not to one's entire network as is common with foursquare or Google+.

4.4 For immediate use vs. for reflection

A final difference between the foursquare/Google Places datasets and the Serendipitous Stories/StoryPlace.me data is in the timeframe when the sharing of places is to be used. From friends' check-ins on foursquare or Google+ posts with locations from Google Places data, updates are meant to be used immediately (as seen in [3]). In foursquare, friends have to spend considerable effort to see each other's history beyond a day. However, the storytelling systems focus on creating a lasting object, one that can be relived for years to come. This shifts the focus from

immediate coordination and short-term sharing to reflection and describing more long-term, meaningful events and experiences which then changes the types of places where they are used.

5 Design Inspirations

We see an interesting design space for services that support engaging with places that harbor important memories and supporting reminiscing over in-the-moment location sharing. These types of services bring important new design considerations, and as we have shown above are used in very different places within cities than traditional check-in services.

Important design considerations include finer-grained sharing of places and stories. Many important places might only hold meaning to one or two other people - perhaps the site of a first date or a spot visited on a family vacation. It is important to be able to restrict access to the people that the sharer desires to engage in these often very personal life events. This can help the sharer to portray the appropriate image of themselves and their past activities to particular people in their lives, following from Goffman's discussions on presentation of self [6].

Having the option to leave a personal local memory, or message for a specific friend or family member, rather than only being able to share with 'all friends' would facilitate playful and private interactions deemed unsuitable for wider sharing.

Another design direction could explore personal reflection over sharing to help people remember their own past experiences in particular places in the world. Similar to Cramer et al.'s findings on Foursquare use [3], often location histories can be useful for reminiscing or locating the spot of a past memory. Systems that support including rich media such as video with a personal location history can help people to better remember and reminisce about their experiences in particular places in the world.

Either type of system involves shifting from a focus on the more ephemeral sharing present in today's check-in systems to services that maintain a rich history of locations and experiences in those locations. This history then supports reminiscing and re-engaging with places that contain rich memories and important life events in a way that is not currently supported by today's popular location-based services.

Being able to communicate about more types of locations than only public venues can be very helpful in such cases. For example, for more utilitarian or personal messages, being able to specifically address private place such as home, work, or 'grandma's house' is helpful. In our 'happy places' study, the reported places that invoked strong positive emotions were not necessarily suited to creation of a public venue. Services need to support the creation of outdoors, on-the-move contexts involving multiple 'locations', as well as ephemeral spots or events.

A variety of usage motivations underlie location-based services, with the immediate sharing in systems such as foursquare useful for many purposes. However, creators of location-based services should actively consider the types of places where their systems will be used, the content about the places that will be shared, and the depictions of the lives of their users created from this location history. This should all be done while providing users explicit control over the people who can see this information.

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References

1. F. Bentley, H. Cramer, W. Hamilton, and S. Basapur. 2012. Drawing the city: differing perceptions of the urban environment. Proc. CHI'12.
2. F. Bentley and S. Basapur. 2012. StoryPlace.Me: the path from studying elder communication to a public location-based video service. Ext Abst CHI'12.
3. H. Cramer, M. Rost, L.E. Holmquist. 2011. Performing a Check-in: Emerging Practices, Norms and 'Conflicts' in Location-Sharing Using Foursquare. Proc. MobileHCI'11.
4. Cranshaw, J., Schwartz, R., Hong, J., & Sadeh, N. 2012. The livehoods project: Utilizing social media to understand the dynamics of a city. ICWSM'12.
5. J. Gehl. 2010. Cities for People, Island Press.
6. E. Goffman. 1959. The Presentation of Self in Everyday Life. Anchor Books.
7. J. Hightower, S. Consolvo, A. LaMarca, I. Smith, J. Hughes 2005. Learning and recognizing the places we go. In UbiComp'05 2005: (pp. 159-176).
8. J. Jacobs. 1961. The Death and Life of Great American Cities. Vintage Press.
9. N. Lathia, D. Quercia, J. Crowcroft/2012. The hidden image of the city: sensing community well-being from urban mobility. In Pervasive Computing (pp. 91-98).
10. J. Lindqvist, J. Cranshaw, J. Wiese, H. Hong, and J. Zimmerman, I'm the Mayor of My House: Examining Why People Use foursquare, Proc CHI'11.
11. K. Lynch, 1960. The Image of the City. MIT Press.
12. S. Milgram. 1976. Psychological Maps of Paris, in: Environ-mental Psychology: People and Their Physical Settings. Holt, Rinehart and Winston. pp. 104–124.
13. M., Rost, L. Barkhuus, H. Cramer, B. Brown. 2013. Representation and communication: Challenges in interpreting large social media datasets. Proc CSCW'13

14. A. Sun, J. Valentino-DeVries and Z. Seward. 2011. A Week on Foursquare. http://graphicsweb.wsj.com/documents/FOURSQUAREWEEK1104/ (Accessed July 20, 2012).