Who's Checking in to Downtown Tampa?

How location-based social media helps with visioning.

By Randy Goers

Will location-based social media become planners' new best friend? The city of Tampa Planning Division is trying to answer this question by mapping and analyzing trends derived from data from Foursquare, the location-based social network, which lets people "check in" to places using their mobile phones. The goal is to determine if social media data can be used to inform planning and redevelopment decisions.

Location-based social networks depend on the ability of a mobile device to signal where a person is in relation to its cell site; that location in turn can be translated into a location on a map and shared with friends via a social network. There are hundreds of LBSN sites and applications, including popular sites such as Facebook, Foodspotting, and Foursquare.

What interests Tampa city planners about location-based networks is that every check-in is recorded in GPS hardware in the mobile device or network location provided by the application. Having access to that data could provide insights into how people use their community.

All of the LBSNs can collect and store this data, but for its study, Tampa city planners selected Foursquare as the data source because of its many users and relative availability of data. According to the company's website, Foursquare had more than 30 million registered users worldwide by the beginning of 2013. More than three billion check-ins have been registered through the network.

Several cities (including Chicago, New York, and San Francisco) use Foursquare and Facebook to promote city services, parks, and historical and culturally significant places, but the use of social media data to advance city planning initiatives is still in its infancy.

One such project comes from Carnegie Mellon University in Pittsburgh, where researchers at the School of Computer Science have developed a program called Livehoods (www.livehoods.org). Livehoods organizes check-ins from social networking sites into a cultural database of local habits and trends.

According to the university's researchers, Livehoods could allow planners to explore how people actually use the city by clarifying the factors that come together to shape the urban landscape and the social texture of city life, including municipal borders, demographics, economic development, resources, geography, and planning.

Other research is being conducted by Foursquare itself. With billions of check-ins in its database, the company is looking into how its data make cities easier to use. Speaking at a gathering of New York's data community in September 2012, Blake Shaw, a Foursquare data scientist, demonstrated several tools that could analyze behavior at a very high resolution. These tools are not yet available to city planners. (However in May, Foursquare announced a new partnership with Gnip.com to distribute anonymized check-in data, which could provide planners with new tools.)

Acquiring the data

One reason why the use of LBSN data by planners is not widespread is that the data are not easy to acquire. Foursquare does not make data sets available for download. It does, however, give applications developers access to real-time data through its applications programming interface. API is not a data repository in the traditional sense, but users can get information on venues and total check-ins.

Twitter opens the door to location-based networks. When a user sends a tweet, he has the option of posting that tweet on other social networks. Tweets are not subject to the same privacy controls those found on other social networks. With the right programming scripts, tweets can be downloaded and linked directly to the venue database of the social network where they are posted.
The process, called “crawling,” allows web programmers to create a web robot that systematically scans Twitter for changes in content. Tweets referencing other LBSNs are saved to a database and can be used for mapping and analysis. Programmers can create their own databases, or they can seek out other organizations that have already gone through this process and have produced geospatial databases.

The International AAAI Conference on Weblogs and Social Media website ([www.icwsm.org](http://www.icwsm.org)) makes available open-source social media datasets that could be used for planning analysis. ICWSM has accumulated several social media datasets. One contains more than 100,000 geotagged tweets from 100 top cities. Users must request access to the data, agree not to redistribute the datasets, and abide by the citation requests of the authors of the dataset used.

Tampa's Foursquare heat map

In the first application, Tampa city planners partnered with the city's technology department to create the Tampa Foursquare Heat Map, an application that allows users to see who’s checking into venues all over the city in real time.

Data are drawn directly from Foursquare's servers and displayed in a web browser showing the relative concentrations of check-ins at that moment. The greater the concentration of check-ins, the redder (hotter) the map appears. Lower (cooler) concentrations are shown in blue.

The changing pattern of check-ins led city planners to investigate how the data could be compiled, analyzed, and used in decision making. In March 2012 Tampa's planning division requested data directly from Foursquare for a pilot project to assess the viability of social media data as a planning tool. Foursquare obliged via a user agreement and provided two weeks of check-in data. The data were imported into a GIS system and check-in patterns were mapped and analyzed.

The stage was set in 2010, when the city received a grant from the U.S. Department of Housing and Urban Development Office of Housing and Sustainable Communities to complete a master plan for its urban core. The InVision Tampa planning effort strives to connect Center City neighborhoods and lay the groundwork for a reimagined Center City — one of an active, thriving, vibrant waterfront city. Two years later, the core area also became a Foursquare study area.

The 3,200-acre study area includes the central business district and all or part of eight surrounding neighborhoods, each with its own special character. The CBD is a financial, government, and entertainment center comprised of commercial mixed use developments of moderate to high intensity. An emerging neighborhood east of the CBD, the Channel District, is a moderately high-intensity residential area. Ybor City, a nationally recognized historic and entertainment district, is located northeast of the CBD. The remaining neighborhoods are characterized by low-density, mixed use, residential development.

Just to the west of the CBD is the University of Tampa, with an estimated 6,738 students living on-campus or in nearby neighborhoods. Several regional entertainment destination are located in the study area, including the St. Pete Times Forum, the Florida Aquarium, Tampa Port Cruise Terminal and the Tampa Convention Center. A dominant, natural feature is the Hillsborough River, which bisects the area. The Center City has about 30,767 residents, about nigh percent of the city’s total population.

Launch and aftermath
Tampa Mayor Bob Buckhorn launched the project on “Foursquare Day,” April 16, 2012, announcing the Tampa Heat Map application and encouraging Tampa citizens to be a part of the InVision Tampa master planning process by checking in on Foursquare between April 16 and April 30. Mayor Buckhorn is an avid fan of Foursquare and a heavy user of social media as a communications tool to connect with citizens.

"It's about making our cities places where people want to come and where they can enjoy a wide variety of things to do. We have to begin thinking out of the box and looking at our communities with the help of new technologies," Buckhorn says.

During the two-week study period, 25,026 check-ins were recorded at 2,461 venues in the CenterCity. The top five categories of venues were food, nightlife spots, professional and other places, colleges and universities, and travel spots. Within these categories, the top five venue types included bars, college dorms, offices, nightclubs, and hotels. The top five places were IKEA, TampaBay Times Forum, Carnival Paradise Cruise Line, Ybor City, and the Castle Bar (a popular YborCity destination). These check-ins highlight Center City's entertainment, employment, and college nature.
The check-in patterns reveal several major hotspots, including the University of Tampa, the Ybor City entertainment district, the cruise ship terminals, Tampa Bay Times Forum, and the office core. Check-ins were plotted hourly and a time-lapse video was created showing the changing levels of activity in Center City over a 24-hour period.

Viewing the time-lapse video, it's easy to see changing levels of activity at the University of Tampa, the morning check-ins at work downtown, the return to residential towers in the afternoon, people arriving and departing at tourist venues, an ebb and flow of activity at restaurants, and the awakening of Ybor City after 6 p.m. The check-in data also show a linear pattern, stretching across the Hillsborough River, from the west of the University of Tampa into Ybor City.

**Invision Tampa Check-ins 7 a.m.-9 a.m.**
Employees check in to office locations, parking garages, and morning coffee laces. Visitors arrive for conventions and meetings or at cruise ship terminals.

**Invision Tampa Check-ins 4 p.m.-6 p.m.**
University of Tampa students continue to check in to class, Visitors check in at the convention center, at nearby hotels, and restaurants in Ybor City (upper right).

**Invision Tampa Check-ins 11 p.m.-1 a.m.**
Activity in Ybor City peaks and dominates this time period. People return to Center City condos, apartments, and college dorms from a night out. Activity on South Howard, another entertainment area (far left), emerges. Images courtesy Randy Goers.

**Value of the data**

After evaluating the results of the pilot project, planners found several benefits in using social media data, including these:

- Social media data are ideal for conducting pedestrian counts and quick surveys on a massive scale and at low cost, since the content is entirely user-generated. And because the data constantly change, they can be refreshed to show the most current patterns.
- Activity at the University of Tampa had never been quantified. Using the social media data, planners for the first time could evaluate student activity patterns in relation to a variety of places within the urban core.
- Before the Center City Master Plan, discussions of in-town transit focused on a north-south alignment or a loop through neighborhoods to the north and west of the CBD. The AECOM consulting team, after evaluating the trends and input provided at community meetings, saw an immediate market and demand for an east-west connector. The heat maps reinforced this recommendation.
- The check-in patterns reveal missing links or voids between activity nodes that could be targeted for different types of uses to attract or extend pedestrian activity.
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- Tampa planners will also integrate check-in patterns into prioritizing streetscape improvements and other enhancements to the pedestrian environment. High-activity areas or pathways connecting high check-in nodes will be evaluated first for improvements that will support and foster additional pedestrian and economic activity.

Limitations

While social media data can help planners analyze user behavioral patterns, there are some inherent limitations in the data that must be accounted for when interpreting the results. For example:

- Demographic information is not stored in the data, but news articles describe the typical Foursquare user as a 30-year-old American male who earns $50,000. Overall, 60 percent of users are male. Forty percent of users are between ages 18 and 29, 42 percent between ages 30 and 43.
- Because social media users tend to be younger professionals with smartphones, neighborhoods with older, poorer populations are nearly blank in heat maps.
- Foursquare allows users to define places, so obscure locations that have a meaning only known to the user are common ("grandpa's new car" is one that popped up in Tampa). Locations and experiences are interchangeable in the data; interpretations of the patterns have to be fluid.
- User-entered data are subject to input errors or typos. On a map, input errors are not visible, but if one is compiling a database, there is a need for data cleaning.

As social networking sites evolve, the hope is that improved data sets will become available, thus reducing or eliminating the effects of these limitations.

Next steps

In the second phase of the Challenge Grant project, a master plan for a planned bus-rapid transit corridor, the Tampa planners are partnering with Carnegie Mellon University to analyze the relationship between where users congregate and where transit stops are planned. The collaboration will build upon the previous heat map exercise but at a finer grain level of detail.

CMU researchers will map the Livehoods that exist along the corridor, specify the key attributes of Livehoods for planned metro rapid transit station project areas, and identify trends that might support certain redevelopment projects. The results of the analysis will be a resource for the consulting team that is developing redevelopment scenarios.

In the more distant future, the city’s planning division wants to integrate data from other location-based social networks to create a broader picture of user behavior and experiences that can augment traditional planning tools.

Randy Goers is the project manager for Tampa’s InVision project.

Resources

**Images:** Top — Tampa residents and visitors checked out — and in to — the Florida Aquarium during the city’s Foursquare study period. Photo by Tom Wagner, courtesy the Florida Aquarium. Bottom — A heat map of user check-ins shows that Center City hot spots are in key activity centers and along major corridors. Photo courtesy Invasion Tampa.


Foursquare: [www.foursquare.com](http://www.foursquare.com)

InVision Tampa: [www.invisiontampa.com](http://www.invisiontampa.com)


"A Week on Foursquare" by Albert Sun, Jennifer Valentino-DeVries, and Zach Seward in the *Wall Street Journal*, May 19, 2011: [http://on.wsj.com/j3LgUP](http://on.wsj.com/j3LgUP)