Motivating Crowds to Volunteer Neighborhood Data

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Abstract
Organizations invest resources to gather geographical information about cities or neighborhoods. This can help governments or companies identify needed services or city improvements. However, collecting this information can be difficult and expensive. In this study we investigate ways to motivate local crowds to serve as the world's sensors and provide geographical data about their surroundings. We conduct interviews and a pilot study to understand whether we can motivate people to contribute data about their neighborhoods via games or for the greater social good of helping the neighborhood. Our results provide a glimpse of how people feel about donating neighborhood data given different motivators; they also provide insight into the amount of data people are willing to contribute. We conclude by discussing possible design implications of our findings.

Author Keywords
Crowd-sourcing; Motivations; Gamification; Community; Location-based and context-aware computing; Computer-Mediated Communication; Entertainment/games

ACM Classification Keywords
H.5.m Information Interfaces and Presentation (e.g., HCI): Miscellaneous

Figure 1: Person inputting neighborhood information to the gaming interface.

Figure 2: The leaderboard only present in the gaming interface, shows the rankings for the photos and tips users contributed. Clicking a user's name makes the map show the places visited by that user, allowing others to spy on the competition.

Introduction

Gathering geographical information usually requires paying expert curators to provide knowledge bases [6]. While this information can be rich and detailed, it usually is expensive and cumbersome to update. Occasionally, governments install sensors to implicitly understand how a city is evolving. However, such installations can also be expensive, and rarely provide any semantic meaning [3].

Figure 3: Each number showcases how the interface design is different based on how it motivates crowds.

To overcome some of these issues, organizations can use a crowd of locals to provide detailed information about a geographical region. Local crowds can deliver updated, detailed and semantic information about a city [6, 1, 3], inclusively, some are self-motivated by their passion or emotional attachment to a place [5, 2].

Current research has begun to study how to motivate crowds to contribute more and better information. The work of Bowser et al. [1] studied whether offering rewards, such as store discounts, drove people to contribute more information about local restaurants. Massung et al. [4] studied whether game mechanics, such as points and leader boards, were more effective than financial incentives for data collection tasks. Teodoro et al. [6] studied the motivations and experiences of people who regularly complete physical world tasks.

Previous research has, however, failed to consider what type of motivators could get local crowds to volunteer data about the places they frequent. Designing technology to persuade or motivate crowds to take part in a cause is still an open research question. In this work, we explore the intrinsic and extrinsic motivations of local crowds. An intrinsic motivator prompts participation for inner joy such as the satisfaction of helping others, while an extrinsic motivator prompts by offering some type of material reward. We use different interfaces to investigate whether local crowds can be more intrinsically or extrinsically motivated to contribute data about their neighborhoods, and we gather information on their perceptions of each motivator. Figure 1 shows a user interacting with the gaming interface.

Methodology

Interface Design
Our aim was to create mechanisms to manipulate people's motivations for contributing neighborhood data. We designed two mobile interfaces, each with a different motivator, using Foursquare's and Google Maps' API. The intrinsic motivator focused on encouraging contributions for the greater social good of a neighborhood, while the extrinsic motivator prompted by offering prizes for providing the most data. Figure 3 presents both mobile interfaces; the major differences between them can be seen in Figures 2 and 4.

Food in Goleta:

Scroll through the list and click on a name to see it displayed on the map.

Los Agaves Restaurant
Tips: 0

Presto Pasta
Tips: 1

La Carreta
Tips: 2

Paloma Restaurant & Tequila Bar
Tips: 2

Rusty's Pizza Parlor
Tips: 2

Figure 4: Only the social good interface ranks locations from least to most photos or tips contributed by any user. This shows the dining places in Goleta ranked by tips to encourage contributions to these locations.

Interface / Metric	Social Good	Gaming
# Comments (Tips)	12	134
Median # of Words	9	6
Min. # of Words in Tip	2	1
Max. # of Words in Tip	23	33
# of Photos	3	34
Total # of items	15	168
Total # of Places Visited	12	116

Figure 5: The table displays the data totals contributed by users for each interface as a group.

Study Design
We recruited participants in public spaces (e.g., beaches and parks) and invited them to participate in our study. A total of 8 individuals participated in an interview covering people's perspectives on the two interfaces and motivators for contributing neighborhood data; 6 different individuals participated in the pilot study. Interviewees ranged from the ages 21-35, with a median age of 24. Pilot study participants ranged from the ages of 20-27, with a median age of 23.

Interview Study. We conducted a within subjects study that began by asking each interviewee to use each interface for 5-10 minutes, and then asking them to discuss their thoughts on the interface and the motivators driving them. Participants voiced their thoughts of the motivators, the reason they preferred one interface over the other, how and why they would contribute or not, and their use of social media. We used a Latin square design to select the order in which participants would use and discuss the two interfaces. A qualitative coding based on grounded theory was used to analyze interview responses. This allowed us to establish categories of people's perceptions on the motivators found in the interfaces.

Pilot Study. We conducted a between groups study, where participants were divided into two groups: one group used the social good interface, and the other used the gaming interface. Each participant was randomly assigned to one of these two groups and used the interfaces for a period of 5 days. Participants in the social good group were told to upload photos and comments to help their neighbors have a better notion of local activities. Conversely, participants in the gaming group were told that they were competing for prizes for submitting the most data in three categories: most

photos, most comments, and most photos and comments combined. At the end of the study, we manually analyzed the amount, and quality of the data provided to understand how viable these motivators are.

Results

Interview Study
All interviewees expressed they would likely donate more data to the social good interface. The following 4 categories covered participants' perceptions of the social good and gaming interfaces. Note that one person can be associated with more than one category, as a person can have more than one perception associated with these interfaces or motivators.

Neighborhood Identity. People (47%) felt their contributions to the social good interface depended on how much they identified themselves with the neighborhood regardless of how long they had lived there, or amount of knowledge they had about the place.

Self-Branding. Some participants (31%) expressed they were likely to contribute equally to both interfaces, as long as others could see the places they had contributed to. These individuals appeared to be interested in using their contributions to promote their persona, either by showing they knew the most about certain places in their neighborhood, or that they donated their time and effort to the neighborhood's cause.

Cheating. Participants (25%) thought the gaming interface could incent people to cheat and submit bulks of irrelevant data to win. People felt that the social good interface limited this type of behavior, as there was no incentive to cheat. Participants also discussed that displaying the user's name and contributions to their neighbors would limit and discourage cheating.
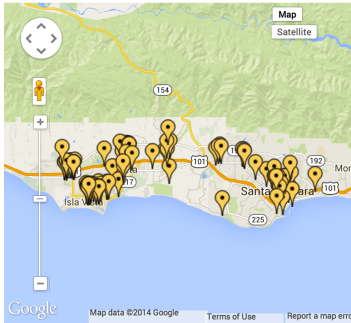
Gaming Interface Results

Figure 6: Map showing the locations for which crowds contributed data in the gaming interface. This interface received more crowd data than the social good interface.
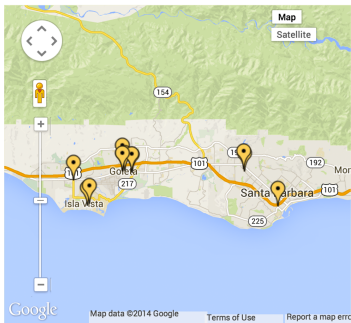
Social Interface Results

Figure 7: Map showing the locations for which crowds contributed data in the social good interface. In general, individuals only volunteered one neighborhood data point for this interface.

Bridges. Some participants (20%) believed they were unlikely to contribute geographical knowledge, as they hardly went out or felt unfamiliar with their spatial surroundings. However, these individuals expressed that for the social good interface they were likely to recommend friends who did go out and could volunteer for the cause. The gaming interface did not prompt people to want to bridge or connect others to the site.

Pilot Study
Figure 5 presents the number of comments and photos that participants volunteered about their neighborhood to the social good and to gaming interfaces. Participants donated more data to the gaming interface. Upon manual inspection of the data it appeared it was all relevant and related to the locations. Participants did not appear to be cheating. Figures 6 and 7 show a visual of the data submitted by users.

Discussion and Future Work
Our interview results highlight that to encourage crowds to contribute data we need to make a design that motivates different types of users and allows them to participate in ways they find comfortable. Creating interactive data visualizations that help organizations understand which neighbors identify themselves the most with that region and allowing people to assume different social roles, such as bridges or connectors are some examples of accommodating users' and organizations' needs. Additionally, designers might want to consider creating interfaces that let people donate their knowledge while building their desired public image.

In our interview-based study the majority of participants felt more likely to contribute data for the social good interface, however, the pilot study results showed the

contrary. It is also possible that the social good cause that we presented to participants was not compelling enough to encourage contributions. Future work could investigate the relationships between neighborhood social good causes and crowd participation, as well as the differences between people's perceptions and actual data contributions. A user study evaluating our system is forthcoming; within the study we also plan to evaluate peoples personal intrinsic and extrinsic motivators.

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