Towards a Micro-Contribution Platform That Meshes with Urban Activities

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Abstract. In this paper, we discuss a mobile, context-aware platform for people to request and/or carry out microtasks in urban spaces. The proposed platform is based on our analysis of the activities of people in urban spaces including public transport environments, and considers various contextual factors to recommend relevant microtasks to citizens.

1 Introduction

Crowdsourcing provides a service platform for harnessing the skills of the large, network-connected crowd [1]. Integrating it with ubiquitous computing would allow for capture, sharing and validation of a massive amount of data [2], and development of a pervasive participatory system.

A key challenge in mobile crowdsourcing is the provision of the right task requests to the right people at the right time, at the right place, and in the right way. One of the approaches to tackle this challenge is task recommendation. Recent proposals to recommend tasks to crowdworkers exploit different approaches to match users and tasks [3,4,5] although they do not consider mobile contexts.

In this paper, we discuss a mobile, context-aware platform for people to request and/or carry out microtasks in urban spaces. The proposed platform is based on our analysis of the activities of people in urban spaces including public transport environments, and considers various contextual factors to recommend relevant microtasks to citizens.

2 The Urban Context

To develop a micro-contribution platform that can be integrated with urban spaces effectively, we investigated two types of prominent activities in a city: (1) using public transportation and (2) visiting food venues.

Firstly, we examined the activities of public transit users, focusing on their use of *spare time* while on the move, based on informal field observation at 20 train stations of a Japanese railroad line as well as a survey which we have carried out by using a Japanese online crowdsourcing service called Lancers [6].

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Table 1. Activity Choice

(1) Reading	(8) Using an alternative means of travel
(2) Shopping	(9) Going back to work / going home
(3) Snacking	(10) Smoking
(4) Taking a walk	(11) Visiting an amusement spot
(5) Dining	(12) Staying at a hotel
(6) Playing games	(13) Others
(7) Working / studying	

A key result from this investigation reveals different patterns of activities for different lengths of spare time. Respondents of the survey answered multiple choice questions by selecting the preferred activities at train stations, for different spare-time lengths, i.e., 0–5, 5–10, 10–20, 20–30, 30–60, and more than 60 minutes. They chose from the 13 activities that are shown in Table 1[1].

We received responses from 151 citizens in total. Figure 1 shows the number of respondents who preferred each activity for different lengths of spare time. Reading is the most popular activity to kill time in public transit environments, and it is particularly popular for shorter spare time of less than 30 minutes. We can see that some activities are skewed towards the shorter time length, and other activities towards longer time length. If people use a mobile application that recommends these activities (e.g., [7]), the length of upcoming spare time could be inferred based on chosen activities. The length of spare time is an important contextual information for a system that asks people to perform a small task while on the move. We also found that demographic information such as age groups and occupation is correlated with activity choices for spare time.

Secondly, we examined the activities of people who eat out based on a survey, focusing on the influence of social context over the choice of restaurants. We carried out the survey by using Lancers. We received responses from 193 citizens, and 32 percent of them had compromised on the choice of a food venue in the last 7 days. Interestingly, they are more likely to compromise when they eat out with many people. Figure 2 shows that when they eat out with more than 5 people, less than 10 percent of them decide by themselves which food venue to visit. We also found that people who eat out frequently are more likely to decide by themselves where to visit in social eat-out situations.

What this implies is that social context affects people's discretionary movement and behaviors. This can be a critical aspect when people in a social situation may carry out a microtask.

[1] The survey was conducted in Japanese. Items in this table have been translated from Japanese into English by the authors.

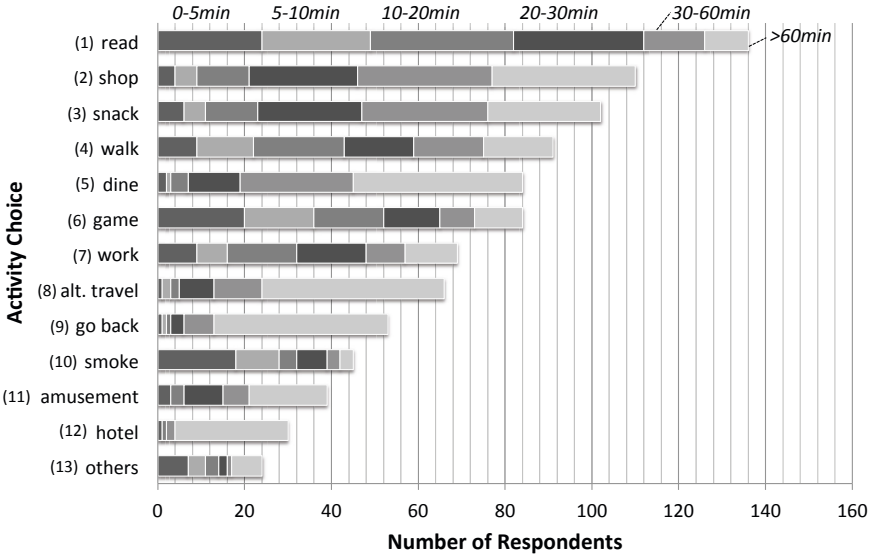

Fig. 1. Number of Respondents by Activity Choice for Different Length of Spare Time

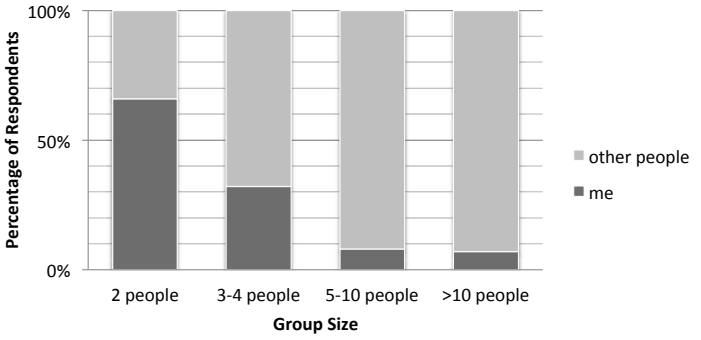

Fig. 2. Patterns of Compromise in Selecting Place to Eat Out

3 Micro-contribution Platform

We have designed a micro-contribution platform based on the studies presented in the previous section. As shown in Fig. 3, the platform recommends microtasks to citizens by using context-based task filtering, which is based on the pre-filtering model of contex-aware recommendation [8].

This platform represents users, tasks and contexts based on a hierarchical model of generalization so as to remedy the problem of data sparseness, which is a major issue in context-aware collaborative filtering systems.

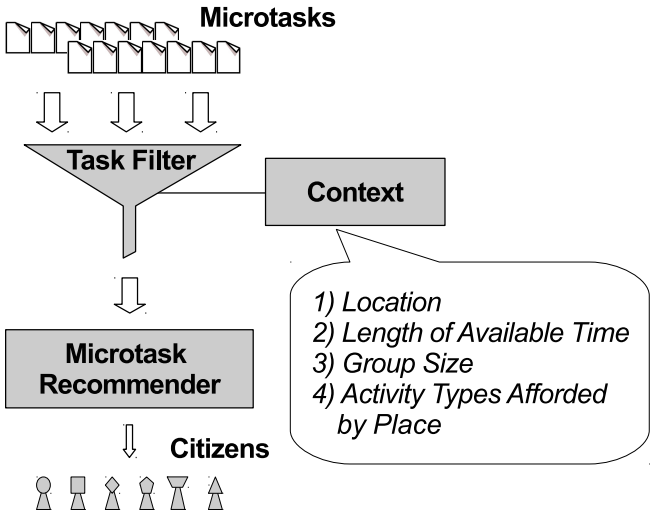

Fig. 3. A Micro-Contribution Platform Based on Context Pre-Filtering

The platform considers the four types of contextual information: (1) location, (2) length of available time, (3) group size, and (4) activity types afforded by place. Location is commonly used in many context-aware systems. Our discussions on spare-time activities of public transit users is reflected in the second type of context: length of available time, which could be inferred by using implicit information. Group size is used as a social context which can be used to incorporate socially contextualized movement and behaviors of people. We can infer group size using smartphone sensors.

Activity types afforded by place, or *AoP (Affordance of Place) context* is also critical because each place has its own physical and social constraints. It is about action possibilities, which Gibson has discussed in depth [9]. For example, performing a microtask that requires photo taking may be inappropriate in a museum. Typing text can be difficult in a supermarket in which people's hands are often full. We have explored the use of smartphone sensors to detect high-level AoP contexts in some areas at a public park.

4 Concluding Remarks

We have examined the urban contexts that are familiar to many, i.e., public transport environments and eat-out activities, and proposed a micro-contribution platform. We acknowledge that the proposed platform not only create opportunities but also introduce risks related to privacy violation as well as potential intensification of mobile cocooning. Working everywhere on mobile phones could potentially deprive citizens of the opportunities to interact with the 'real' world. Although there are no easy solutions to these issues, appropriate integration of

microtasking and the urban contexts should focus on the improvement of quality of life as a whole.

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