SocialCRC: A Social- and Context-Aware Rendezvous Coordination System

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figure 1. SocialCRC enables users to consensually find a rendezvous point for an impromptu rendezvous

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Abstract
We present a new mobile application SocialCRC to simplify the process of coordinating an impromptu rendezvous. By considering contextual information and the social relationships between the attendants of a rendezvous, SocialCRC can identify a more satisfactory rendezvous point. In this study, we deploy SocialCRC in the context of a dinner rendezvous. A preliminary user evaluation indicates that SocialCRC can offer satisfactory results for the most influential person involved in the coordination process. It also provides an acceptable solution for the whole group, without diminishing the satisfaction of the least influential person in the group.

Keywords
Social Network, Social Influence, Rendezvous, Commensality, Location-Based Services

ACM Classification Keywords
H5.m. Information interfaces and presentation (*e.g.*, HCI): Miscellaneous.

General Terms
Design, Experimentation

Introduction
Social networks play an important role in influencing people’s thoughts and actions [1]. The last few years have seen the emergence of a number social

networking websites such as MySpace[1], Facebook[2], and Orkut[3]. These websites offer a range of interesting applications to users for expanding their social graphs. Further, with the development of ubiquitous systems and location-based services (LBS), regular social activities are likely to be routed through these systems, transforming them into opportunities for serendipitous connectivity, i.e., occasions to rendezvous in a wider range of contexts than previously possible via conventional computing systems. Particularly, commensality, or the practice of eating together, is a social activity that offers many opportunities for coordinating with family and friends [9]. In this study, we demonstrate the use of an innovative mobile coordination system in an impromptu dinner setting. The system selects participants for *a* rendezvous on the basis of their location proximity. It also enables them to dynamically decide on a rendezvous point for meeting and eating together later.

The existing location-based systems only provide location-specific information in the geographic coordination. These systems select a rendezvous point solely on the basis of contextual information, without considering other intrinsic factors impacting people's thought or actions, i.e., social influence [1]. Imagine the following scenario.

Jane and Ben are very interested in Japanese culture and are planning a trip to Japan. One day, with the help of their location-aware mobile devices, they find a Japanese friend in their vicinity. So they invite the Japanese friend and a bunch of other friends, who are nearby, for dinner so that they can exchange some notes on Japan. They first confirm everyone's location and availability through phone calls and finally decide to meet at a Thai-food restaurant located not very far away from all the invitees. These interactions are called ***microcoordination****. Now, imagine that their Japanese friend dislikes Thai food. Naturally, he/she may be reluctant to attend. Thus, Jane and Ben end up losing an opportunity to meet a key person for discussing their travel plans. Probably, they may even cancel the rendezvous.*

Thus, the choice of the rendezvous point can significantly influence an individual's willingness to attend, which in turn can impact the opportunity to rendezvous. This leads to a considerable amount of stress for the host, who is usually the selector of the rendezvous point. To overcome these problems, we propose a social- and context- aware rendezvous coordination system, called SocialCRC, which can enable smooth microcoordination and reduce the burden of individually contacting the members by facilitating a consensual situation.

Related work

Rendezvousing behavior has been extensively discussed by Colbert et al [3, 4]. In their diary studies, which involved user-centered research, they identified the effects of location awareness on the coordination stage of a rendezvous. Dearman et al. [2] evaluated the effectiveness of location-aware mobile devices in aiding the microcoordination before a rendezvous and concluded some design implications. However, none of these works examined how the microcoordination

[1] MySpace, http://www.myspace.com/

[2] Facebook, http://www.facebook.com/

[3] Orkut, http://www.orkut.com/

before a rendezvous is affected by the social influences acting on the attendants. Social influence [1] has been identified as an intrinsic social effect on people. It occurs when a person's thoughts or actions are affected by others in a group interaction. Our system takes this factor into consideration in the early stages of coordinating a rendezvous, and thus enables socially aware rendezvous microcoordination.

Design Concept

Traditional research on rendezvousing focused on the impact of contextual information [8]. In these studies, social activities or rendezvous were planned among attendants who shared a social relationship. Although some studies [5] have discussed measures for extracting this relationship information from social media, few applications utilize this information [7], especially for social collaboration. Furthermore, rendezvousing in real life is an activity that requires geographic and social coordination among a group of people prior to the rendezvous. Easing the microcoordination by consensually selecting a rendezvous point is the first and most critical step in effecting a rendezvous. Therefore, we have designed a system to iteratively distill rendezvous options until the best rendezvous point is arrived at on the basis of contextual information and social relationships between the attendants.

Prototype

SocialCRC consists of a centralized server and multiple mobile clients. Information exchange between the clients and the server occurs through wireless connections such as Wifi or 3G networks. The detailed structure of the system is presented in Figure 2.

The server consists of three components: server daemon, rendezvous point recommender, and data crawler. It also includes a content database that stores application-required information.

- Server Daemon

The server daemon accepts incoming requests from mobile clients to query information and forwards personal preferences to all the attendants of a rendezvous and preferred cuisines (abbreviated as *personal preferences*) to the rendezvous point recommender.

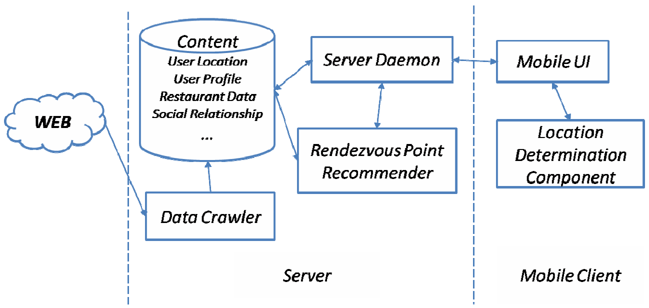
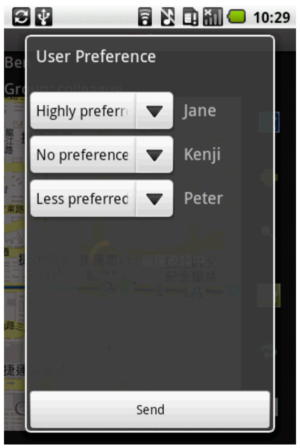


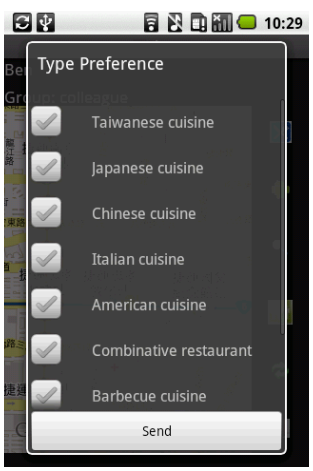
figure 2. The system architecture of the server and clients.

- Rendezvous Point Recommender

The rendezvous point recommender uses personal preferences of the attendants as well as data from the content database to recommend a rendezvous point. The process involves the following steps: (1) After receiving the personal preferences of all the attendants, the system generates personal rendezvous point ranking lists (referred to as *personal ranking list*) for each attendant. For example, the personal ranking list of the i^{th} attendant is based on the *distance* between this attendant and every possible rendezvous point, the current timestamp, and his/her personal preferences.



(a) User preference



(b) Cuisine preferences

figure 3. UIs for selecting user and cuisine preference.

(2) The system then calculates the social influence of each attendant using the proposed algorithm *UserRank*, which is similar to PageRank [11]. A preference matrix *P* is generated on the basis of the past personal preferences of the attendants stored in the content database. The social influence of the attendants is captured by the social influence vector *E*. The equation $E^{(k+1)} = PE^{(k)}$ is iteratively solved until *E* converges. (3) The system then merges individual personal ranking lists into a group ranking list that is weighted by the social influence of each attendant. Only the top α percent of rendezvous points are retained in the group ranking list. (4) Step 3 is repeatedly performed to filter the options and arrive at the most suitable rendezvous point. Finally, after recommending the rendezvous point, this system records the current attendance history to incrementally refine the stored *long-term social relationship*, which is calculated based on past attendance history, in the content database.

- Data Crawler

The data crawler continuously crawls through restaurant data made available on the Web by the Yahoo! LifeStyle Plus APIs [6]. The extracted information stored in the content database includes the following details of each restaurant: name, address, geo-location (i.e. latitude and longitude), type of cuisine served, and telephone number. For this experiment, we chose restaurants located in central areas of Taipei city.

Each mobile client installed in HTC Magic[4] mobile clients was already equipped with a location determination component, and we employed a GPS for position tracking in our experiment. Our program would automatically update the client's location status on the server.

[4] HTC Magic., http://www.htc.com/.

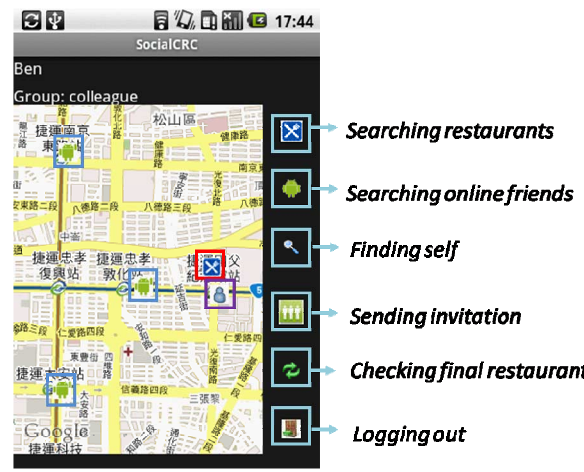


figure 4. The main UI of the client program. There are three frames in this UI: personal information frame, map frame, and functional frame. In the map frame, there are icons representing friends (blue rectangles), restaurants (red rectangles), and self (purple rectangles).

- Mobile Client UI

We embedded a Google Map in our UI to visualize the locations of users and restaurants, as shown in Figure 4. To invite friends in their vicinity for a rendezvous, the users had to first log into our system. All the attendants of the rendezvous, including the host, had to enter their personal preferences, as shown in Figure 3. Once the personal preferences of all the attendants were transmitted to the server, the rendezvous point recommender would generate a final rendezvous point (i.e., restaurant) and send the data back to every attendant to be indicated on the map UI.

Preliminary Evaluation

For our preliminary user evaluation, we invited two 4-person groups to use our system for coordinating their dinner rendezvous. Every participant was familiar with at least one person in his/her group. The objective of this evaluation was to assess the performance of the rendezvous point recommender in our system, given that the initial social relationships required by the recommender can be extracted from other social media by existing methods [5]. For this purpose of this experiment, we used a survey questionnaire to obtain information about the social relationships among the participants, prior to the evaluation. All the participants were asked to fill a pre-study questionnaire to indicate their familiarity with other participants and their opinions on rendezvousing. On the basis of their familiarity levels, the initial social relationships between participants were extracted by our algorithm. The following questions were used to determine participants' opinions on rendezvousing:

- Do you like to engage in an impromptu rendezvous with your friends?
- Are you concerned about the tedious microcoordination before a rendezvous?
- While selecting a rendezvous point, are you willing to change your preferences to accommodate those of other highly-influential people?

Positive responses from the participants to these questions indicated that they were willing to engage in an impromptu rendezvous if a system could simplify or ease the initial microcoordination. They also revealed that their decisions might be influenced by a highly influential person in the group, which is consistent with our assumption of the impact of social influence.

Four participants were randomly assigned to different predefined locations in the central areas of Taipei city and one participant was asked to play the host, inviting other participants. After the final rendezvous point was determined on the server and indicated on the client UI, all the participants evaluated the type of cuisine served at the restaurant and their respective distances to the recommended restaurant. We designed a post-study questionnaire to assess participants' satisfaction with the recommended restaurant. Participants were asked to rate the recommended restaurant on a five-level Likert scale. A score of 1 indicated "strongly dissatisfied" and a score of "5" indicated "strongly satisfied." The average overall score of the participants was 3.854. The average satisfaction score of the most influential person was 4.5, clearly higher than the average value. On the other hand, the average satisfaction score of the least influential person was 3.812, which was slightly lower than the average value. Thus, SocialCRC can provide satisfactory results for the most influential person in the microcoordination. At the same time, it suggests an acceptable rendezvous point for the whole group, without significantly diminishing the satisfaction of the least influential person in the group. All participants in our experiment agreed that SocialCRC can ease the microcoordination before a rendezvous, and they were willing to invite or to be invited to a rendezvous through this system.

Discussion

In our system, the recommender suggests a rendezvous point on the basis of cuisine preferences and social and contextual information. Although the cuisine served at the final restaurant and its distance from the participants were acceptable, a few participants felt that the final rendezvous point did not meet their expectations of a typical restaurant. We will, therefore, try to include a feedback process that allows participants to vote for a more suitable option out of the top K rendezvous options in the final group ranking list.

Conclusion and Future Work

We developed a new online application, i.e. SocialCRC, to ease the microcoordination before a rendezvous. By considering social relationships between the attendants of a rendezvous, SocialCRC can propose a more satisfactory rendezvous point. In this study, we demonstrated the use of our system in an impromptu dinner setting. We designed a prototype and conducted a preliminary evaluation of its performance. Results show that SocialCRC provides satisfactory results for the most influential person in the microcoordination. At the same, it suggests a rendezvous point that is acceptable to the whole group. The satisfaction score of the least influential member of the group indicates that SocialCRC does not completely disregard his/her preferences. In future, we would like to involve more users in the evaluation process, and modify the rendezvous point recommender to address the limitations in the current prototype.

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References

[1] Social Influence from Wikipedia, http://en.wikipedia.org/wiki/Social_influence/.

[2] Dearman, D., Hawkey, K., Inkpen, K.M. Rendezvousing with Location-Aware Devices: Enhancing Social Coordination. Interacting with Computers 17, 5 (2005), 542-566.

[3] Colbert, M. A Diary Study of Rendezvousing: Group Size, Time Pressure and Connectivity. In Proc. Mobile HCI 2002, Springer-Verlag (2002), 21 – 35.

[4] Colbert, M. User Experience of Communication before and during Rendezvous: Interim Results. Personal and Ubiquitous Computing, Volumn 9, 3 (2005), 134-141.

[5] Ramaswamy, L., P., D., Polavarapu, R., Gunasekera, K., Garg, D., Visweswariah, K., Kalyanaraman, S. CAESAR: A Context-Aware, Social Recommender System for Low-End Mobile Devices. In Proc. MDM 2009, IEEE Computer Society (2009), 338-347.

[6] Yahoo! LifeStyle API website, http://tw.developer.yahoo.com/lifestyle/api.php

[7] Kurvinen, E., Oulasvirta, A. Towards Social-Awareness in Ubiquitous Computing: a Turntaking Approach. In HIIT technical report 2003, Helsinki Institute for Information Technology, Finland.

[8] Manzaroli, D., Lacche, P., Pettinari, M., Roffia, L., D'Elia, A., Cinotti, T. S. Enhancing Social Life with Path Solvers: Rendezvous without Constraints on Meeting Place and Time. In Proc. WiMob 2008, IEEE Computer Society (2008), 490-495.

[9] Grignon, C., Commensality and social morphology: An essay of typology. In Food, Drink, and Identity: Cooking, Eating, and Drinking in Europe since the Middle Ages (ed. Peter Scholliers), Oxford: Berg (2001), 23–33.

[10] Sergey, B., Lawrence, P. The Anatomy of a Large-Scale Hypertextual Web Search Engine. In Proc. WWW 1998, Elsevier Science Publishers (1998), 107-117.