What Kinds of Experiences Do You Desire? A Preliminary Study of the Desired Experiences of Contributors to Location-Based Mobile Crowdsourcing

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ABSTRACT

Mobile crowdsourcing enables people to learn location-related information from others with diverse experiences and opinions. However, little research has investigated the expected quality of the location-related information users of mobile-crowdsourcing platforms, and the levels and types of relevant experience such users expect crowd members to possess, respectively. To fill this gap, we first conducted an interview study with 22 participants, which yielded five key information properties of the answers to location-based questions: objectivity, relativity, specificity, temporal regularity, and variability. Based on his//her stated perceptions of these properties of the requested information, we deemed each participant to desire at least one, and up to 10 main qualities of the information, and seven main aspects of contributors' experience. A follow-up survey study was then used to quantify the characteristics of a list of location-related information according to the information properties that the 139 respondents perceived that information to have.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in collaborative and social computing**; **Empirical studies in ubiquitous and mobile computing**.

KEYWORDS

mobile crowdsourcing, location-based, review, information quality

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1 INTRODUCTION

Mobile crowdsourcing has been commonly leveraged to collect location-related information for various purposes, ranging from scientific enquiry [27], to commerce [6], to supporting local communities [5, 17]. Crowdsourcing location-related information enables people to learn from diverse others' collective knowledge, experience, and opinions of specific places. However, such diversity also inevitably introduces discrepancies in the information that crowdsourcing-platform users receive. While the presentation of conflicting opinions may reassure their users that such platforms are relatively unbiased [8], it remains difficult for users to know which opinions and information are more pertinent to their own needs. This is chiefly because they do not know the experiential or other basis of such opinions and information. This problem is equally prevalent in the more specific context of mobile crowdsourcing. That is, information seekers may find information and opinions offered by people with specific backgrounds to be the most useful and applicable to their needs [15, 32, 33]; yet, current location-based mobile crowdsourcing platforms do not take account of their information contributors' backgrounds or experience, focusing instead on their activeness/engagement and quantity of information contributed. Numerous studies have also suggested that information seekers judge the usefulness or helpfulness of online information based on their perceptions of the quality of the information they encounter, whether expressed as reliability, recentness, understandability, or relevance [13, 20, 25, 29, 30]; unsurprisingly, knowledge of where information comes from is a crucial basis for making such judgments [28, 33]. Platforms' failure to consider the relevance

Figure 1: Content of a set of cards, pre-printed by the researchers for use during interviews, offering a range of examples of location-related experience and information

of information contributors' backgrounds and experiences to information seekers' requests thus inevitably renders their services sub-optimal, at least from the latter user group's viewpoint.

Nevertheless, the existing literature that focuses on matching information contributors with tasks only tends to examine their current location contexts [18, 22], mobility [16, 21], compliance [17, 19], and cognitive abilities [14, 15], along with how to optimize the quantity of their contributions [3, 11]. To the best of our knowledge, there has been little investigation of the applicability of contributors' experience to requested items of location-related information.

To fill this important research gap, this study seeks answers to the following three research questions.

- RQ1: From the perspective of information seekers, what are the key characteristics of the location-related information available from location-based crowdsourcing platforms?
- RQ2: What aspects of the quality of their desired location-related information do information seekers care about the most?
- RQ3: What kinds of experience do information seekers expect or desire information contributors to possess as the basis of information and opinions that will be useful?

To answer these questions, we plan to conduct this research in three phases, of which the first two – an interview study and a survey study – have so far been completed. Specifically, in the first phase, we conducted semi-structured interviews with 22 participants to obtain preliminary insights about our three RQs. In the second phase, we surveyed a group of 139 information seekers to clarify the information properties that they perceived as being associated with various location-related questions.

Together, this paper makes the following contributions to the literature:

- It identifies five key properties of the location-related information the participants were seeking, and 10 information qualities that they commonly desired for this kind of information.
- It identifies seven aspects of information-contributor experience likely to be expected and desired by location-related information seekers.
- It quantifies how frequently the location-related information that seekers actually obtained was perceived by them as possessing each of the five information properties mentioned above, including their perceived similarity and distinctness.

2 INTERVIEW

2.1 Participants

The participants in our semi-structured interviews included 12 males and 10 females aged 21-50, all of whom had experience of seeking and/or providing location-related information online. We recruited them through several Facebook groups aimed at connecting researchers with research participants in our country. Each interviewee was given NT$300 (US$10.75) as compensation for their participation.

2.2 Procedure

In the interviews, we asked the participants what kinds of information they had obtained, or hoped to obtain, from crowds on location-based crowdsourcing platforms or online forums. Then, we asked them what kinds of experience and backgrounds they expected or desired the information contributors on such platforms and forums to possess. We also prompted the interviewees to reflect on the similarities and differences, across various kinds of location-related questions, in the types of experience they desired those answering such questions to have had. Through this process of comparing and contrasting, we hoped to identify the key properties of the location-related information they were commonly seeking; the information qualities they expected from the obtained information; and the experiences they desired from the contributors. During this process, we developed a set of cards (as shown in Fig. 1) that offered various examples of location-related experience and information, with the aim of providing the interviewees with cues that would help them recall their prior experiences of seeking and acquiring the same, similar, or different-yet-relevant information. The development of card content was iterative: i.e., new cards were drafted and added to the set whenever the researchers learned from interview data about a new type of location-related experience or

information. In all, this process led to the creation of 23 cards covering types of location-based information, and 11 covering types of experience. All the interviews were conducted via online video conferencing with screen-sharing, within which the interviewee and researchers viewed the then-current cards on Conceptboard[1], an online collaborative whiteboard software. The interviews were video-recorded and transcribed. Each interview lasted between 90 and 120 minutes.

2.3 Data Analysis

We conducted thematic analysis of our interview data using the qualitative-analysis software MAXQDA.[2] Generation of the codebook was guided by our RQs. To ensure the reliability of our coding process, three researchers first coded interview transcripts from three participants independently, and then discussed the codes with one another. In that discussion, each researcher explained the word they chose to use, discussed the similarities and differences in their interpretations, and eventually agreed upon the relevant coding schema. Then, for each coded transcript, the coders compared and discussed the discrepancies and clarity of the codes until full consensus was reached. After all the discrepancies were resolved, they updated the codebook.

2.4 Preliminary Insights from the Qualitative Analysis

The preliminary results of our qualitative analysis highlighted that the characteristics of the requested location-related information were crucial determinants of the participants' feelings about both information quality and information-contributor experience levels. Further details are provided below.

2.4.1 Key Properties of Location-Related Information. The interviewing process yielded the five properties of information that played the most critical roles in influencing the interviewees' perceptions of it. They were:

- *objectivity* - the extent to which a description of the location-item in question tended to be objective vs. subjective;
- *relativity* -the extent to which a description of the location-item in question tended to relate or compare to information of the same/similar kind held in one or more other locations;
- *specificity* - the extent to which a description of the location-item in question tended to be applicable to a specific item vs. to a wider range of items, including but not limited descriptions of its location and period;
- *temporal regularity* - the extent to which a description of the location-item in question tended to change regularly vs. irregularly over time; and
- *variability* - the extent to which a description of the location-item in question tended to vary vs. remain stable.

2.4.2 Desired Qualities of Location-related Information. Depending on how they perceived the above five key characteristics of the information, our participants desired that the information they were seeking have different kinds of information quality, and also that those people who contributed it to crowdsourcing platforms have different types of experience on which to base it. Both these assessments affected our participants' impressions of the usefulness and applicability of the information they received. The 10 main kinds of information quality commonly mentioned by interviewees were as follows:

- *completeness* - the extent to which the information incorporates all key aspects of information and is of sufficient breadth and depth to enable completion of the task at hand;
- *degree of context* - the extent to which context is provided for the information;
- *enjoyability* - the extent to which consuming the information is regarded as fun;
- *novelty* - the extent to which the content of the information is either wholly new to the information seeker, or different from what s/he knew before;
- *objectivity* - the extent to which the information is unbiased and impartial;
- *recency* - the extent to which the information is sufficiently up-to-date for the task at hand.
- *reliability* - the extent to which the information is correct and reliable;
- *specificity* - the extent to which the information is specific to a particular item, topic, location, and/or time appropriate to the user's needs;
- *temporal relevancy* - the extent to which the information satisfies the user's needs in terms of time; and
- *understandability* - the extent to which the information can be comprehended by the user.

2.4.3 Desired Aspects of Contributor Experience. In describing occasions when they had successfully obtained information that fulfilled their various information-quality desires, the participants named various desirable aspects of information contributors' experience. The seven that were mentioned most often were:

- *length of residence* - how long the contributor had resided in or near, otherwise been exposed to, the described location;
- *quantity* - how many times the contributor observed and encountered the described location;
- *recency* - how recently the contributor observed and encountered the described location;
- *regularity* - how regularly the contributor observed and encountered the location;
- *variety* - at how many different, diverse locations the contributor had observed and encountered the same or similar kinds of location information;
- *professional relevancy* - how much and what kind(s) of professional experience the contributor possessed that was relevant to the location information s/he provided; and,
- *engagement in commentary* - how often and how proficiently the contributor publicly offered his/her comments, opinions, and reviews of a location.

2.4.4 Desired Information Qualities and Desired Experiences from Contributors Are Specific to the Information Properties. Notably, participants mentioned a number of specific associations between

[1] Conceptboard is an online whiteboard allowing people to collaborate. https://conceptboard.com/
[2] https://www.maxqda.com/

certain types of location-related information, certain kinds of information quality, and certain aspects of contributor experience. For example, highly recent information was deemed highly desirable for aspects of a location with both high temporal regularity and high variability: e.g., that it easily becomes crowded during certain periods, but within such periods, is still subject to rapid change. For such places, they also mentioned the information contributor would ideally have conducted both regular and lengthy observations of the crowdedness of the area. In contrast, for aspects of locations the participants perceived as having high temporal regularity but low variability, such as traffic congestion and weather, they mainly desired the description of the area to inform them of the periods during which traffic congestion would and would not happen, and during which the weather would be almost certainly be rainy, sunny, gloomy, etc., respectively. Therefore, they mainly desired the contributors to have made long and regular observations of the target locations, irrespective of recentness.

For location-related information that they perceived as being highly subjective – e.g., about the taste of food, staff attitudes, or atmosphere – the interviewees desired information that was reliable and that covered as many such aspects in as great detail as possible (i.e., high completeness), to facilitate their judgments about its usefulness. As such, they expected the contributor to have made a high quantity of observations. As P20 explained, if such experience was not extensive enough, the offered information *might be just a one-time thing, even an outlier"*. The same interviewee mentioned that it would be even better if the information contributor had been engaged in offering commentary; this was because such experience was perceived as enabling the contributor to know which aspects of their subjective experience information seekers would find most useful and interesting. On the other hand, when the interviewees perceived the provided information as highly relativistic (e.g., that the food is more delicious than at other restaurants, or that the restaurant is less crowded at some times than at others), they desired that it also contain more context. For that reason, they preferred the contributor to have a high variety of experiences, which would give him/her the standing to make such comparisons; but they regarded it as even better if the contributor had formal expertise or professional skills related to what they were talking about: e.g., in the case of food-related information, had worked as a food critic or chef.

Finally, for some information that was perceived to be highly specific, such as Wi-Fi connectivity, opening hours, or menu choices at a specific location or during a specific period, the interviewees told us that they preferred contributors who had visited that location and during that specific period many times. This, they said, was because they assumed such contributors were more likely know specific details about the place. On the other hand, when the requested information was general, such as about an entire region, the participants preferred contributors who had resided there for a long time, based on an assumption that these contributors' knowledge of the area was more comprehensive and geographically wide-ranging, and because they perceived that some information – e.g., about shortcuts, car parking, and secluded beauty spots – might be almost exclusively known about and accessible by residents.

To sum up, our interview results indicated that the subjects valued different information qualities and contributor experiences, depending on precisely what location-related information they were seeking. Additionally, different combinations of the five information properties seemed to correspond to different information qualities that the interviewees deemed matter to them; and consequently, they desired different types of location-related experience from the people contributing information. However, our approach thus far was inherently incapable of providing quantitative evidence of such relationships among information properties, information qualities, and desired types of contributor experience. To identify those relationships, it was first necessary to use survey methods to develop an accurate list of the types of location-related information most often sought from a mobile crowdsourcing platform, as well as how users of that platform perceived the characteristics of items of such information. This additional data will allow us to design an online experiment, i.e., phase 3 of our wider research project, that asks crowdsourcing-platform users about their desired information qualities and contributor experiences for specific location-related information items. The survey is described in the section below.

3 SURVEY

For the reasons mentioned at the end of the previous section, we developed an online survey that included location-related information items that 1) had previously been adopted as crowdsourcing tasks in the mobile-crowdsourcing literature and 2) were commonly mentioned during our interview study. These comprised food reviews [23]; product supply details [11, 17]; product price [9, 17]; crowdedness information [11, 17, 23]; event-related information [1, 11, 23]; the condition of public equipment [10, 17, 31]; region-specific public issues such as pollution, noise, and safety [4, 26]; parking availability [2, 11]; scene descriptions [12, 24, 31]; and recommended points of interest (POI) within a region [7, 23].

3.1 Procedure

The online survey was implemented using SurveyCake,[3], and its items were divided into three dimensions. These were 1) the participants' basic demographic information; 2) their frequency of looking for the aforementioned location-related information items, rated on a seven-point Likert scale ranging from 1=low to 7=high; and 3) their perceptions of the six information properties, i.e., the same five listed above in connection with the interview study, plus time-specificity, which we extracted from the specificity property to better distinguish it from location specificity. The survey contained 73 items (3 in dimension 1, 10 in dimension 2 and 60 in dimension 3), and took about 15 minutes to complete.

3.2 Participants

The online survey was advertised on a number of Facebook groups and pages aimed at residents of various cities in our country. We chose to advertise the survey via these groups and pages because we assumed most people who had joined them were interested in obtaining information about their localities. The survey was open throughout December 2021 and January 2022. We awarded a prize of NT$200 (US$7.17) to one in every five respondents, chosen at random.

[3] SurveyCake provides tools to build online questionnaires and data results visualization. https://www.surveycake.com/

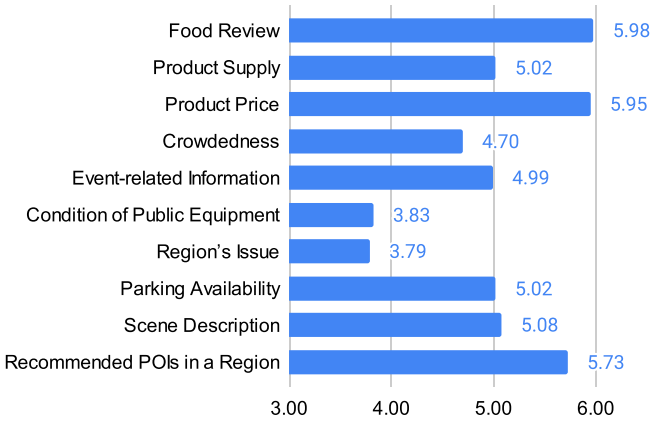

Figure 2: Frequency of the location-related information respondents wanted to obtain from the crowd

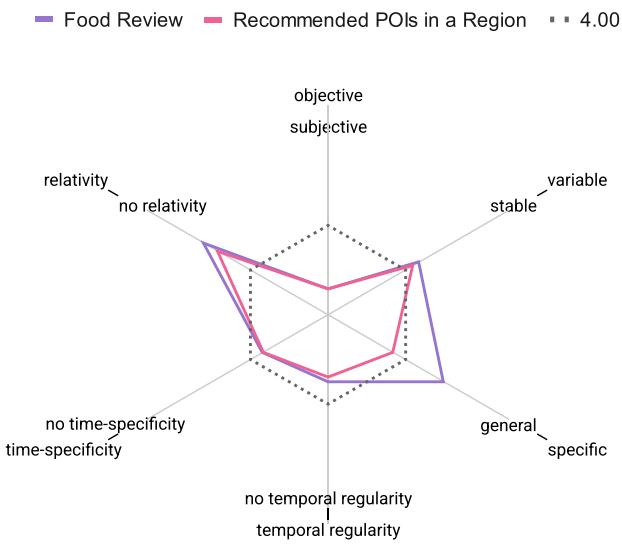

Figure 3: Scores distribution for the six information properties of a food review (purple) and recommended points of interest (POI) for a region (pink)

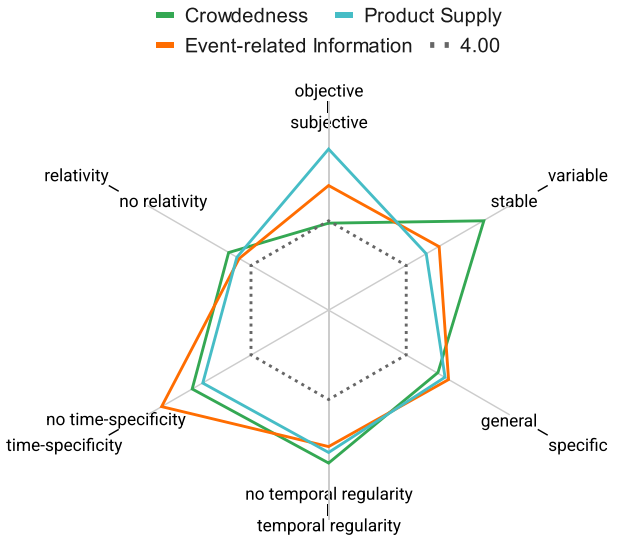

Figure 4: Scores distribution for the six information properties of crowdedness (green), event-related information (orange), and product supply (cyan).

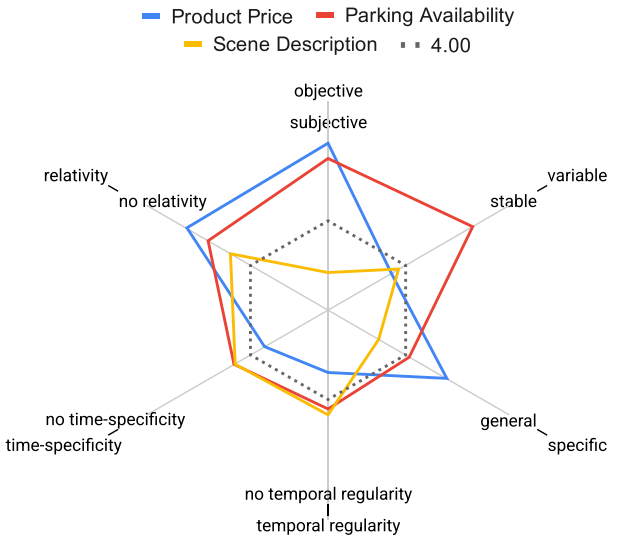

Figure 5: Scores distribution for the six information properties of product price (blue), parking availability (red), and scene description (yellow)

3.3 Results

We received 199 responses in total. After data cleaning, 60 responses were classified as invalid, leaving 139 for further analysis. In the final dataset, 56.1% of our respondents were female, 41.7% were male, and 2.2% were not willing to disclose their gender. All were aged between 20 and 56 (M=29.23, SD=7.98).

3.3.1 Most Frequently Sought Types of Location-related Information. As shown in Figure 2), the top three types by frequency of location-related information that our respondents wanted via the mobile crowdsourcing platform were: food review (5.98 out of 7), product price (5.95), and recommended POIs in a region (5.73). In contrast, public issues affecting a region (3.79) and the condition of public equipment (3.83) were the least frequently wanted from the platform.

3.3.2 Characteristics of the Frequently Sought Location-related Information Items. Next, we examined how the respondents perceived the six information properties of each of the most frequently sought types of location-based information. The results are shown in 3

Table 1: The Average Scores on All Six Information Properties of Each Information Type

	Objectivity	Variability	Specificity	Temporal Regularity	Time-specificity	Relativity
Food Review	2.94	4.25	4.73	3.63	3.77	4.91
Product Supply	5.19	4.38	4.76	4.88	4.93	4.28
Product Price	5.29	3.72	4.79	3.54	3.73	5.24
Crowdedness	3.96	5.50	4.60	5.06	5.14	4.43
Event-related Information	4.58	4.63	4.81	4.78	5.73	4.24
Condition of Public Equipment	4.54	4.39	4.11	3.48	3.91	4.13
Public Issues in a Region	4.00	4.75	3.27	3.31	3.40	4.46
Parking Availability	5.03	5.29	4.08	4.15	4.32	4.83
Scene Description	3.12	3.87	3.48	4.25	4.29	4.40
Recommended POIs in a Region	2.93	4.14	3.75	3.54	3.76	4.63

to Figure 5. Those figures exclude data on the two least-sought information types. However, the average scores for all information types are shown in Table. 1. In the three figures, information types are grouped according to their similarity to one another in terms of perceived properties.

Specifically, food review and recommended POIs in a region were similar to each other in that they both were perceived as having low objectivity, high relatedness, and neutral temporal regularity, so both were placed in Figure. 3.

Crowdedness, product supply, and event-related information, on the other hand, were similar to one another in some aspects and were thus grouped together in Figure 4. Specifically, all three were perceived as medium to high in relativity, high in specificity, and high in temporal regularity. However, product supply received especially high scores for objectivity; crowdedness, for variability; and event-related information, for time-specificity.

The rest of the information items were perceived as distinct from all of the other items, and therefore formed the "catch-all" group shown in Figure 5. For example, parking availability was the only type of information perceived as simultaneously highly variable, objective, and relative. Scene description, meanwhile, was perceived as somewhat high in relativity, time-specificity, and temporal regularity, but particularly low in objectivity and specificity; and product price was perceived as highly objective, relative, and specific, but as particularly low in variability, time specificity, and temporal regularity.

4 CONCLUSION AND FUTURE WORK

Both our interview and survey results showed that, while some types of crowdsourced location-related information were perceived as similar in many aspects, more were perceived as distinct from one another. This, according to the interview results, is likely to lead the users of mobile crowdsourcing platforms to expect the information they obtain through those platforms to vary in different aspects of its quality and, as a result, to expect and hope that the people contributing it will have certain kinds of relevant experience. To proceed to answer our research questions, our next step will involve conducting an online experiment to clarify and verify the relationships among information properties, information quality factors, and information-contributor experience, such that we can gain a clear understanding of what kinds of contributors mobile crowdsourcing platforms should assign location-related tasks.

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