Understanding Requirements of Place in Local Search

Karen Church

Yahoo Labs,

701 1st Avenue,

Sunnyvale CA 94089

kchurch@yahoo-inc.com

Henriette Cramer

Yahoo Labs,

701 1st Avenue,

Sunnyvale CA 94089

henriette@yahoo-inc.com

Abstract

We present an online survey (N=306) focused on understanding what factors of location are important when choosing a target place of interest in a local search scenario. Using descriptions of location requirements from a restaurant search as our use case, we provide a characterization of the factors of location that influence decision-making in local search tasks. We highlight the complexity of end-users' location constraints, especially for *shared* local search scenarios, i.e. scenarios involving others. Even in a relatively mundane scenario, we demonstrate significant gaps in the handling of place requirements in existing location-based services as compared to identified user requirements. Our results point to a number of implications for improving location-based search.

Author Keywords

Location; Place; Search; User Study

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Local search can be defined as a search to find things nearby, or nearby specific locations. Examples include searches for local restaurants, bars, gas stations or

local stores. While local search is prevalent across all devices, i.e. smartphones, tablets and PCs/Laptops, its use has risen dramatically on mobile phones in particular. 79 percent of mobile phone owners use their devices for local search[1], while the proportion of mobile search queries carrying geographical or local intent (such as finding a local venue) rose to 50% in 2012[2].

The most defining aspect of local search is the geographic location requirements it needs to fulfill. When people interact with local search engines after issuing a local search query, they are normally presented with a range of different businesses / locations to choose from and they make a decision about which place to visit by using different constraints, some of which are related to location, e.g. distance. However, decisions about where to go are often made by weighing-up a multitude of constraints and options. Furthermore, when people interact with such location-based services, they also often do so with other people, and the constraints of others in mind. Understanding such constraints in more depth is of critical importance to improving local search experiences.

Thus our goal is to explore people's *requirements* for place in local search. To this end we conducted an online survey with 306 participants, focusing on the factors of location that are important when choosing a target place of interest. Given the prevalence of local search queries related to food and drink - Amin et al. [1] found that 24.5% of local mobile search queries relate to such - we chose one of the most common local search scenarios: *finding a restaurant for you and a*

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[1] See: ComScore report, http://selnd.com/1hBzXUQ

[2] 50% Google Mobile Search is Local, See: http://bit.ly/1pnrjO2

friend. This use case might appear trivial at first glance. You might assume that a local restaurant search is already well-supported by existing commercial systems. However, we found that our participants' seemingly unassuming location requirements are not fully reflected in the existing literature, nor supported in existing local search services. Thus we contribute a characterization of four key location requirements that influence decision-making in a local search scenario and highlight a number of design implications for future local search experiences.

Related Work
Studies have shown that a significant proportion of people's daily information needs, in particular needs that occur in mobile settings are local in nature [4]. For example Church & Smyth highlight that over 31% of information needs have local intent [4]. Amin et al. [1] conducted a diary study on the motivations and context around location-based mobile search. They found that many of the *target locations* are often related to regularly visited places (e.g. home or work) rather than proximity to current location. Furthermore many of the *choices* of where to visit from a set of location-based search results were influenced by social elements, including that the place was recommended by other people (15.8%) or the place was decided together with other people (13.2%). Amin et al. also found that the 71% of location-based mobile searches were conducted in the presence of others.

Using a large-scale survey, Teevan et al. [8] explored the importance of location, time and people in mobile local search. They found that 63% of the mobile local searches took place in the presence of others and were discussed with someone else. Their results also

highlight that participants looked for information related to their destination (27%), en route to their destination (12%), or near their destination (12%), thus highlighting that the searcher's location trajectory as well as current location are important.

Churchill et al. [5] describe a map-based chat in which users can decide together between different options collected from local results. More recently, Riegelsberger et al. [7] describe a model for user decision-making during local search tasks, specifically hotels, and highlight a number of discrete stages and information needs including Stage 0) Learning about desirability and safety, etc. for users unfamiliar with an area; Stage 1) generating options for a good deal, trading off and price, discarding low quality options. In their study, 'location' was typically referenced by proximity or neighborhood name, and focused on distant locations, i.e. where you need to find a hotel.

Combined, this related work has shown the influence of social context and social activities in local search. Likewise, destination location or trajectory is as important as current location, and finally that there are some tradeoffs in users' decision-making process. However, what's missing from the literature is an in-depth investigation about the range of factors related *specifically to location* that influence people's choice of place in local search. Understanding the nuances of their location requirements will inform improved location-based search experiences.

Rather than looking at searches made using existing tools, we aim to take a step back, and to focus on the starting point for such a search. We take a look at the requirements a user has in terms of location *before*

they choose a search tool. By taking this standpoint, we allow participants to express their requirements outside the known constraints of existing local search engines.

Method
A dynamic online survey designed to assess the factors of location that are important in local search was deployed in Dec 2013 using Amazon Mechanical Turk. The survey collected a range of demographics as well as details regarding participants' current and recent locations. The core of the survey was a local restaurant search scenario in which participants were asked to provide freeform textual responses to the following question: *"Imagine you are searching for a place to eat. It will be tonight, and you will be with a good friend. What requirements are important for you in terms of where the restaurant is?"*

The survey was deployed over a 1-week period. Participants were compensated with $1.50 on completion of the larger survey this question was a part of. We collected responses from 306 participants, 145 female (47%), 160 male (52%), with 1 participant listing gender as unspecified. The average age among our participant group was 33 (sd 11.5, mdn 30). All except one were US-residents; participants lived in 36 states across the US. The majority of the participants, 264 (86%), owned a smartphone and engaged with location based services including Google maps, navigation systems and check-in services.

Results
The freeform textual responses to the local restaurant search question were coded by both authors using qualitative thematic analysis; data was analyzed iteratively to find repeating patterns of meaning. Items

Main category	Subcategories
Getting there	Transport options (stations, parking)
	Proximity (time, distance)
Area surrounding resulting location	Wayfinding: imageability & familiarity
	Specific area preferred
	Topological features (e.g. waterfront)
	Trajectories: other activities & events
	Safety
Temporal & Seasonal	Time of day
	Seasonality & Holidays
	Special occasions
Multi-person & Social	Social context
	Satisfying or compromising across multiple people's constraints and preferences

Table 1. Summary of reported location requirements

of analysis were the individual exact full responses. Emergent themes were discussed, reviewed and revised until full agreement was reached, resulting in four final themes along with multiple sub-themes described below and summarized in Table 1. Note that we did not categorize properties of the restaurant or food in itself (even though such factors where mentioned by participants).

1. Getting There: Proximity & Transport
In line with past work, we find that proximity is key in local search. This can be proximity to current location, home or a specific meeting point, e.g. P281 *"It needs to be within a ten minute drive of wherever we meet"*. Some users expressed this proximity in terms of distance (e.g. P224 *"As long as it's within a 25 mile radius."*), but also in time (e.g. P33 *"As long as it's within like 15 minutes away."*). Proximity wasn't always related to the individual, but also related to the friend, e.g. P14 *"within about 10 miles of my home and my friends home".* Participants also expressed the desire for the location to be accessible via specific means of transport, e.g. P143 *"Within 15 minutes from my house. No need to take the freeway."* or close to multiple transport options, e.g. P234 *"Somewhere on the same train line I live on or easy to take a cab home from".* The latter quote illustrates the need to include detection of personally meaningful places (like home, or places frequently visited by a particular user), and preferred mode of transport in the extraction of location constraints and preferences.

2. Area: Imageability & Activities
Features of the area in question were also important. Safety was a prominent sub-theme, e.g. P95 *"a neighborhood that isn't ravaged by poverty and crime".*

Familiarity with the area and its imageability in terms of for example landmarks were also mentioned, e.g. P53 *"Identifiable exterior landmarks"* and *P54 "In an area of town I'm familiar with".* Some participants mentioned preferences (or lack thereof) for (a) specific areas, e.g. P209 *"In the French Quarter, close to where I live"* or (b) specific landmarks or terrain, e.g. P3 *"Near by, preferably close to the water".*

A restaurant visit was seen as part of a trajectory, as part of something bigger, with mention of nearby activities, events or places. e.g. P289 *"I'd like it to be in a busy place, near a mall or other shops so that I may have other dining options, in case I want to change my mind and go to another restaurant. Also, when I go out, I usually like to stop at other places besides restaurants."* and *P113 "It should be within 1 mile of a shopping center".* This highlights a need for 'also nearby' type features in local search services, beyond alternative local search results.

3. Temporal/Seasonal Effects
Not previously identified in related work, our participants also specified temporal and seasonal constraints. Factors like (1) day of week, e.g. P68 *"Because it's a weeknight, I'd like the restaurant to be somewhere close to where I live. I don't care about a view because it will be dark"*; (2) weather conditions, P253 *"The weather is bad today, so I would prefer a restaurant on a main road because those are kept clear"*; and (3) seasons/holidays e.g. P165 *"In a safe environment, in a quiet setting near the ice skating rink in Cincinnati fountain square with all the holiday lights glowing"* also influenced location preferences. This highlights a need for temporal adaptation of local search results on a variety of scales.

4. Multi-Person Preferences & Shared Location
One of the more prominent and novel themes that emerged relates to *shared* location preferences and *shared* location constraints. That is the location described was not solely related to the participant but instead related to the individual plus others; 1) P155 *"It is important that it is located **somewhere both my friend and I** would have to drive about the same distance from our homes"* or 2) P168 *"It is important the restaurant is located **between the two of us** and easy to get there. It also needs to be a restaurant that isn't too loud and allows us a chance to enjoy our food and chat."; 3) P168 "In a central place that is **convenient for everyone"***. These shared needs can be tied to the trajectories that both the participant and the friend are already constrained by. Aside from shared locations, the general preferences of the friend were also an important consideration, e.g. *"I would go to Rally's […] **my best friend loves going there"***. This extends on the observations in [1,8] and highlights that local search services may need to consider multiple people's trajectories. It means that future local search experiences might also benefit from detecting tradeoffs between users, to ensure that all parties would be satisfied in case of compromises on multiple requirements. Note that one property can affect another. For example if we take safety constraints related to area, these may be perceived differently when accompanied by a friend.

Discussion & Design Implications
While the common scenario used in this survey may appear trivial, we note that currently available systems do not fully support the combination of requirements found; i.e. this is a rather non-trivial design challenge. While it's likely that local requirements evolve,

especially when users look at different search results and think of preferences that they couldn't articulate at the start; ideally local search systems should be able to support these identified requirements from the get-go, instead of forcing users to conduct multiple searches.

Not surprisingly, multiple noteworthy research projects and commercial systems have addressed some of these aspects. Amin et al. [1] suggest *location-based service mashups,* which integrate different services like business directories, public transport, navigation as well as other services like gas stations. The goal would be to assist users in estimating distance and travel between places. However, we find that the combination of requirements we identified and the iterations required for different tradeoffs, such as comparing different trajectories of activities, would require a different type of organization. The majority of today's commercial local services such as Google Maps, Yelp and Foursquare provide "also-nearby" venues based on categories, e.g. hot and new businesses, time-of-day, venues frequently visited afterwards, etc. However, local search systems could also present users with a set of alternative plans and trajectories that take into account the diversity of location preferences and constraints for multiple people, as well as familiarity with an area. While users would still have to decide between alternatives in a process similar to [7], taking a multitude of combinations of preferences and requirements into account from the get-go would speed up this process.

Social context plays an important role in prompting location-based search needs and decision-making [1] . Our results add further weight to the argument that to help users in planning and decision-making, integration

beyond the individual, and beyond en-route trajectory aware search [2], is required. Our findings suggest that future location-based services should incorporate the planned trajectories of multiple people, and 'multi-personalize'. We however add that it's not necessarily always the people nearby, or those directly involved in conducting the search, (as in [1,8]), who are of most interest. We plan for others, or consider others' constraints in our future plans. Finally, while researchers have begun to develop collaborative local search interfaces [5], there has been little focus on incorporating local intent and in-depth location requirements into such shared experiences that allow groups of people to express local queries and interact with local search results together [3].

Conclusion

Through our survey of 306 participants we identified 4 key factors of location that influence choice of place in a local restaurant search scenario. While Riegelsberger [7] found that multiple stages in local search processes can be successfully supported in terms of exploring requirements and options, we found that we do not yet support the range of complex location requirements identified in our study. Existing search applications currently require users to map complex search cases and requirements into multiple queries, across multiple interactions. Future local search or recommendation systems need to support complex multi-person preferences if they are to provide users with truly compelling experiences. Finally, the tradeoff among various location requirements should not be underestimated. To date, existing commercial local search and recommendation services, as well as existing academic work have not yet addressed the full range of location requirements identified in our study of a seemingly common, mundane scenario. While this work presents insights for local searches in the initial stages of a search, we would encourage the CHI community to extend this type of study to a broader set of use cases (i.e. beyond restaurant searches) as well as to different stages in the search or recommendation process.

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