Find me if you can: Designing Interfaces for People Search

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ABSTRACT

Selecting relevant people is crucial for collaborative systems exploiting other users' experiences. With the new developments of the Web and ubiquitous technologies, various user data may support people selection. Given the wide range of user data sources, the question is now how to select appropriate users meeting the information seeker's goal. We propose recommendations for the design of people search interfaces, providing an overview of the user data and tools of relevance and two examples of how such recommendations can be met in one single interface, ensuring the selection of appropriate and reachable people. We also show applications of people search interfaces in different scenarios.

Author Keywords

people search, people selection, interface design

ACM Classification Keywords

H.5.2 [User Interfaces]

INTRODUCTION

Human decision making usually not only takes into account the decision maker's personal experiences but also experiences and opinions of other people. Systems such as collaborative recommenders [8] and expert finding systems [1] assist the user's decision making with other people's information such as their preferences, interests or expertise. For instance, collaborative recommenders aggregate the preferences of a community subset matching the user's preferences to recommend new items. However the resulting item recommendations largely depend on the quality of the selection of the recommendation givers, i.e. people who are likely to be helpful with respect of the user's need.

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Recent developments of Web technologies are making it much easier to obtain user data for selecting appropriate and reachable people for different purposes. For example, social network services (e.g., myspace and facebook) provide millions of searchable user data including interests, demographic data, and social relationships. Metadata (e.g., FOAF) also provides user data in a structured and therefore queryable manner. Some recent services (e.g., Spock and Wink) allow to search for people using data extracted from the Web. Preferences or interests of users can be obtained from their browsing histories and recent social bookmarking services. E-commerce or auction sites (e.g., EBay) provide users' reputation data. Sensor (e.g., RFID) and mobile (e.g., GPS) technologies provide data to get insight of the user's context, activity and thus information need.

Given this wide range of user data, the question is now: *how to select appropriate users meeting the information seeker's goal?* Research has addressed the people search task in the context of social matching systems that enable users to find relevant people for given purposes [12]. Some systems take automatic approaches to identify matching between people in an algorithmic way. However, people selection should also be supported by the user and thus the interface. Some studies have indeed addressed collaborative systems from the HCI perspective [11].

In this paper, we propose design principles for and examples of interfaces for people search. Our contributions are two-fold: we first give an overview of user data and tools relevant for the design of people selection interfaces, providing basic design recommendations. Second, we show with the help of two sample interfaces how the design recommendations can be applied in one interface and describe application examples of these interfaces in different scenarios.

DESIGN RECOMMENDATIONS

People search basically consists in selecting people satisfying most of the criteria derived from the user's goal. Therefore the design of an interface for people search depends on the kinds of user data made available. In this

section we describe the data and tools recommended for a people selection interface. We grouped them in three categories: user model-based data which are used to determine matches, context-based data used for user's need determination and ad-hoc support, and relationship-based tools mainly useful to ensure people reachability. Privacy on the user data is one of important issues. Several studies have address the privacy issue in dealing with the user modeling [9]. However, due to the space limitation, we do not go into details about the privacy issue.

User Model-Based Data and Tools

A *user model* [6] is essential to determine matches between people [12]. It may contain *demographic data* (e.g., age, gender, occupation) as well as *domain-oriented attributes*, preferences, and expertise level. Fischer [4] showed the importance of such data too, given the correlation of the similarity in demographic data with interpersonal attraction. Therefore a *model of a good match* based on such personal attributes may support the selection of appropriate persons. The model of a good match can either be of the responsibility of the system (e.g., by a similarity calculation) or of the user (using the interface to specify criteria of relevance within the user models).

Context-Based Data and Tools

Context allows to infer the *user's goal* or information need, which strongly influences the people search criteria. The user's goal may be obvious in some systems (e.g., dating systems), while for others (e.g., ubiquitous systems) the user's context (location, time, actions performed, and surrounding people and resources) can be applied to infer it. When inferring it is not possible or desired (for more user control), the goal has to be expressed manually.

Some automatic systems, such as I2I [3], provide *opportunistic matches* based on the user's context without explicit request from the user. Relationships by common property in the people's context are used to recommend people or form ad-hoc communities. An extension consists in applying *keyword-based search* using keywords extracted from the user's context and searching for matches with keywords in the people's models, contexts, or relations.

Relationship-Based Data and Tools

Information about relationships among people such as social networks can be used to search for people. Social networks data is currently available from several information sources such as email, social network sites and metadata [7]. Annotation mechanisms such as FOAF metadata or relationship tagging allow to search for people according the type of relationships in interest.

More importantly social networks allow for finding people who are socially close and may thus be reached via mediators. Reaching other people is indeed an important aspect of people search. Graphical representations support the visualization of *referral chains* that facilitate the interaction between people. With respect to the asymmetric nature such relations, we suggest to design such representations in a way enabling *egocentric view*s on social networks, i.e., views which reflect the user's personal opinion of her relationship to other people and which are not necessarily shared with others.

Based on the data described above, we propose the following basic design recommendations:

- Selecting people: allow a user to interactively search for other users using attributes and numeric values from the users' models and contexts which are of relevance for the user's need.
- Reaching people: provide a user with contextual and relation data such as location or social networks to help reaching the selected users and facilitate interaction between them.

EXAMPLES OF USER INTERFACE DESIGN

In the following, we present examples of people search interfaces designed with respect to most of the recommendations from the previous section. We begin with an interface for people selection called Community Browser (CB). Then, we continue with an interface for reaching people. Both interfaces have been implemented and operated as services for end users in different scenarios: cooking/shopping and academic conference.

Selecting people

The interface of the CB consists of a layer for the specification of selection constraints and another one for the exploration and refinement of the selection.

In the former (see the upper two screens of Figure 1) the user selects sets of people using constraints, which have been identified as relevant selection criteria in a contextual inquiry we conducted for our scenarios. The interface provides the user with a rough selection preview (A). The constraints originate from various sources. Constraints from the user model include demographic data as well as data specific to the application domain (B). Other constraints are related to *contextual data* such as proximity (C), or information from the user's *social network* such as the quantity of *past interactions* with others (e.g., number of encounters at the conference) and to some qualitative *feedback* on them (e.g., rating of the expertise). An interesting variable is the profile similarity calculation, i.e. the *model of a good match* which depends on the application domain. The user has the possibility to ignore it and specify her model of a good match using the people search criteria, or to combine her model and the system's one by specifying an acceptable range of similarity level.

Contacts are divided into a given number of predefined

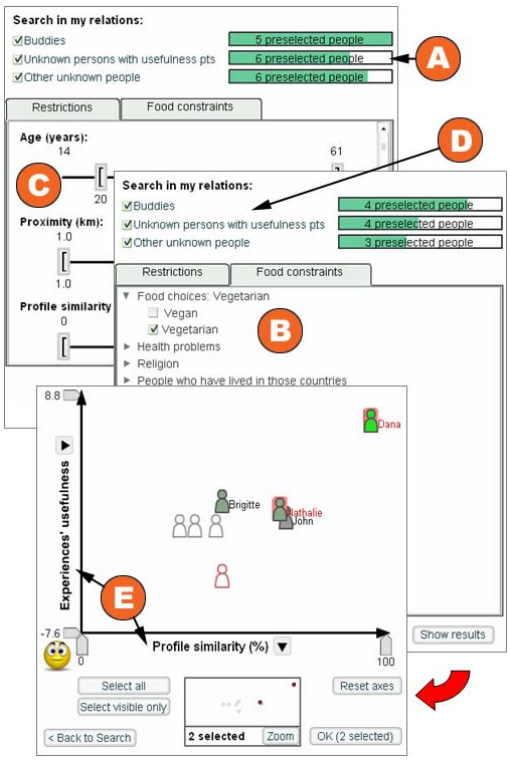

Figure 1. Screenshots of an interface for people discovery and selection.

categories (D). The user can restrict the selection to certain people categories. The number of people in each category matching all search criteria is indicated in front of each people category, allowing the user to refine the criteria until an adequate number of candidates is reached.

The resulting people set may be explored and refined in the second layer (the last screen of Figure 1). It consists in a 2D space that can be configured by the user to arrange the selection according to various dimensions (E), usually the variables from the first layer. This visualization aims at supporting the user in the discovery and explicit selection of people from the original set.

The display provides the user with an egocentric view on the selection. To learn about the selection from another person's viewpoint, the user may drag that person's symbol to the origin of the 2D plot. Then, the selection is rearranged according to preferences known for that person. The main user (symbolized by the Smiley) is moved from the origin to the plot, which enables the user to learn about situations when the user at the origin might select her. The layer of selection criteria can be skipped as well if one prefers a more exploratory way to make one's selection, i.e. starting from the graphical representation and using the selection layer only if necessary.

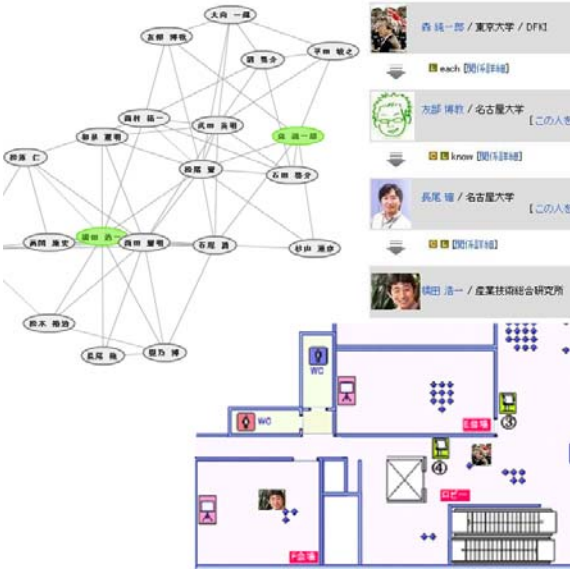

Figure 2. Screenshot of an interface for reaching people. Social network and Location information assist a user to reach other users.

Reaching people

Selecting people using the previously mentioned interface results in a set of candidates. The next step consists in assisting users to find reachable candidates. Several user data can be exploited for this purpose.

Social networks data is currently available from several information sources such as email, social network sites and metadata [7]. Even recent sensor information provide the clue of social relationships between people. Figure 2 (upper figure) shows an interface that assists users in exploring selected people in their social network: the visualization helps to find a *referral chain* to a given user. People who are easy to reach are direct contacts of the user or are linked with only one intermediate to the user: knowing both of them, the intermediate might introduce the seeker to the target. The referral chain can also leverage assessing the credibility of others.

The interface also allows to visualize the location of users of interest (e.g., location in an event space) as shown in Figure 2 (lower figure). The location can be obtained from sensors (e.g., RFID) or mobile devices (e.g., GPS). Together with the social network, the location information can be used to assist users in reaching the selected users in their interest.

The system may also encourage the user to use other external interaction means such as emails and Instant Messengers to contact the target. Displaying commonalities such as common interests or friends that caused the user to find another user can be presented to them in order to facilitate their communication [10].

Applications

Recommendation in a Ubiquitous System

The two interfaces for selecting and reaching people have been integrated with SharedLife, a system supporting the user's decisions with recommendations based on other persons' past experiences [2]. Here an "experience" is captured via ubiquitous sensors and consists in contextual information (time, place), the user action, and involved objects. Recommendations in the application domain (in our case grocery shopping and cooking) are provided by experience sharing based on requests and answers. People selection was required to select the most appropriate recommendation givers. Given the currently rare instrumentation of environments, we can not expect to always infer the user's need. This need may also be complex and unrelated to the user's context. A manual input was therefore required to specify relevant information sources. We therefore performed two iterations of design and evaluation with users to develop our CB interface, which, as said, makes use of data about the users, the user context, the past interactions, as well as similarity calculation to support the user with people selection.

Expert Finding in Conference

Our interfaces have also been integrated with the conference support system of JSAI (Annual Conference of the Japanese Society for Artificial Intelligence) that aimed at enhancing the communication between conference participants. The support system, which is both a Web-based (for online support) and ubiquitous (for onsite support) [5] allowed to collect user data such as a user's social network, domain specific data (e.g., affiliation, research interests) and location in the conference space. Based on such user data, our interfaces have been used to help conference participants to find and meet relevant people at the conference. More than 300 participants registered and used the system in JSAI 2007. The participants answered a questionnaire about our interfaces that we are currently analyzing. So far, the results show that our interface supported meetings and interaction between participants who shared common research interests.

CONCLUSION AND FUTURE WORK

Selecting relevant people is important for collaborative systems. In this paper, we proposed recommendations for the design of people search interfaces based on an overview of the user data of interest for such a task. We described examples of interfaces following these recommendations. In the future, we plan to exploit the user's context to preconfigure the search interface with selection criteria which may support the user's current goal. We also plan to design evaluation criteria for interfaces of people search and evalute our interface with user studies.

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REFERENCES

1. M. S. Ackerman, V. Pipek, and V. Wulf. *Sharing Expertise: Beyond Knowledge Management*. MIT Press, Cambridge MA, 2003.
2. N. Basselin and A. Kröner. From personal memories to sharable memories. In *Proceedings of the Annual Workshop on Adaptivity and User Modeling in Interactive Software Systems (LWA 2006)*, 2006.
3. J. Budzik, S. Bradshaw, X. Fu, and K. J. Hammond. Clustering for opportunistic communication. In *Proceedings of the International WWW Conference*, 2002.
4. C. Fischer. *To dwell among friends: personal networks in town and city*. University of Chicago Press, 1982.
5. T. Hope, M. Hamasaki, Y. Matsuo, Y. Nakamura, N. Fujimura, and T. Nishimura. Doing community: Co-construction of meaning and use with interactive information kiosks. In *Proceedings of the 8th International Conference on Ubiquitous Computing (UbiComp2006)*, pages 387–403, 2006.
6. A. Kobsa. Generic user modeling systems. *User Modelling and User-Adapted Interaction Journal 11: 49-63, 2001.*, 11(1–2):49–63, 2001.
7. Y. Matsuo, J. Mori, M. Hamasaki, K. Ishida, T. Nishimura, H. Takeda, K. Hashida, and M. Ishizuka. Polyphonet: An advanced social network extraction system. In *Proceedings of the International WWW Conference*, 2006.
8. B. N. Miller, I. Albert, S. K. Lam, J. A. Konstan, and J. Riedl. Movielens unplugged: Experiences with an occasionally connected recommender system. In *Proceedings of ACM 2003 Conference on Intelligent User Interfaces (IUI'03)*, Chapel Hill, North Carolina, 2003. ACM.
9. J. Schreck. *Security and Privacy in User Modeling*. Springer, 2003.
10. Y. Sumi and K. Mase. Supporting the awareness of shared interests and experiences in communities. *International Journal of Human-Computer Studies*, 56(1):127–246, 2002.
11. K. Swearingen and R. Sinha. Beyond algorithms: An hci perspective on recommender systems. In *Proceedings of the ACM SIGIR 2001 Workshop on Recommender Systems*, 2001.
12. L. G. Terveen and D. W. McDonald. Social matching: A framework and research agenda. *ACM Transactions on Computer-Human Interaction*, 12(3):401–434, 2005.