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Measuring Social Networks for SmartCampus

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ABSTRACT

SmartCampus is a wireless mobile location-aware set of community services designed to support and expand social networks on a campus or similar urban enclave. To validate that SmartCampus is successful in that, we need to measure the users' social networks before and after use. Measuring social networks is complex: concomitant with eliciting accurate representations of the social networks, the procedures need to be completed quickly and lend themselves to presentation on the World Wide Web. Techniques described in the literature needed to be modified to be more suitable to our needs. This paper describes the development of a questionnaire used to measure egocentric student social networks and our initial findings about the size of current campus student networks.

Keywords

P3 systems, mobile social software, social networks

INTRODUCTION

Social software (supporting a range of coordination activities, from meeting new people to providing information on current location and availability, and coordinating activities) has seen a tremendous increase in usage over the past few years (e.g., Facebook with over 4 million users in 2005) and will experience additional significant growth as it becomes integrated into location-aware mobile devices users can carry at all times. However, there are very few studies of the actual social impacts of these systems. This paper reports on the development of an instrument to measure the on-campus social networks of students at an urban university by eliciting the actors (nodes) in their egocentric social networks and the strength of the ties between them. We focus on the changes in on-campus friendships. Our challenge in developing the instrument is to accurately elicit the social networks in a way that is easy to do, takes less time than traditionally, and can be administered through a Web based application. Our initial efforts have been to iteratively develop such a technique, using feedback from each trial to refine the process for the next trial. We initially use paper-based questionnaires, but designed with the intent of placing the questionnaires on the Web.

A team of researchers at NJIT is designing SmartCampus, a wireless mobile community system with people-to-people-to-place (P3) services (Jones and Grandi, 2005). A university campus is an example of the type of "urban enclave" that can best support and benefit from this type of system (Jones and Hiltz 2005). SmartCampus is designed to, among other things, support and expand social networks on campus. Three of its main components are ActiveCampus, a modified version of UCSD's active campus that will enable users to locate buddies on campus and communicate with them; CampusMesh, a location aware friends-of-friends social network application that will serve as a recommender to introduce students to other users; and CampusWiki, a location and context aware web page that will allow students to view, post, and vote on information and opinions about locations, events, and issues on the campus. To validate that SmartCampus is successful in expanding social networks, we will use the instrument we develop to measure social networks before and after use.

A web based questionnaire can maximize the number of participants in the study while minimizing the number of investigators needed. We will be assessing the effects of SmartCampus on both the size of the individual's egocentric network and the strength of the ties by repeated administration of the questionnaire.

MEASURING EGOCENTRIC SOCIAL NETWORKS

An egocentric social network is made up of a node representing the person whose social network is being represented, nodes representing the people in the network, and ties which are the connections between the central person and the nodes in his or her network. Each tie is made up of strands, which represent the relations between the two nodes. For example, strands might represent work colleagues, sports partners, and/or friends. Ties can be differentiated as having varying strengths which can be measured by the degree to which the relation it represents is present and also by the number of strands.. The strength of a tie can be stronger if it represents a stronger relationship (e.g. closer intimacy) and/or if it has more strands. The measure

of tie strength depends upon the criteria upon which the social network is built. For our purposes, we have initially used undirected ties of one strand – friendship, with strength of level of intimacy. Our intention is to keep friendship as the predominant strand, but in the next series of trials to look at other ways that students relate to each other on campus. Greater strength is indicated in Figure 1 by an increase in the thickness of the line representing a tie.
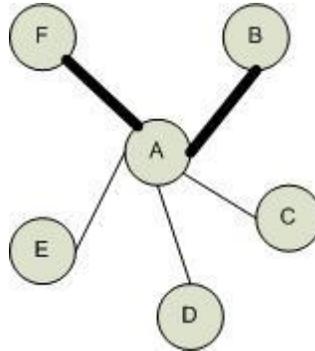
Figure 1. Example of an egocentric social network

We reviewed methods used to elicit egocentric social networks and evaluated their appropriateness to our needs. Recall is frequently, and sometimes the only, method used (Adamic et al, 2005). Garton et al suggest that recall alone will not be as accurate as using observation (Garton, Haythornthwaite, and Wellman, 1997). Nodes of social networks reside in the electronic artifacts that subjects use. Although email extraction methods are often used to elicit the nodes in social networks (Adamic, 2005; Whittaker, Jones, Nardi, Terveen, Isaacs, and Hainsworth, 2004), we ascertained it is not feasible for our use. Students at NJIT are provided with email accounts. Many, if not most, of the students choose to primarily use another account and have all their NJIT email automatically forwarded to their preferred account. Because so many domains are used, automatic email extraction cannot be employed. The time it would take to have subjects manually sort through their email address books to extract NJIT affiliated contacts would be prohibitive and would violate our goal of designing a process that is as brief as possible without sacrificing accuracy.

However, we recognized that the social networks also reside in other electronic artifacts popular with our students. Therefore, in later trials we began to ask the students to review their cell phone contact lists, IM buddy lists, and buddy lists on whatever "friend of a friend" system (e.g. Friendster) to which they may belong. We cannot do automatic extraction from these artifacts because the domains vary, but it is useful to have the subjects look at them during the interview process as a means of jogging their memories as they use recall. This process takes less than 5 minutes and so is appropriate to our goal of keeping the process brief. It is also something the subjects can do while answering an online questionnaire and so is appropriate to our needs.

OUR TECHNIQUE OF ELICITING SOCIAL NETWORKS

We have based our technique of eliciting social networks, and the characteristics of the social networks we look at, on the "name generator" technique used by Wellman, Hogan, et al to elicit egocentric social networks for the project "Connected Lives" (Carrasco, Hogan, Wellman, and Miller, 2006; Wellman, et al 2005). It uses paper slips and colored pencils in a process that is time consuming and cannot be directly moved to a Web application. Therefore, we used the underlying concepts and definitions, but modified and changed the procedures.

The "Connected Lives" project elicited tie strength based upon definitions of "Very Close" and "Somewhat Close" friends. We found that students had difficulty differentiating between "Very Close" and "Somewhat Close" and so, although we retained the definitions, we renamed "Somewhat Close" as "Less Close or Casual Friends." Very Close Friends are defined as "Friends with whom I discuss important matters, regularly keep in touch with or do things with, and are 'there for me' if I need help," and Less Close or Casual Friends are "Friends who are more than just acquaintances but are not 'very close'."

Subjects are given two forms, one for Very Close Friends and one for Less Close or Casual Friends, and are asked, using recall, to list their NJIT friends on the appropriate form. . Then they note how they met each friend (with a list of categories) and if they would choose to have that friend as a SmartCampus buddy – i.e. someone who can locate them on campus and interact with them using SmartCampus devices. In the post-use study the subjects will also be given a choice of having met the friend through SmartCampus. Social networks are dynamic, changing often for many reasons. By noting how they met

the friend (and noting if it was through SmartCampus) we will be able to determine what social network changes resulted from SmartCampus use. In addition we ask for a variety of demographic information that we think will be related to use of the system for social networking purposes, such as their year in school, whether they live on campus or commute, their age, and their current use of mobile devices and of technologies.

After two trials with the above procedure, we added looking at artifacts (cell phone contact lists and buddy lists on IM and friend-of-a-friend systems) as a way of stimulating the recall of the subjects.

There were some surprises to us. Students will often list as Very Close Friends people whose last names they do not know. On reflection we believe this is because their contact is primarily through means that do not require the knowledge of last names (e.g. email, IM, face-to-face). As a result, we ask that if they do not know the last name of a friend, they put some unique identifier (e.g. email address, IM name) so that we can distinguish between people with the same first name.

PRELIMINARY RESULTS AND DISCUSSION

We have been able to keep the time required to administer our questionnaire to an average of 31 minutes, which also included time to administer a survey questionnaire about the subjects' perceptions of campus community. Our subjects did not find this length of time burdensome and it meets our criteria of being a relatively short process. We surveyed 28 students:

Men	Women	Commuters	Dorm Residents	Under-graduates	Graduate students
20	8	22	6	24	4

Table 1. Sample population

The results for the number of Very Close Friends and Less Close Friends elicited from undergraduates are shown below in Table 2. While there was not a significant difference in the results for Very Close Friends between dorm residents and commuters, there was a marked difference in the results for Less Close or Casual Friends. It was also interesting to us that a substantial number of students reported that they had no very close friends, or even less close friends, at the school, an indication that there is an opportunity for the new technology to make a difference.

	Very Close Friends at NJIT			Less Close or Casual Friends at NJIT		
	Commuters	**Dorm Residents**	**Total**	**Commuters**	**Dorm Residents**	**Total**
Mean	5.71	6	5.78	3.41	9.67	5.04
Standard Deviation	3.95	2.45	3.57	3.14	3.78	4.28

Table 2. Number of Very Close and Less Close or Casual Friends for Undergraduates Sampled

All graduate student subjects were commuters. Including them in the analysis resulted in, for very close friends, a mean of 6.05 and standard deviation of 3.73; for less close friends, a mean of 3.24 and standard deviation of 2.99. Nineteen of our subjects referred to artifacts to support their recall of NJIT friends. The addition of the use of artifacts resulted in an insignificant average increase: only .13 Very Close friends and .21 Less Close or Casual friends. That the addition of reviewing artifacts to aid in recall did not make a significant difference does not indicate it is a technique to abandon; it encourages us to believe that our process of eliciting social networks from recall will be successful. The small sample size is a constraint on this research. However, early indications are that the measures will enable us to ascertain the impact of SmartCampus on social networks. This is research in progress and future trials will use larger sample sizes and continue the iterative development of the measure.

CONTRIBUTION

The main contribution of this research is the development of a measure of social networks that is easy to use, takes less time than previous techniques, can be moved to a Web-based survey, and still maintains accuracy. This method will be useful in future studies of changes in social networks that have time and resource constraints.

FUTURE RESEARCH

In the next trials we will also ask the subjects if they are part-time students or full-time and if they work, if they work on campus or off campus and for how many hours. We will also elicit the relations that make up strands of the ties in the social networks (e.g. classmates, sports buddies). After a trial with these additions, we will conduct trials with our questionnaires on the Web for eliciting social networks of SmartCampus users as they change over time. Once trials begin, the questionnaire will be administered immediately prior to receiving the device and again two months later. This allows a trial to be completed within one semester.

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