commuCity: A Social Network System for the Non-resident Elderly in Big Cities in China

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ABSTRACT
Urban non-resident elderly is an emerging population in the first and second-tier cities of China in recent years. They come to cities mostly for helping their children take care of newborn babies, but the feeling of loneliness in a strange city is a real problem for them. We undertook a qualitative study of the non-resident elderly in a metropolitan Chinese city to better understand their living conditions and how can information and communication technology potentially help them develop interpersonal relationships in a new city. Our observed needs and behavior patterns of those elderly were used to generate scenarios and based on which we proposed our design of commuCity, a system that incorporates social works of community to help better organize social activities for the newcomers of non-resident elderly.

Author Keywords
Social networking system, urban non-resident elderly, user centered design, scenario-based design.

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

INTRODUCTION AND MOTIVATION

The past two decades in China witnessed a tremendous tide of immigration from inner, backward places to coastal and advanced cities. Currently, this population is bringing about another immigration trend—the young people's parents, who have already retired, leave their hometown and come to large cities to live together with their sons or daughters, and to help them take care of the newborn babies [1, 2].

For those newcomers of non-resident elderly, the living conditions in an unfamiliar city differ a lot from the life in their hometowns (Figure 1). In addition to the unfamiliar physical environment, the social environment in the city is a more serious problem for them. The alien surroundings and the lack of social relationship badly reduce their happiness and quality of life. Many investigations have shown that overwhelming majority of non-resident elderly feel lonely and are reluctant to stay after they have moved to big cities. But due to young people's working pressure and a tradition of helping take care of grandchildren, most of them would not leave soon [1, 2, 4].

Figure 1. The comparison between the non-resident elderly's life before and after coming to the big city.

With the increasing social concerns on the emotional problem of urban non-resident elderly, some social works have tried to help them rebuild interpersonal relationships and better adapt to urban life. But there are no researches that have considered this social issue through the lens of technology, especially social-media technologies that could help facilitate the connection between people. It is suitable and necessary to explore how those emerging technologies could be applied to address the problems encountered by the non-resident elderly and help them improve their urban experience [4].

The goal of this research and design is to identify the unique behavior patterns, and characterize perceptions of information and communication technologies (ICT) among the urban non-resident elderly to build a social networking mechanism with appropriate technological interventions for them. We conducted a qualitative study of the urban non-resident elderly in one of the largest city in China to better understand their life situation and to explore the potential touch points with regard to the web-based communications and social activities [12]. The qualitative research involved

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observations of existed activities among the elderly, and contextual interviews with nine participants covering their activities in daily life, relationships and communication with other people, and their ICT related experience.

Our findings suggest that most of those non-resident elderly are conscious of their loneliness, but they generally have no initiative to expand their social relationships in the new city. Moreover, most of them come from rural areas and have rarely touched emerging technologies. So, how to design a system that both takes advantage of the connectivity of ICT and skirts elderly's blank of ICT skill, and also takes their passivity in social behavior into consideration is the most challenging part. In this regard, the paper tries to explore an embodiment of SNS in a form of real-world activity to accommodate their specific needs and behavior patterns.

RELATED WORK

Non-resident elderly in large Chinese cities is quite a new research topic in China. Some researchers in the field of sociology and public administration have come to address this issue. For example, Liu proposed strategies of social-work intervention to help non-resident elderly better integrate into the life of city [1]. Fan analyzed the social relationships of urban non-resident elderly and the potential of increasing their belongingness in the city through the cooperation of various sectors within the communities [4]. These works all tried to find solutions from the perspective of traditional social works, but they have not explored the new ways of social work collaborating with technologies in this digital age.

On the other hand, significant contributions have been made in the research of SNS about how to better involve older adults in the web-based social media communication. Lehtinen *et al.* undertook a qualitative study to explore older adults' understanding of SNS and the implications for designing SNSs for older adults in an advanced country [6]. In China, some researchers have also explored the design of elderly online social network service. For example, Zheng *et al.* proposed a model of elderly SNS platform and analyzed the data interaction based on statistics [3]. Yang conducted qualitative studies about the interface design of SNS to improve its usability for Chinese elderly users [5]. Although research data shows the rate of elderly using Internet is increasing [3], they have always been concerning the literate elderly and the urban residents, but have seldom considered who live in rural areas and have very limited ICT experience.

USER RESEARCH

We chose Nanshan district in Shenzhen city to conduct a qualitative research of non-resident elderly because it is one of the youngest and the most typical urban areas in China that contains a large population of non-resident elderly. According to the government data of December 2012, there were nearly 94000 people above 60 years old in this district, among which approximately 70000 were non-resident [10].

In the first day of research, we walked from one community to another, to observe elderly's activities and the places where elderly always go and stay. We noticed that the parks and recreation sites in the residential areas (e.g. the gardens and playgrounds of community) are completely gathering places for older adults. Young people all go to work during the daytime, leaving elderly there for various activities. At those outdoor sites, some people played cards or chess under trees, some performed traditional music and dramas on the grassland, and some did exercise by group. But there were also numerous individual elderly lounging around the park without companion, or some sat on the public stools reading newspaper by themselves.

As the gathering places not only for those who take part in activities but also for those who don't, we thought the parks or such kind of outdoor sites were just the ideal situation to conduct contextual interviews. But to gain a diverse cross section of the non-resident elderly population, we also went to markets and kindergartens, at there we talked with some non-resident elderly casually about their daily routine. They told us they liked to go to the parks near from their homes because they loved the lively atmosphere there, and thus they would not feel that lonely. In this regard, we decided to undertake our further research in a community park and a small neighborhood park. And the activities in the parks can indicate natural approaches of social behavior to inform us what the potential technological intervention should look like for the non-resident elderly.

Based on our observation of elderly in the parks we sorted non-resident elderly according to their involvement in the activities: 1) those who had already been involved in the activities, 2) those who sat or stood around the activities to look on and 3) those who stayed alone or just with their grandchildren. Our interview study embraced these three kinds of people and we focus more on the latter two kinds.

In the following days, we undertook a contextual interview study with 9 non-resident older adults who all came to Shenzhen in the past five years. As we interviewed them in the parks, we were able to watch them doing their everyday activities and to discuss what we saw with them [8]. Six of our participants were staying alone or with babies when we asked them for interviews, two participants were bystander of activities, and just one was involved in playing game. Each of our interview took roughly half to one hour, and the questions in the interviews were mainly open-ended, such as "for what reasons you don't participate those activities in the park?" and "what do you think about communicating and playing games with strangers online?"

Among the 9 participants, only two have already gain stable interpersonal relationships in Shenzhen, and both of them have been lived in the city for more than 3 years. Questions for them were somewhat different from others because we hope to gain some insights about how they got acquainted with playmates and how they kept in touch with each other. Their hands-on experiences of establishing companionships

provided important implications for us to find technological ways for newcomers of non-resident elderly to make new acquaintances sooner.

With regard to the ICT experience of non-resident elderly, we inquired them about the ownership of digital and mobile devices, and their purposes and context of usage. Moreover, we asked them to use their mobile phone to make phone call or text message and we observed how they operate their phones. In this way we could better understand the behavior patterns when they use a digital device.

FINDINGS

In this section we present the most noticeable findings about the urban non-resident elderly that are related to their interpersonal relationship and communication in daily life, also analyze their implications for designing social network service with proper technological interventions.

Variation of busyness

Because most non-resident elderly come to city for taking care of babies, their busyness commonly vary in pace with babies growing up. And the key time point is when the baby born, as the parents of the new parents and the grandparents of the newborn babies, they undertake the responsibility of taking care of the babies. Figure 2 roughly describes the variation of busyness and divides the timeline into 4 periods accordingly in which they would have different situations with respect to social behaviors.

In period II, the elderly are busy on the newborn babies and their daughter or daughter-in-law on maternity leave can also stay at home as their companion. And in period IV, the elderly who still stay in the city mostly have to some extent got used to the urban life. On the other hand the newcomers of non-resident elderly (I) and those who are gradually freeing from the obligation of taking care of baby (III) are more apt to feel lonely. In the face of loneliness caused by being in a new environment, the newcomers are most likely to make phone calls to their old friends or relatives at their hometowns. While the elderly in phrase III, who have been familiar with the physical environment would always like to take a walk around the lively outdoor places to mitigate their feeling of loneliness.

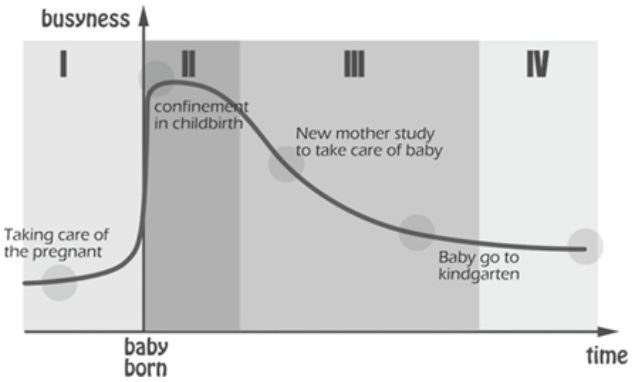

Figure 2. Non-resident elderly's variation of busyness.

Neighborhood model

Being unfamiliar with the city and being responsible for taking care of babies or children, most non-resident elderly always have a relatively regular life within a quite limited area coverage, which is called Neighborhood Unit in the field of urban planning (Perry, 1929). They go shopping, go to kindergarten or school to pick up kids, and go to the parks for recreation all in the same unit (Figure 3). And meanwhile, because of the high residential density in the city, large amount of people live in the same neighborhood unit. This condition lays a foundation for the non-resident elderly to develop their social relationship within the units.

Another phenomenon led by the above-mentioned condition is familiar strangers (Milgram, 1972) among older adults in a neighborhood unit. People always see someone at specific places but do not interact with each other. Such as one of our interviewees said: "I *almost see some elderly every day in the market or outside the kindergarten, I just have never talked to them*."

Figure 3. Neighborhood Model of non-resident elderly.

Passive social behavior

Most of our interviewees talked about their feeling of loneliness, especially female older adults who come to city alone. But unexpectedly, although our interviewees realized their loneliness, they had hardly thought about finding some new friends in the city. They tend to contact with their old friends in hometown, or simply hope to have more chance to communicate with their children at home. They defined friend as long-term relationship with others, so they did not think they could or have necessary to find friends in the city. Most of them told us that they wish to return to hometown after their grandchildren go to kindergarten, this would be a reason except personality for their passive social behavior.

Although the non-resident elderly we interviewed expressed indifference and passiveness towards finding new friends, from the interview we found that they indeed had a strong willingness to communicate with other people. It is possible that the term *friend* is improper for them to describe such kind of relationship. They hope to have someone to chat with or play with, but they just would not *look for* someone stranger on their own initiative. On the other hand, if they

come across some people who share common grounds, they would always readily communicate with each other. As one participant put it, "I came across a woman in a pet shop who likes breeding parrots as much as I do, we talked about parrots and other trivial matters for almost two hours."

Activities at gathering places

As we said in the section of user research, there were many elderly who participated various activities in the parks near from residential areas by day, and also many elderly who didn't take part in the activities at there by themselves. The activities make the park a lively place that attracts many non-resident elderly to saunter at there. Whether the elderly participate those activities or not, those out door gathering places are the ideal sites for them to get acquainted with others.

The activities in the parks include chess and card games, sports games, and dancing & singing performances. The organizers and participants are mostly urban residents, and the non-resident who have been the city for many years or with quite outgoing personality. These activities should be perfect social activities for elderly to develop interpersonal relationships, but the newcomers of non-resident elderly are always hard to get involved, so they watch as onlookers if they are interested in those activities. In this way they could enjoy the lively atmosphere there, but could hardly interact with other elderly. This activity-oriented gathering could to some extent bring the elderly who share common interests together, but it seems that more incentives are needed to make the onlookers interact with each other. Besides, many elderly neither participated nor watched those activities, because they're not interested in those activities in the park, they just want to stroll around and do some exercise alone.

Lack of ICT experience

As the non-resident elderly mostly come from outback and relatively less developed districts, they have less experience of using computer and related devices compared with the urban residents. Their most frequently used ICT device is mobile phone, by which they are able to contact with their sons or daughters when they need help. They generally use mobile phones with very simple functionality because the price is very cheap and there is no complex operation. Our interviewees all had computers at their children's home but only two of them tried to surf the Internet. When talked about making friends online, their attitudes were negative, such as the responses: "*That's your young people's business, I would not use it*" or "*I don't trust people on the Internet at all, I prefer talk with and play with real-world people*".

CONCEPT VALIDATION

Based on the synthesis of non-resident elderly's needs and behavior patterns that we got from the qualitative study, we developed twenty concepts through brainstorming. These preliminary ideas addressed how non-resident elderly could get to know other elderly who share some common grounds within a neighborhood unit. The types of common ground include their hometown, present address, interests, favorite sports. Many elderly who share some of the common points are sometimes familiar strangers such as the elderly sharing common interests gathering in the parks, or living in the same building often meeting each other in the elevator. If some additional connections are made between them, we thought their Familiar Stranger relationship would likely be extended [13].

By means of ICT, it's easy to connect those elderly online, but social networking sites or other web applications are improper for non-resident elderly because of their passive social behavior and deficient knowledge about ICT. So we filtrated the set of concept based on this consideration to ten concepts. In the detailed design section, we analyzed some interesting scenarios that we observed to get more insight to humanize ICT for the non-resident elderly. These scenarios are separate episodes rather than a continuous story about elderly's life. In this way, we aim at highlighting the touch points where technology could potentially play a role in connecting the non-resident elderly with a natural approach of ICT that is specifically designed for them.

Figure 4. Brief scenarios describing elderly's touch points.

(1) Uncle A and uncle B are waiting their grandchildren outside the kindergarten before the school is over, they almost meet with each other every day at this time and this place, but they have never talked with each other, just wait grandchildren and then bring them home.

(2) Aunt A and aunt B take their little grandsons to the park to play. After a while, the two kids play around together, then the grandmothers A and B also come together and have a talk.

(3) Uncle A and B are both interested in playing chess, but they are all newcomers so they could only be bystander of other elderly's chess game. This afternoon they look on a game at the same spot, seating around, they show their opinion about the game and talk with each other.

One important value of scenario-based design is that the vivid description of real life situations could provoke so called "what if" discussions [8], which are quite significant for the transition from research to design. For example, in the scenario 1, what if the kindergarten holds a parenting game and arrange these two elders and their grandchildren together in the game? The familiar strangers would be more likely to introduce themselves than outside the kindergarten, because they are both set in a new context [13]. In scenario 2, what if the two elderly find they are from the same place? They would chat delightfully with each other and even keep

contact afterwards. Or in the scenario 4, what will happen if they live in the same community and even same building? It's possible that they would become playmate of each other in their own game rather than onlookers as they were.

Those "what if" cases provided us critical insights to further approach our concepts toward the behavior patterns of non-resident elderly. We thought about designing a mechanism that can bring elderly who share common grounds together in a real-life approach while without their own initiative to use any online applications. We kept four concepts in this direction and shared these concepts with a group consisting of five non-resident elderly. We presented the concepts to them to further explore and verify the feasibility of various design possibilities.

The concept of incorporating community service to use the ICT system to match the targeted group of elderly together and then help organize specific activities for them was well received. The real-world activities are the natural way for elderly to develop their interpersonal relationship in the city. This way enables ICT to work for the non-resident elderly through the transition from the virtual connection into real-life relationship even themselves do not necessary to have ICT experiences and skills.

SOLUTION

We proposed commuCity, a unique SNS that collects non-resident elderly's informations into the system to discover and manifest the potential connections among them based upon the matching results with those informations. The unique point of this solution is that unlike the SNSs for young people, the end user of commuCity are not elderly themselves but the various sectors within the community, such as kindergartens, healthcare centers, or community service centers etc. Only these sectors are able to access the database of commuCity system. And they would turn the virtual connections automatically generated according to the degree of correlation among the elders' informations in the system into real-life activities in various forms. In this approach, those who are most likely to become friends will be brought together naturally in those activities.

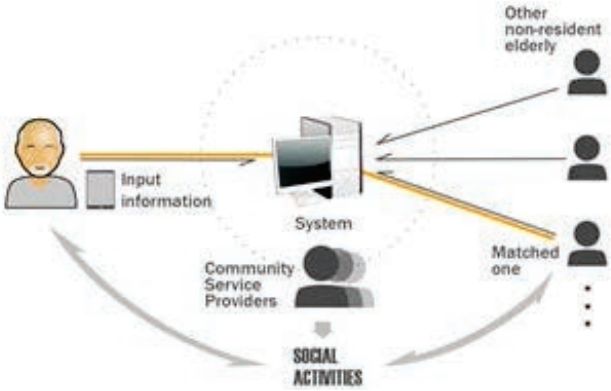

Figure 5. Interaction model of the commuCity system.

The commuCity system could be regarded as an extension of community service. Although currently some community have started to help non-resident elderly rebuild their social relationship in the city by means of community activities, they are not effectively targeted [11]. But commuCity takes advantage of ICT and computing technology to help create more targeted activities for the group of elderly who are most likely to be interested in each other and even to become friends. This mechanism would make the activities more effective to establish interpersonal relationships for the non-resident elderly.

Figure 5. The interface for information inputting.

With regard to the information entrance of the system, we designed a very simple interface on iPad for elderly to input their personal informations. We investigated various ways of information input, such as mobile phone, PC or touch screens at the entrance of residential buildings. But because many elders are not able to use those digital devices by themselves, young people need help to guide them to use the devices anyway. So we think iPad would be the most convenient device that young people could give it to elderly and teach them to input their informations whenever and wherever. We prototyped this interface and tested it with 4 elderly. Under our guidance, they all successfully finished the input task within five minutes.

FUTURE WORK

The commuCity is just one of the potential solutions, while we don't know its actual effect. So in the next step, we are going to test the effect of this mechanism with a small-size research sample of elderly. Problems such as what are the key informations of non-resident elderly for grouping them with regard to developing interpersonal relationships and how they could keep in touch with each other afterwards and enhance relationships by means of this system would find answers through the test and iteration.

CONCLUSION

Technology is not supposed to just serve those who can understand and afford it. Elderly, especially those from less developed areas in China are basically ignored by the emerging technologies, which otherwise could potentially improve their lives. How to humanize those technologies to make the old population enjoy the better life that created by them is an essential problem in front of the Chinese HCI research community.

This paper addresses the problem of loneliness encountered by the urban non-resident elderly in big cities of China and the possibilities of technological solutions for this problem. Through the observation and interview studies we held, and our subsequent analysis, we got some insights about how technology could fit into the non-resident elderly's life and what kinds of technological intervention can actually help those elderly improve their social life in the new city. Our findings from the design research have revealed not only the unique behavior patterns but also the living condition of the urban non-resident elderly in big cities in China. These informations we observed from the research lead us to a unique social network system design that incorporates the social works of community to connect the targeted group of non-resident elderly through real-life activities.

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