Multimed Tools Appl
DOI 10.1007/s11042-015-2480-1

An SNS-based model for finding collaborative partners

Chengjiu Yin · Jane Yin-Kim Yau · Gwo-Jen Hwang · Hiroaki Ogata

Received: 28 July 2014 / Revised: 9 December 2014 / Accepted: 19 January 2015

Abstract This paper proposes a model, Recommendation of Appropriate Partners (RAP), used on a Social Networking Service (SNS) for locating appropriate "helpers" for users based on individual users' Chain of Friends (CoF) relationships. Using the RAP model, individual users can participate in a collaborative online community in remote locations, whereby helpers are willing to help other users solve their tasks/problems, and it is intended that both the users and helpers gain knowledge from these interactive online sessions. An example of the RAP-based system was implemented to invite Program Committee members to an international conference. The system was evaluated and the experimental results show that our model is very effective for discovering collaboration partners and finding users with similar interests in order to create communities for providing future and longer-term helping exchange.

Keywords Social networking · Personal relationship · Collaboration · Search engine

1 Introduction

Web 2.0 is the term given to describe the second generation of the World Wide Web that is focused on allowing people to collaborate and share ideas, thoughts and information online ([21], p. 93). Today, many kinds of Web 2.0 applications exist, such as blogs, social networking services (SNS), and Wikis. SNSs are one of the fastest growing and most popular Web applications [12].

C. Yin (✉)
Faculty of Arts and Science, Kyushu University, 744, Motooa, Nishi-ku, Fukuoka 819-0395, Japan
e-mail: yinchengjiu@gmail.com

J. Y.-K. Yau
Department of Computer Science, Malmö University, Malmö, Sweden

G.-J. Hwang
Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taipei, Taiwan

H. Ogata
Faculty of Arts and Science, Graduate School of Information Science and Electrical Engineering, Kyushu University, Fukuoka, Japan

Published online: 30 January 2015

A social network is defined by Boyd and Ellison [3] as a web-based service which allows individuals to a) construct a profile within a bounded system, b) generate a list of other users with whom they share a connection, and c) view and connect to others via this list, such as a friend of a friend. Different members within an SNS may have different degrees of mutual trust and closeness with each other. Social interactions and access to social information resources on SNSs can be facilitated by mobile devices anytime and anywhere [23]. Nowadays, an increasing number of people tend to make their personal information public via Social Networking Services as SNSs allow users to create in-depth profiles describing themselves.

Facebook is such an online social networking service for which the number of daily active users had reached 864 million daily active users on average for September 2014 [10]. Facebook is used to find out more about other people/friends/acquaintances or just to keep up-to-date with others [15].

Friend recommendation is one important feature of SNSs such as Facebook. Many studies suggest that friendship is a significant and positive factor in collaborative activities [2, 4, 13]. Every person/user in a social network has an interpersonal relationship contact (e.g., "Friend", or "Friend of a Friend" in the SNS). Some researchers have tried to understand and enhance the way people organize their contacts [16, 19]. The authors depict these in Fig. 1—direct Friend of User, or Acquaintances of A, Friend of B, or Acquaintances of C. These connections form the so-called "Chain of Friends" (CoF), from User through to D.

Despite their importance, "the interpersonal relationships such as friendship are rarely considered in academic research about information retrieval" [7], and there are currently no search engines within SNSs which can be used to find "helpers" by using friendship such as friends and acquaintances.

When a learner faces problems in daily life learning, he/she usually searches for information on the Internet using search engines such as Google, but the problem is, there are many irrelevant answers, and the learner needs a reliable answer.

There are two problems involved in building a model to address this particular difficulty:

1) How can one find an appropriate person to solve the problem?
2) How can one get help (i.e., recommendation of an appropriate Chain of Friends) from a stranger?

In this paper, the Recommendation of Appropriate Partners (RAP) model is proposed based on the CoF interpersonal relationships in an SNS. Utilizing these relationships, the RAP model was designed to locate appropriate "Helper" for individual users to help them with their tasks/problems. For example, the model can recommend a "best" request CoF for users, and locate

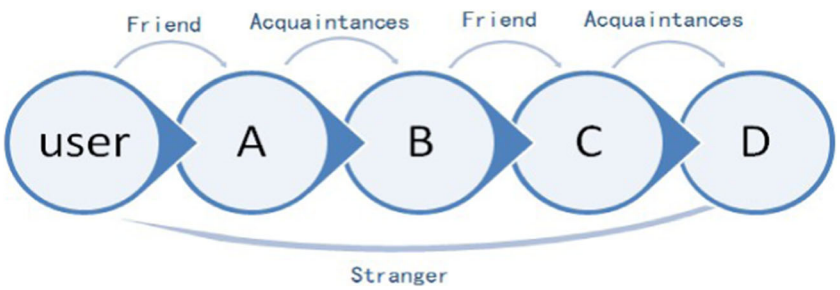

Fig. 1 Chain of friends

someone to help the user, even if they are Strangers. This is a novel approach using interpersonal relationships to get help from others, even Strangers.

An instance of the RAP model-based system was trialed and evaluated. The system is called the Collaborative Partners Search Engine (CPSE), which is extended from a previous SNS system for foreign language learning exchange [25]. The CPSE was designed to help invite scholars to serve as program committee members of international conferences.

This paper is organized as follows. In the next section, the literature review is presented. Then the recommendation algorithms used in the RAP model to find appropriate "Helper" and locate the "best" request CoF for users are described. The process of the development of the RAP model is then depicted. Finally, the conclusions and future work are presented.

2 Literature review

The RAP model uses personal information (such as personal relationships) in an SNS. The model provides a connection between friends and acquaintances; this is also known as a Help Network [18]. The model is built on a foundation of trust between friends. Therefore, the literature review is presented according to the three aspects of personal information research, help networks and trust, as follows.

2.1 Personal information research

The advent of SNSs has led to an explosion in the quantity of personal profiles available online. SNS user profiles are a rich source of information as they comprise a large set of personal attributes. Lampe et al. [17] explored the relationship between profile structure (namely, which fields are completed) and number of friends in an SNS, and also pointed out the importance of the profile and how it works to encourage connections and articulate relationships between users. By examining users' decisions in an experimentally controlled social network, Stecher and Counts [22] explored the most important profile information to form impressions about people.

There are many applications for the use of personal information to help users find relevant information about others. For example, Context Phone is a system which employs users' context information to know the best time to make a call, or to select the best communication channel [20]. "Should I Call Now?" is a similar system which is proposed to provide callers with cues of a receiver's context through an awareness display, allowing informed decisions as to when to call [11]. JAPELAS was developed to provide the appropriate polite expression according to the context information such as learners' personal information and location [24].

2.2 Help networks

The RAP model provides a connection between friends and acquaintances; this is also known as a Help Network system [18]. The Help Network was created before the birth of the social networking technologies. A number of studies have demonstrated that one of the most effective channels for gathering information and expertise within an organization or institution is its informal network of collaborators, colleagues and friends [9]. Such a Help Network coupled with social networking technologies has huge potential for generating and sharing a rich wealth of information and learning resources, as well as for providing a mechanism for instant real-time communication with others around the globe. Additionally, research suggests that social networks can potentially be useful for learners to solve problems, because learners have access to a) many "Helper" who can and may be willing

to help them solve and complete the tasks, and to b) a great deal of relevant and useful information/learning materials [8].

2.3 Trust

"Trust" is very important in our RAP model. "Trust" allows us to form relationships with others and to depend on others for love, for advice or for help. Most research regards trust as an important factor in task effectiveness. For example, Baier [1] regarded trust as necessary for effective cooperation and communication.

Trust has become a hot topic in many research fields such as ethics, sociology, and psychology [6]. Many scholars have conducted studies to explore the relationship between the level of trust and performance. Hsu et al. [14] explored the relationship between trust and expected outcomes. Chang and Lee [5] also found that trust serves as a learning facilitator which affects students' performance in the learning activities conducted on Facebook. A survey conducted by Yin et al. [25] showed that the closer the relationship, the more important the trust is.

3 The RAP model

The RAP model can help users locate an appropriate collaborator/helper, who can in turn help them solve their tasks/problems. If an appropriate helper is a Stranger without any connections, then locating a helper for this user may normally be a problem; this forms one of our research questions in this paper. This section describes the algorithms used in the RAP model for locating appropriate "Helper" and the "best" request CoF for the user.

3.1 Algorithm for finding an appropriate collaborator/helper

The RAP model uses the users' self-administered profiles (including personal information, study interests, schedules, and past actions) to locate an appropriate helper with a similar profile who has the ability to solve the problem. Additionally, for each problem, the user enters some related keywords so that a match between the user and a helper who is suited to solving the problem can be found.

A formula is designed for calculating the appropriate degree of being a helper. Consider that n is the number of keywords that the user inputs, and compares them with the other person's profile, schedules, interests and actions; the number of matched keywords is n_m. The Level of Matched Keywords (LMK) is calculated as follows:

$$\left(LMK = \frac{n - n_m}{n}\right), \quad \text{where} \quad 0 \le LMK \le 1$$

In the case of the LMK value being equal to or close to zero, then the person will be recommended as an appropriate helper who is close to the user's request.

3.2 Getting help from a potential helper

As mentioned above, a survey which was previously carried out to examine the process of seeking help/learning support from others concluded that: 1) The more intimate the interpersonal relationships are, the easier it is to get help/support; and 2) The more simple things are,

the easier it is to get help/support [25]. Based on this conclusion, the authors found a way of utilizing the Chain of Friends (CoF) to get help from a stranger.

Our model can recommend an appropriate request CoF to the user. In the case of there being many request CoFs, the model recommends a "best" request CoF according to the strength of the interpersonal relationship with the user.

3.3 Algorithm for recommending a "best" request Chain of Friends

A "best" CoF should not only have a close interpersonal relationship between the people, but also a small number of people in the chain. This is the condition to determine whether the CoF is appropriate or not.

The following table describes the categories of interpersonal relationships which are utilized in locating CoFs in our RAP model.

3.3.1 Strength of Interpersonal Relationship (SIR)

The table contains six categories of interpersonal relationships, from intimate to unfamiliar relationships. According to a previous survey [25], the authors developed a formula for calculating the SIR (Strength of Interpersonal Relationship). Consider that n represents the level of the interpersonal relationship which was previously set by the user. The SIR is calculated as follows:

$$\left(SIR = \frac{6-n}{6}\right), \text{where} \quad 0 \le SIR \le 1 \quad \text{and} \quad n = \{1, 2, 3, 4, 5, 6\}$$

In the case of the SIR value being equal to or close to zero, then the interpersonal relationship is more intimate, and n is a natural number from 1 to 6.

3.3.2 Length of CoF (LCoF)

According to the "six degrees of separation" theory [18], we can know a social network typically comprises a person's set of direct and indirect interpersonal relationships, and the length of the CoF is no more than six people. Therefore, the authors developed a formula for calculating the LCoF. Consider that n is the number of people in the CoF.

$$\left(LCoF = \frac{n}{5}\right), \text{where} \ \ 0 < LCoF \le 1, n = \{1, 2, 3 \ldots\}$$

In the case of the LCoF value being close to zero, then the number of people is smaller, and n is a natural number.

3.4 Flow chart of the RAP model

Figure 2 shows a flow chart of the RAP Model. An appropriate request CoF can be recommended upon the user's request by utilizing their interpersonal relationships to determine which helpers can support the user to get help more easily.

This flow chart has a layered structure. The 1st layer is the Friends layer. The 2nd layer is the Friends of Friends (FoF) layer, which means that there is 1 intermediary. The 3rd layer is the Friends of Friends of Friends (FoFoF) layer, which means there are 2 intermediaries. This continues until the 6th layer, which has 5 intermediaries.

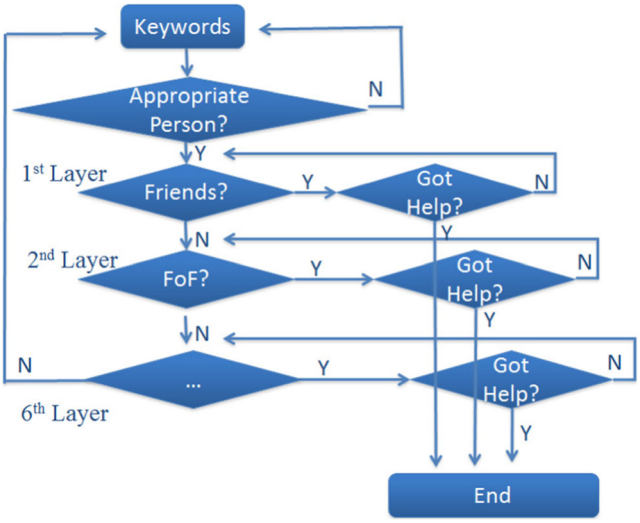

Fig. 2 Flow chart of the RAP model

First, the user enters some keywords related to the requested event. The RAP-based system will search for an appropriate person who has some relationship with the keywords. If there is no such person, the user changes the keywords and searches again, and if appropriate people are found, the system will recommend a person who has a close relationship with the user.

If the appropriate person is in the 1st layer, the system will recommend that person to the user, and if there are several appropriate people in the same layer, the system will recommend one who has a close relationship (in the order of Family, Relatives, Friends, and Acquaintances) to the user. If the user gets help from an appropriate person, then go to "End".

Otherwise, if the user cannot get help in this layer, then the system will find appropriate people in the next layer, and so on until the 6th layer. If there are still no appropriate people, the user should change the keywords and search again.

Here is an example to explain the usage of the RAP model. Participant A, Akira, is a Japanese person studying Chinese, who wrote a blog in Chinese and wants someone to correct it for him, so he inputs the keyword "Language Learning, Chinese" and performs a search on the system. The system finds those people who have some relationship with the keyword and recommends an appropriate request CoF for Akira.

As shown in Fig. 3, in the 1st layer, Participants M, E, and F are Japanese, and they cannot understand Chinese; therefore, there are no appropriate people in the 1st layer. In the 2nd layer, Participants C and B can speak Chinese, so they are appropriate helpers. Participant C is a friend of Participant M, Participant B is an Internet friend of Participant M, and Participant M is a friend of Participant A. There are therefore three Request CoFs:

- In case 1, Akira asks for help from Participant B or Participant C directly. But, as they are strangers, it is difficult to get help from them.
- In case 2, Participant C is a friend of Participant M and Chinese is her mother tongue.
- In case 3, Participant B is an Internet friend of Participant M and Chinese is her mother tongue.

Comparing cases 2 and 3, friend is level 4 (case 2) and Internet friend (case 3) is level 2 (see Table 1), and so the personal relationship of case 2 is closer than that of case 3; therefore, the

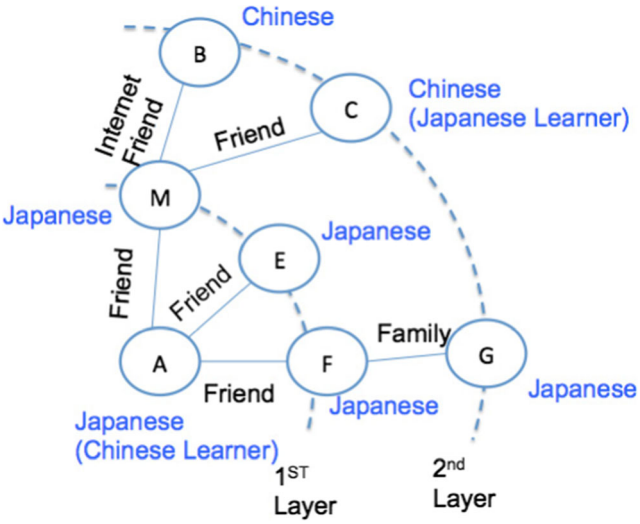

Fig. 3 Request CoFs

system recommends case 2 to Akira. Then Akira asks Participant M to introduce his friend Participant C to him.

Note that although users can send an invitation to a stranger via some friend who knows the stranger, it could take time for them to find the relationship (i.e., to inquire who could be the friend of the stranger or who know the friend of the stranger) without any assistance; in particular, if the relationship is built on a long "friend of friend" chain and the number of strangers to be invited is large. The proposed RAP model can solve the problem by providing them the best CoF for getting help from the stranger.

4 The Collaborative Partners Search Engine (CPSE)

As mentioned above, based on the RAP model, a system called the Collaborative Partners Search Engine was developed. Snapshots of the system are given below. Figure 4 is a profile

Table 1 Categories of personal relationships

Relationship	Level	Definition and explanation
a) Family	6	They are family members such as father, mother, brother or sister.
b) Relatives	5	They are very close to the user such as boy/girlfriend, relatives or close friends.
c) Friends	4	They are people whom the user has met and talked with frequently such as friends, classmates or teachers.
d) Acquaintances	3	They are people whom the user has met and talked with a few times.
e) Internet friends	2	They are people whom the user has never met before, but has talked with many times online.
f) Strangers	1	They are people whom the user has never met before, either online or offline.

Fig. 4 Profile

interface for setting the profile.

Figure 6 shows a user's list. If he clicks the "Add Friend" button, then Fig. 5 will be shown for setting the personal relationship. Before using the system, users should preset the level of their personal relationships.

The user uses Fig. 7 to find an appropriate person. He inputs the keywords (Computer Education, Professor) related to his problem and performs a search on the system; appropriate people will then be displayed. He can select someone and send an invitation message to that person by using the "Ask for help" button.

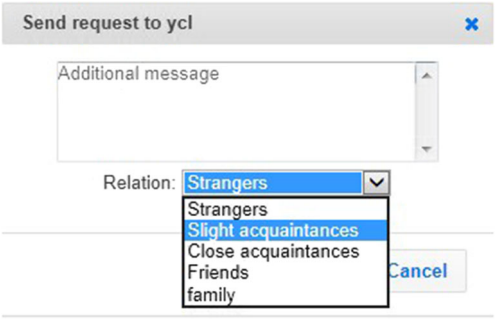

Fig. 5 Setting of the personal relationship

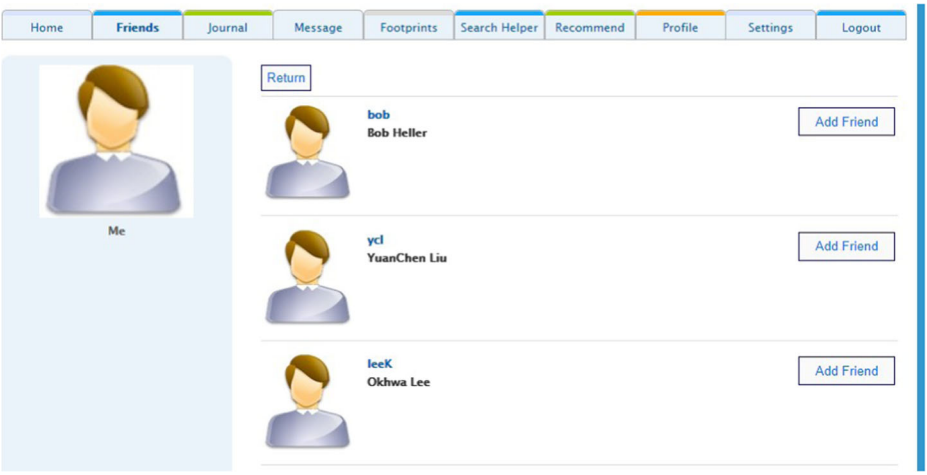

Fig. 6 Users' list

5 Experiment and discussion

As mentioned above, the RAP model is proposed to help users find a helper, even if that helper is a stranger. In order to evaluate if the RAP model is effective at finding an appropriate person for getting help, we used the RAP model-based system, CPSE, to perform an experiment and analyzed the results. As a case study, we used CPSE to invite scholars to a conference.

One of the authors of this paper has held two conferences: IC1 and IC2. IC1 can be seen as the control group and IC2 as the experiment group.

In order to invite Program Committee members and chairs (including general chairs, organizer chairs, program committee chairs, location chairs, publication chairs) to IC1, the author sent invitation letters to professors whose research is related to the conference. These professors' information (name, affiliations, e-mail, nationality, position) was collected from proceedings and journal papers. Prior to this the author did not know these scholars.

The author used the CPSE system to invite the PC members and chairs to IC2. The author collected their Facebook (http://www.facebook.com/) members' information such as major, occupation, title and email, then set up the interpersonal relationships between the authors and the members. The personal information and relationships were saved in the database of the CPSE system.

Fig. 7 Appropriate people

Table 2 Control group

	Invited number	Accepted number	Success rate
Control group (PC member)	200	20	0.1
Control group (chair)	20	0	0

5.1 Control group (C1)

The authors collected the information of 200 scholars in related research fields and sent invitation letters via e-mails to invite them to help us organize a conference and review the conference papers. The authors sent 200 messages to invite these professors to serve as PC-members via the conference email account. In the end, only 21 professors accepted the invitation. This is a 10 % success rate (Table 2).

The most difficult part was to find conference chairs, as chairs not only have a great deal of responsibility, but also do more work for the conference. The author sent 20 messages to invite potential people to serve as chairs. However, only six replied, all saying that there is a great deal of responsibility and politely declined the offer. The result is that nobody was willing to take the chair of an unknown conference. In the end, the author had to invite acquaintances to serve as chairs.

5.2 Experiment group (C2)

The author input the keywords "Computer and Education, Professor" into the CPSE system to find prefessors whose research is related to computers and education. In this instance, professor includes assistant professors and associate professors. As there were only two keywords, the author selected those members who matched the keywords exactly. In other words, only those results for which the LMK value was zero were selected.

5.2.1 Chair invitation

Using the search results, the author selected 7 close friends (Level 5, LMK =0) and sent emails to invite them to serve as chairs (General Chairs, PC Chairs, Organizes Chairs), and they all

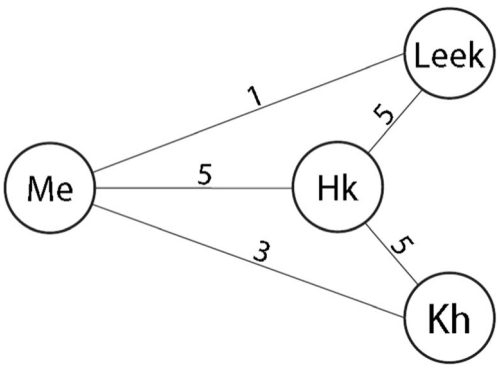

Fig. 8 Chair invitations

Table 3 Level of author's facebook members

	Level 5		Level 4		Level 3		Level 1 and Level 2	
	I	A	I	A	I	A	I	A
PC	5	5	22	20	13	6	30	8
CR	7	7	0	0	0	0	0	0

PC Experiment Group (PC Member), *CR* Experiment Group (Chair), *I* Invited, *A* Accepted

accepted quickly and gladly. The author asked these chairs to create their own user accounts on the CPSE system and set their personal information. Then, these chairs invited their close friends (level 4, level 5) to join the CPSE system and set their interpersonal relationships with them. This personal information and the relationships were also saved to the database of the CPSE system.

There are some well-known professors (Professor Kh, Professor LeeK, and so on) in the computer and education research field. In order to enhance the visibility of the conference, the author planned to invite them to serve as chairs of the conference. However, the author had only exchanged business cards with them at conferences, meaning that the interpersonal relationships were only that of acquaintances (level 3). The author sent emails to invite them to serve as chairs; however, only one of them replied, saying that there is a great deal of responsibility and politely declined the offer.

Then, the author invited these well-known professors using the CPSE system. As shown in Fig. 8, the system recommended Professor Kh, who is a close friend of Professor Hk. Then the author asked Professor Hk to invite his friend Professor Kh. Professor Kh accepted the invitation to serve as a chair of the conference. The author had Professor Kh's business card and had sent an invitation to him before, but he had politely declined the offer. Professer LeeK, who was a stranger to the author, was recommended as a chair by the system. Because he is a close friend of Professor Hk, the author asked Professor Hk to invite Professor LeeK to serve as a chair of the conference, and he accepted the offer. From these two instances, the author

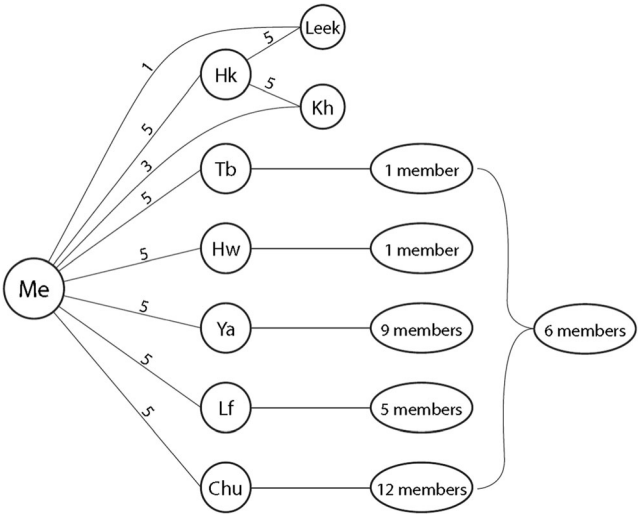

Fig. 9 Member invitations

Table 4 Experiment group

	Invited number	Accepted number	Success rate
Experiment group (PC member)	70	39	39/70
Experiment group (chair)	9	9	1

found that by using interpersonal relationships, the system could support users to get help more efficiently, even though they were strangers.

5.2.2 Member invitation

The Program Committee members were assigned to review 1–2 papers each. Therefore, the workload was not so heavy and there were no other responsibilities. Using Facebook, the author collected 52 members' personal information. In addition, 18 other people's personal information was collected from business cards. Then 70 emails were sent to invite them to serve as PC members.

As shown in Table 3, there are 5 close friends among them (level 5), and they all accepted the invitations; there were 22 friends (level 4), of whom 20 accepted the invitation, while 2 replied that they were currently overloaded with work and politely declined the offer. There were 13 acquaintances among them, 6 of whom accepted the invitation (level 3), and finally, there were 30 strangers (level 1 and level 2), of whom only 8 accepted the offer. The author found that the closer people are, the easier it is to get help.

The author used the CPSE system to invite more members. At first, the keywords "Computer and Education, Professor" were used to find professors who were suitable to serve as program committee members, and then the chairs were asked to introduce them to be PC members.

As shown in Fig. 9, Professor Tb introduced 1 member, Professor Chu introduced 12 members, Professor Hw introduced 1 member, Professor Ya introduced 9 members, and Professor Lf introduced 5 members. Then, the new members introduced a further 6 members. Finally, there were more than 70 members for this conference. Among them, 9 had been invited by the author beforehand but had not replied to the offer (Table 4); however, they accepted the offer when the other chairs invited them. The author found that the closer people are, the easier it is to get help, and the system can support users to get help effectively by using interpersonal relationships.

In order to exchange members' views and promote interaction, the author created a community for the conference, and then added all of these members to this community. It was found that the members can help each other in this community, and they can help the chairs to answer questions; for example, somebody asked about the weather at the conference venue, and one of the local members answered the question instead of the chairs.

Another conference also used the same approach to invite members and chairs, and finally succeeded in recruiting 78 members.

6 Conclusions

This paper proposes a social networked collaboration model—RAP, which can facilitate collaboration and set up an online collaborative community amongst remote individual users via social networked mobile technologies. This model can locate appropriate "Helper" for users based on the Chain of Friends interpersonal relationship in an SNS system, in order to locate appropriate "Helper" for users. In this way, personal direct and indirect relationships can be utilized for pedagogical purposes, a network of

friendships can be potentially enhanced, and knowledge sharing and creation can be supported and expanded.

Additionally, our model forms an SNS among users who have similar interests so that their own communities can be created for further and future learning and teaching exchange.

The RAP model has been applied for inviting PC members to an international conference which was held by one of the authors. The results show that our model is very effective for discovering collaboration partners.

Acknowledgments This work was supported in part by JSPS KAKENHI Grant Number 25750084.

References

1. Baier AC (1986) Trust and antitrust. Ethics 96:231–260
2. Barile AL, Durso FT (2005) Computer-mediated communication in collaborative writing. Comput Hum Behav 18:173–190
3. Boyd DM, Ellison NB (2008) Social network sites: definition, history, and scholarship. J Comput-Mediat Commun 13(1):210–230
4. Brown BB (1989) The role of peer groups in adolescents' adjustment to secondary school. In: Belle D (ed) Children's social networks and social supports. Wiley, New York, p 188–215
5. Chang W-L, Lee C-Y (2013) Trust as a learning facilitator that affects students' learning performance in the Facebook community: an investigation in a business planning writing course. Comput Educ 62:320–327
6. Colquitt JA, Scott BA, LePine JA (2007) Trust, trustworthiness, and trust propensity: a meta-analytic test of their unique relationships with risk taking and job performance. J Appl Psychol 92(4):909
7. Dinet J, Vivian R (2012) The impact of friendship on synchronous collaborative retrieval. Br J Educ Technol 43(3):439–447
8. El-Bishouty MM, Ogata H, Rahman S, Yano Y (2010) Social knowledge awareness map for computer supported ubiquitous learning environment. Educ Technol Soc 13(4):27–37
9. Eveland DJ, Brown W, Mattocks J (1994) The role of "help networks" in facilitating use of CSCW tools. In Proc. of Computer Supported Cooperative Work, ACM Press, p 265–274
10. Facebook Fact Sheet (2014) available as http://newsroom.fb.com/Key-Facts
11. Guzman ESD, Sharmin M, Bailey BP (2007) "Should I call now?" Understanding what context is considered when deciding whether to initiate remote communication via mobile devices. In Proc. of GI, p 143–155
12. Heo GM, Lee R (2013) Blogs and social network sites as activity systems: exploring adult informal learning process through activity theory framework. Educ Technol Soc 16(4):133–145
13. Howes C (2008) Friends and peers. Encycl Infant Early Child Dev 6:552–562
14. Hsu MH, Ju TL, Yen CH, Chang CM (2007) Knowledge sharing behavior in virtual communities: the relationship between trust, self-efficacy, and outcome expectations. Int J Hum Comput Stud 65(2):153–169
15. Joinson AN (2008) Looking at', " Looking up " or " Keeping up with " People ? Motives and Uses of Facebook. Social Networks 5
16. Kelley PG et al (2011) An investigation into facebook friend grouping. In Proc. of Interact, p 216–233
17. Lampe C, Ellison N, Steinfield C (2007) A familiar Face(book): profile elements as signals in an online social network. SIGCHI, ACM Press, New York, p 435–444
18. Milgram S (1967) The small world problem. Psychol Today 2:60–67
19. Ozenc FK, Farnham SD (2011) Life "modes" in social media. In Proc. Of CHI, 561–570
20. Raento M et al (2005) ContextPhone: a prototyping platform for context-aware mobile applications. IEEE Pervasive Comput 4(2):51–59
21. Rollett H, Lux M, Strohmaier M, Dösinger G, Tochtermann K (2007) The web 2.0 way of learning with technologies. Int J Learn Technol 3(1):87–107
22. Stecher K, Counts S (2008) Thin slices of online profile attributes. In Proc. of AAAI, 127–135
23. Tan Q, Kinshuk, Jeng Y-L, Huang Y-M (2010) A collaborative mobile virtual system based on location based dynamic grouping. In Proc. of IEEE International Conference on advanced Learning Technologies, p 16–18
24. Yin C, Ogata H, Yano Y (2004) JAPELAS: supporting japanese polite expressions learning using PDA towards ubiquitous learning. J Inf Syst Educ 3(1):33–39

25. Yin C, Dong Y, Tabata Y, Ogata H (2012) Recommendation of helpers based on personal connections in mobile learning. In Proc. of International Conference on Wireless, Mobile and Ubiquitous Technologies in Education, p 137–141

Chengjiu Yin is a Research Associate Professor of Faculty of Arts and Science, Kyushu University, Japan. He received his PhD degree from the Department of Information Science and Intelligent Systems, The University of Tokushima, Japan, in 2008. Currently he is committing himself in mobile learning, ubiquitous computing, language learning, text mining and social media.

Jane Yin-Kim Yau is a Postdoc at the Department of Computer Science, Malmo University, Sweden. She received her PhD Computer Science (in Mobile Learning) at the University of Warwick, UK. She was also a researcher at the Center for Knowledge and Learning Technologies at Linnaeus University, Sweden.

Gwo-Jen Hwang is currently Chair Professor of National Taiwan University of Science and Technology Distinguished. He received his Ph.D. degree in Computer Science and Information Engineering from National Chiao Tung University in Taiwan in 1991. Dr Hwang has plenty of academic research and administration experiences. He had been Director of Computer Center of National Chi Nan University for 3 years, Chairman of Computer and Education Department of National Tainan University for 1 year, and Dean of College of Science and Engineering of National Tainan University for five and a half years.

Hiroaki Ogata is a Professor at the Faculty of Arts and Science and the Graduate School of Information Science and Electrical Engineering at Kyushu University in Fukuoka, Japan. His research interests include Computer Supported Ubiquitous and Mobile Learning, CSCL (Computer Supported Collaborative Learning), CSCW (Computer Supported Collaborative Writing), CALL (Computer Assisted Language Learning), CSSN (Computer Supported Social Networking), Knowledge Awareness, Mobile and Embedded Learning Analytics, and Computer-Human Interaction.