"P2P-ISN-A Peer-to-Peer Integrated Heterogeneous Social Network"

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I.ABSTRACT

In the age of information technology the facets of work and availability of everything in internet also the unprecedented growth and influence of Social Network Sites (SNSs) haveopened the opportunity for researchers to explore a large amount of social andbehavioral data.[1] The heterogeneity of SNSs further sparks advanced research innovations todevelop another methods and applications that integrate resources and offer more seamlessservices across SNSs. Specifically, aiming at the integration of social inter relationshipdata, a much less studied subject. We propose a peer-to-peer architecture, namelyP2P-iSN, to integrate and collect the heterogeneous SNSs. [1]The P2P-iSN allows different users from heterogeneousSNSs to communicate without involving the SNS they have registeredwith. Under this good architecture, we propose a Global Relationship Model (GRM) tocapture the relationship strength between users and then develop a search-I mechanism, namely i-Search, to find the optimal social path between any twousers who are meaningfully connected in heterogeneous SNSs.[3]

Keywords : SSNs, P2P-iSN, SNCS framework.

II.INTRODUCTION

New services such as Facebook Platform, Google Friend Connect, and MySpace ID let third-party sites develop social applications without having to build their own social network.[1] These social-networks connect services increase access to and enrich user data in the Social Web, although they also present several security and privacy challenges. Social Network Sites (SNSs) such as Facebook and LinkedIn. have transformed today's society by providing easily accessible platforms for users to connect, communicate, and share large amount of information. Social networking websites let users build social connections with family, friends, and co-workers. Users can also build their profiles for storing and sharing various types of content with others, including photos, videos, and messages. Updating user profiles with interesting content is a form of self-expression that mostly increases interaction in such sites. With SNSs, people keep in touch with their contacts, also reconnect with old acquaintances, and establish new relationships with the others based on shared features such as hobbies, interests, and overlapping friendship [1].

A multiple user may register with multiple SNSs for different social network sites applications, carry multiple SNS accounts, interact with contacts from different SNSs, publish and access different web contents, and share contents within each SNS community.[10] While SNSs offer different services, one key feature shared among SNSs is how they are built around users and users' existing social networks [3, 4]. Yet each and every SNS is isolated, so users manage their profiles and build relationship separately on different SNSs. The content for the same user in different SNSs may overlap, so it becomes a burden for users to manage contents across different SNSs.[7] This is the landscape of heterogeneous SNSs.Here, we propose system architecture to integrate heterogeneous SNSs and investigate a model to characterize the social relationships among a large number of users across heterogeneous SNSs.[4]

Social-networking sites provide numerous application services that can mash up user-profile information also data with third-party data. In addition, third-party sites can rapidly distribute and spread their services via social-networking sites to keep in touch with user.[6]

Fig.1: Social Network Connections

To be more specific, we offer the following example. Imagine that within an SNS, user *b* is in user *a*d's friend list. We say that there is a directional social link denoted by "*a↔b*" from user *a* to user *b*. Building with these directional links, users in an SNS form a social graph [6]. When there exists a social path between two users in an SNS, we say that there is a "relationship" between these two users, and more precisely, from the source to the destination. We say that there is a "global relationship" from user *a* and user *b* if there is a social path from *a* to *b* over heterogeneous SNSs. These are basic notations that are used and elaborated in our model. By identifying "global relationship" among users over heterogeneous SNSs, this article opens the possibility for users from different SNSs to interconnect their various networks, resulting in an integrated network of interconnected heterogeneous SNSs, which enable users to communicate with a larger community of users. A comprehensive study of this integrated SNS landscape can help SNS developers design user-centric SNS applications with more features [3].

In this article, we first propose a peer-to-peer (P2P) network, namely *P2P-iSN*, to integrate heterogeneous SNSs and establish global relationships over the integrated SNSs. As shown in Fig. 1, P2P-iSN consists of two kinds of nodes: *peer nodes* and *index peer nodes*. How this Peer To Peer node do its work that can be shown in next figure. The node and peer user are available in figure.[2]
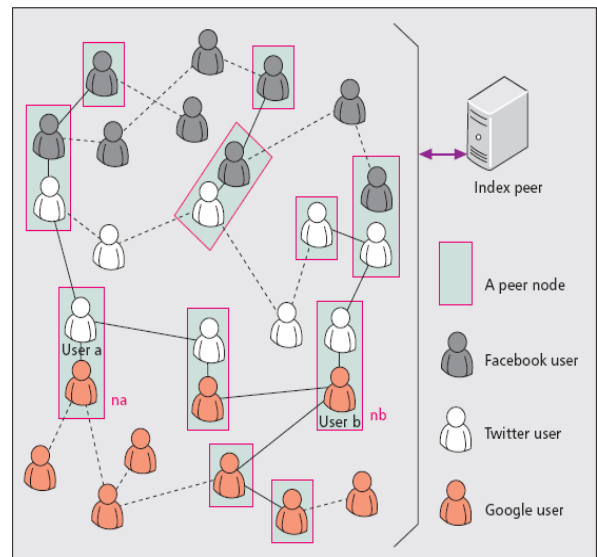

Fig.2: Peer to Peer Connection

The user of a peer node may register to one or more SNSs on his end-device, and possibly log into one or more SNSs at the same time. To associate these different accounts of the same user from heterogeneous SNSs, unique user ID may be required. The concept known as OpenID1 in [7] can serve this purpose although any other uniquely identifiable ID can be used. A unique user ID can be some kind of authenticated information like user's cell phone number or verifiable email address. The index peer node is responsible for maintaining the status(i.e., online or off-line) and the routing information (i.e., IP address) of each peer node. Here is the sketch of the operations over P2P-iSN. When a peer node is turned-on, it reports to the index peer node the online status, which consists of its ID and IP address of the peer node. Upon receiving the online status, the index peer node updates the online status for the peer node. If a user *a* of the peer node **na** and a user *b* of the peer node **nb** are on each other's friend list in a SNS, and **na** and **nb** are turned on, these two online peer nodes can communicate with each other by using the corresponding IP addresses queried from the index peer node. The peer nodes can establish social paths among users from different SNSs.

III.GLOBAL RELATIONSHIP MODE

We develop a Global Relationship Model to assess the strength of the global Relationship between two users from heterogeneous SNSs .Based on the global relationship model, we propose a search-I mechanism, namely *i-Search*, to find the social path between two users from heterogeneous SNSs. We also develop an analytical model to evaluate the

performance of the i-Search mechanism in terms of the "path found" probability and conduct extensive simulation studies to validate our analytical results.[6]

P2P-iSN : In this section, we propose a peer-to-peer architecture, namely*P2P-iSN*, to integrate heterogeneous SNSs. P2P-iSN consists of two kinds of nodes: *peer nodes* and *index peer nodes*.[2]The main functionality of a peer node is to integrate the heterogeneous SNSs through the Friend List maintenance (to be elaborated later). Peer nodes communicate with each other directly and form a peer-to-peer network. An index peer node maintains the status and the IP address of the peer node.

IV.SOCIAL-NETWORKS CONNECTION

User data is composed of three types of information. *Identity data* describes who I am in the Social Web, including my identity, profile information, and privacy policy. *Social-graph data* represents who I know in the Social Web, including my friendship connections with descriptions such as family, co-worker, colleague, and so on. *Content data* represents what I have in the Social Web, including my messages, photos, videos, and all other data objects created through various Social Web activities. For social-networking sites to be able to share user Social Web data with third-party sites, a secure and reliable SNCS framework is required. As Figure 1 shows, this framework consists of a collection of four categories of APIs that allow third-party sites to interface with the social-networking site:
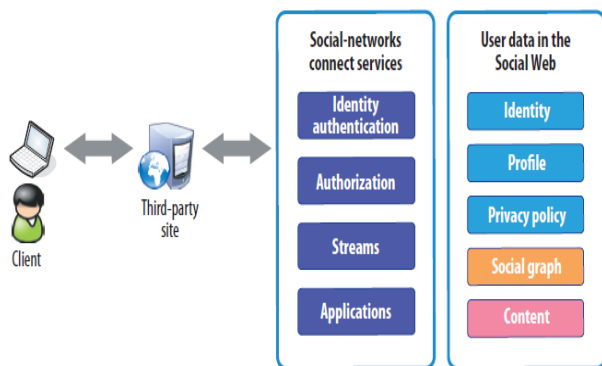

Fig.3: Social Network connection

Peer Nodes: A peer node is installed on an end device (e.g., PDA or desktop)used by a user to access an SNS. A user may register to one or more SNSs on his end device, and login to one or more SNSs at the same time. Because a user may use different IDs in different SNSs, to associate these different accounts of a user, a unique user ID is required. This concept is similar to Open ID in [7]. The unique user ID can be a user's cell phone number or email address, which can be used to uniquely identify this user.

Index Peer Node:-An index peer node is a database that maintains the Global ID list with the format as shown in Fig. 4. For each online peer node, an entry is created in the Global ID List for the peer node. Similar to the Friend List, the Global ID List consists of three kinds of information: Personal Information, Social Network Information, and Address Information for an online user.

The Personal information field stores the IDs of a user, including the ID in SNS used by the user to login an SNS, phone number, and email address. Note that a user may turn-on a peer node by log in into one or more SNSs concurrently, there may be one or more SNS IDs for the same user
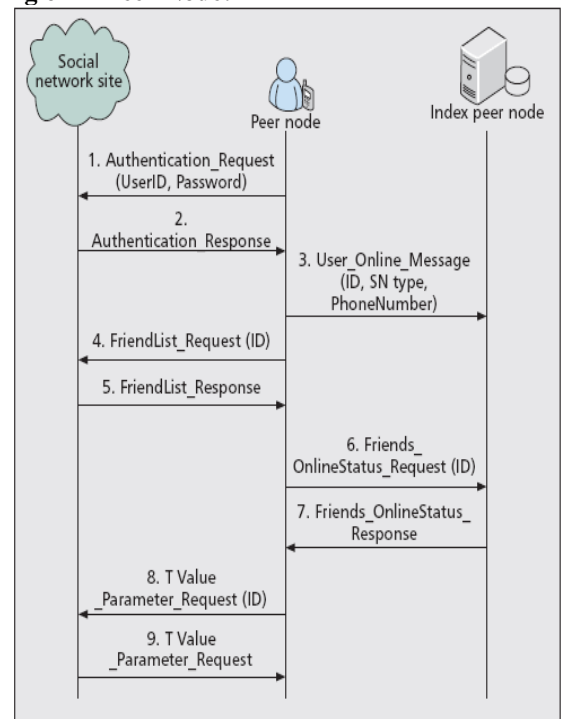
V.Turning on A Peer Node:-

Fig.4: Peer to Peer Node process

This section describes the execution of a peer node. When abuser turns on the peer node on his end device, the Login procedureis executed. Figure 4 illustrates the message flow for the Login procedure with the following steps:

1. Create SampleAuth-Listener() Class and check the user is authenticate or not
2. Add AuthListener()
3. Create Background service class.
4. The peer node creates a CreateFriendListener class.
5. Peer node use background Service Class.

6. Peer node create a Feed Request Listener

The Global Relationship Model

In this section, based on P2P-iSN, we propose the Global Relationship Model to identify the global relationship between two users across heterogeneous SNSs. We first propose a tool to measure the global relationship strength between any two users across heterogeneous SNSs. Then we propose an i-Search mechanism to find a meaningful directional social path between two peer nodes in P2P-iSN.

The i-Search Mechanism

In this section, we propose an i-Search mechanism to find directional social path between two peer nodes in P2P-iSN.Although searching in a social graph has been studied in the previous works [12], most of these studies are centralized in the sense that a social graph is well maintained at a central node. Fewer studies have addressed distributed search over aP2P social network, which is the main focus of this article.

The i-Search mechanism is similar to the flooding search that has been widely adopted in communications networks (e.g., [13]). When a link is added into a path, global relationship strength is calculated for the new path using the $Z(.)$function in Eq. 3. If the global relationship strength for the new path is below a threshold Δ, the social path search stops. Note that Δ is used to guarantee that the global relationship strength for the constructed path is strong enough so thatusers are motivated to use the global social relationship for further SNS applications.

The past social network research findings in the sociology[11] indicated that $F(a, b) = 0.5$. However this may not be true anymore for online social networks. In online social networks(a, b) would be much high than 0.5. In this study, for demonstration purpose, we set up Δ based on the research findings in the sociology (i.e., the interaction factor for link $a{\rightarrow}b$ is $F(a, b) = 0.5$). If we consider a path **P** with length $|\mathbf{P}|= 4$, then using the $Z(.)$ function in Eq. 3, the global relationship strength for the path is $Z(\mathbf{P}) = 0.5^4 = 0.0625$, which is considered very weak relationship. Therefore, in the performance study later, we set $\Delta = 0.5^3 = 0.125$.
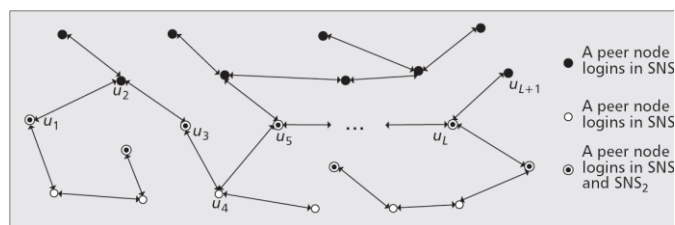

Fig.5: i-Search Mechanism

In other words, it is likely that the social path (searched by the i-Search mechanism) has path length no larger than 3. As mentioned in[14], with path length no larger than3, the flooding search is considered with low complexity. This is the main reason why we use the flooding search. In fact, as long as the interaction factor for link $a \rightarrow b$ is$F(a, b) \le b < 1$, the global relationship strength will be exponentially decreasing, and hence the flood search should have low complexity.

Input: s,r,P,Z(P)
Output: Pnew,Z(Pnew)
1. Foreach v:v $\in$ G-P do
2. If v=r then
3. Pnew←P U {s→v};
4.   Z(Pnew)←Z(P)F(s;v)
5.   Return;
6. Else if v is online, and Z(P)F(s,v)≥Δ
7. V.iSearch(v,r,P U{s→v},Z(P)F(s,v))
8. Else
9.   Quit;
10. End
11. end

VI.CONCLUSION

In this article, we propose P2P-iSN, a peer-to-peer network architecture to integrate multiple SNSs without incurring excessive overhead to the SNSs. With integrated as well as collected model, we could develop an effective approach, a Global Relationship Model, to evaluate the global relationship strength between two users with more precision. With P2P-iSN and the Global Relationship Model as the foundation, we proposed the i-Search mechanism to find the social path with certain level of social relationship strength in a P2P social network. Through both analytical and simulation models, we have justified our approach. Our study indicates that when the social graph is sparser and a peer node has more friends, our proposed approach can find the desired social path with high probability comparing to traditional approach and can effectively establish global social relationship for users from heterogeneous SNSs. This research finding shows that by appropriately integrate users in various SNSs, the proposed integrated framework could enable users to enhance their social connections over cyberspace and create more social and economic opportunities for the users.

Of course, there are many design challenges in designing a viable integrated social network framework like ours. The privacy concerns may be the biggest stumbling block as whenever unique identifier is

used. Users may not want to participate to avoid revealing the connections in their accounts. Thus, appropriate privacy protection and incentive mechanisms must be in place, which is one of our future research tasks.

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