International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 3 Issue 11, November-2014

Peer-to-Peer Architecture for Integration of Different Social Network Sites

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***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.[2] 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]**

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™ andLinkedIn™ have transformed today's society by providingeasily accessible platforms for users to connect, communicate, and share large amount ofinformation. 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 newrelationships with the others based on shared features such ashobbies, interests, and overlapping friendship [1].

A multiple user may register with multiple SNSs for differentsocial network sites applications, carry multiple SNSaccounts, interact with contacts from different SNSs, publishand access different web contents, and share contents withineach SNS community.[10] While SNSs offer different services,one key feature shared among SNSs is how they are builtaround users and users' existing social networks [3, 4]. Yeteach and every SNS is isolated, so users manage their profiles and buildrelationship separately on different SNSs. The content for thesame user in different SNSs may overlap, so it becomes a burdenfor users to manage contents across different SNSs.[7] Thisis the landscape of heterogeneous SNSs.Here, we proposesystem architecture to integrate heterogeneous SNSsand investigate a model to characterize the social relationshipsamong a large number of users across heterogeneousSNSs.[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]

Figure 1. Social Network Connections

To be more specific, we offer the following example. Imaginethat within an SNS, user *b* is in user *a*'s friend list. We saythat there is a directional social link denoted by "$a \rightarrow b$" fromuser *a* to user *b*. Building with these directional links, users inan SNS form a social graph [6]. When there exists a socialpath 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 socialpath from *a* to *b* over heterogeneous SNSs. These are basicnotations that are used and elaborated in our model. By identifying"global relationship" among users over heterogeneousSNSs, this article opens the possibility for users from differentSNSs to interconnect their various networks, resulting in anintegrated network of interconnected heterogeneous SNSs,which enable users to communicate with a larger communityof users. A comprehensive study of this integrated SNS landscapecan help SNS developers design user-centric SNS applicationswith more features [3].

In this article, we first propose a peer-to-peer (P2P) network,namely *P2P-iSN*, to integrate heterogeneous SNSs andestablish global relationships over the integrated SNSs. Asshown in Fig. 1, P2P-iSN consists of two kinds of nodes: *peernodes* 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]

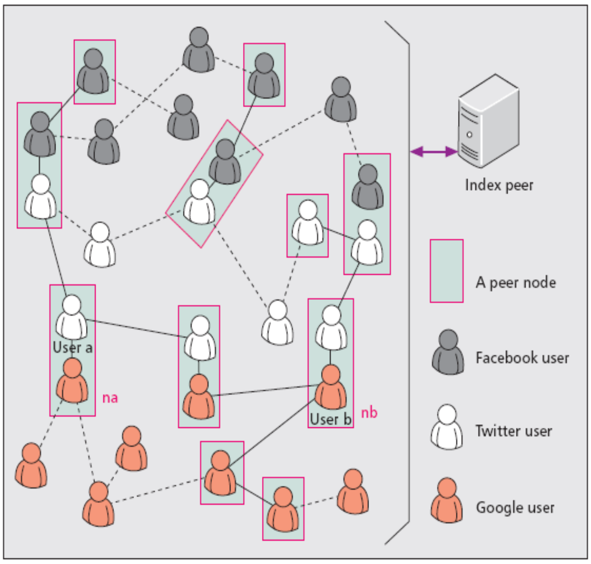

Figure 2 :Peer to Peer Connection

The userof a peer node may register to one or moreSNSs on his end-device, and possibly loginto one or more SNSs at the same time. Toassociate these different accounts of thesame user from heterogeneous SNSs, aunique user ID may be required. The conceptknown as OpenID1 in [7] can servethis purpose although any other uniquelyidentifiable ID can be used. A unique userID can be some kind of authenticatedinformation like user's cell phone numberor verifiable email address. The index peernode is responsible for maintaining the status(i.e., online or off-line) and the routinginformation (i.e., IP address) of each peernode. Here is the sketch of the operationsover P2P-iSN. When a peer node is turnedon, it reports to the index peer node theonline status, which consists of its ID andIP address of the peer node. Upon receivingthe online status, the index peer nodeupdates 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'sfriend list in a SNS, and **na**and **nb**are turned on, these twoonline peer nodes can communicate with each other by usingthe corresponding IP addresses queried from the index peernode. The peer nodes can establish social paths among usersfrom different SNSs.

GLOBAL RELATIONSHIP MODEL:-

We develop aGlobal 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 betweentwo users from heterogeneous SNSs. We also develop an analyticalmodel to evaluate the performance of the i-Search mechanismin terms of the "path found" probability and conductextensive 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 consistsof two kinds of nodes: *peer nodes* and *index peer nodes*.[2]The main functionality of a peer node is to integrate the heterogeneousSNSs through the Friend List maintenance (to beelaborated later). Peer nodes communicate with each otherdirectly and form a peer-to-peer network. An index peer nodemaintains the status and the IP address of the peer node.

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:

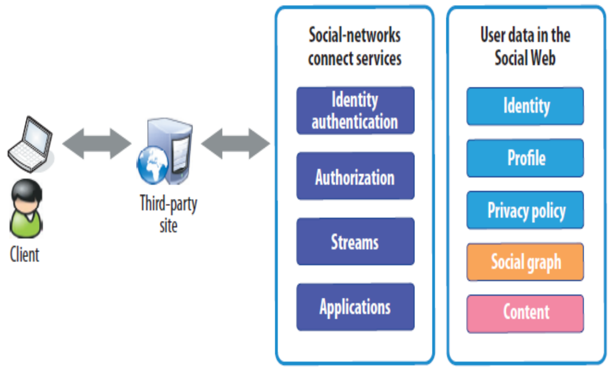

Figure 3.Social Network connection

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 toone or more SNSs on his end device, and login to one ormore SNSs at the same time. Because a user may use differentIDs in different SNSs, to associate these different accountsof a user, a unique user ID is required. This concept is similarto OpenID in [7]. The unique user

ID can be a user's cellphone number or email address, which can be used to uniquelyidentify this user.

Index Peer Node:-An index peer node is a database that maintains the GlobalIDlist with the format as shown in Fig. 4. For each online peernode, an entry is created in the GlobalID List for the peernode. Similar to the Friend List, the GlobalID List consists ofthree kinds of information: Personal Information, Social NetworkInformation, and Address Information for an onlineuser.

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 turnon a peer node by logining into one or more SNSs concurrently,there may be one or more SNS IDs for the same user

Turning on A Peer Node:-

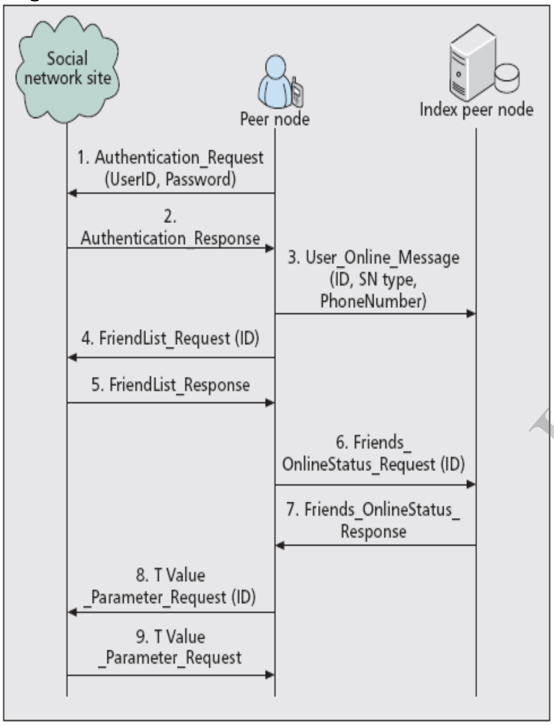

Figure 4 : Peer to Peer Node process

This section describes the execution of a peer node. When auser turns on the peer node on his end device, the Login procedureis executed. Figure 4 illustrates the message flow forthe 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 backgroundService Class.
6. Peer node create a FeedRequest Listener

The Global Relationship Model

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

THE I-SEARCH MECHANISM

In this section, we propose an i-Search mechanism to find adirectional social path between two peer nodes in P2P-iSN.Although searching in a social graph has been studied in theprevious works [12], most of these studies are centralized inthe sense that a social graph is well maintained at a centralnode. 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 searchthat has been widely adopted in communications networks (e.g., [13]). When a link is added into a path, global relationshipstrength is calculated for the new path using the *Z*(.)function in Eq. 3. If the global relationship strength for thenew path is below a threshold □, the social path search stops.Note that □ is used to guarantee that the global relationshipstrength for the constructed path is strong enough so thatusers are motivated to use the global social relationship forfurther SNS applications.

The past social network research findings in the sociology[11] indicated that $F(a, b) = 0.5$. However this may not betrue anymore for online social networks. In online social networks,$F(a, b)$ would be much high than 0.5. In this study, fordemonstration purpose, we set up Δ based on the researchfindings 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 relationshipstrength for the path is $Z(\mathbf{P}) = 0.5^4 = 0.0625$, which isconsidered very weak relationship. Therefore, in the performancestudy later, we set $\Delta = 0.5^3 = 0.125$.

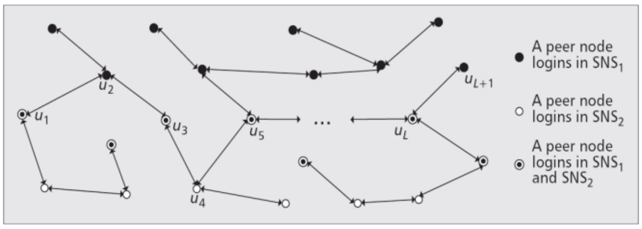

Figure 5: i-Search Mechanism

In other words, it is likely thatthe social path (searched by the i-Search mechanism) has path lengthno larger than 3. As mentioned in[14], with path length no larger than3, the flooding search is consideredwith low complexity. This is themain reason why we use the floodingsearch. In fact, as long as theinteraction factor for link $a \rightarrow b$ is$F(a, b) \leq b < 1$, the global relationshipstrength will be exponentiallydecreasing, and hence the flood search should have low complexity.

Input: s,r,P,Z(P)
Output: Pnew,Z(Pnew)

1. Foreach v:v € 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

CONCLUSIONS

In this article, we propose P2P-iSN, a peer-to-peer networkarchitecture to integrate multiple SNSs without incurringexcessive overhead to the SNSs. With integrated as well as collected model, wecould develop an effective approach, a Global RelationshipModel, to evaluate the global relationship strength betweentwo users with more precision. With P2P-iSN and the Global Relationship Model as the foundation, we propose the i-Search mechanism to find the social path with certain level ofsocial relationship strength in a P2P social network. Throughboth analytical and simulation models, we have justified ourapproach. Our study indicates that when the social graph issparser and a peer node has more friends, our proposedapproach can find the desired social path with high probabilitycomparing to traditional approach and can effectively establishglobal social relationship for users from heterogeneousSNSs. This research finding shows that by appropriately integrateusers in various SNSs, the proposed integrated frameworkcould enable users to enhance their social connectionsover cyberspace and create more social and economic opportunitiesfor the users.

Of course, there are many design challenges in designing a viable integrated social network framework like ours. The privacyconcerns may be the biggest stumbling block as whenevera unique identifier is used. Users may not want to participateto avoid revealing the connections in their accounts. Thus,appropriate privacy protection and incentive mechanismsmust be in place, which is one of our future research tasks.

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