How do we make friends in Online Social Networks

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***Abstract*—Online Social Network plays a significant role in everyday life recently. To understand how we make friends via these social sites is an interesting topic. In this paper, we study the features in Renren, the largest online social network in China and proposed a new methodology to explore the model of friendship establishment.**

I. Introduction

To make friends online is not a novelty. Various of social sites and instant messengers (e.g. MySpace and Window Live Messenger), enable Internet users to get connections all over the world. Nevertheless, with authentic personal profile and featured interactive model, online social network (OSN)[1], or named social network sites(SNS)[2], leads a new trend on online personal interaction .

OSN is person-oriented network concentrating on the interaction between people. Thus, user behavior identification is a crucial work[3]. In this paper, we study Renren OSN in terms of its unique features for encouraging people to make friends, and then propose a methodology from a network perspective to measure how inter-person connections are established in OSNs.

II. Renren OSN

With more than 500 million active users[4], Facebook is the most popular OSN in the world. However, due to the censorship from Chinese government, the Internet users in China mainland are not able to access Facebook. According to this, considered as Facebook's Chinese twin, Renren is founded in 2005, and soon became the largest OSN web site in China, with more than 150 million users now.[5]

As an imitator from the beginning, Renren shares similar user interface and page layout with Facebook and provides most of Facebook's functionalities, including personal profile, news feed, status update, public pages etc. Nevertheless, Renren has developed a series of features during its 5-year operation.

A. Unique Features of Renren

As mentioned in [5], Renren differs from Facebook in several significant ways: 1. each Renren user profile includes a "footprint" box, which lists the last 9 visitors ordered from most to least recent; 2. friend lists in Renren are always public; 3. comments in Renren are threaded; 4. Renren shows a list of 8 "popular users" at the very bottom of the page.

In addition to these, we discover more features in Renren. The first crucial one is that, each Renren user maintains a page count displayed on the very top of his profile. The page count is an accumulation of visited times by other users in Renren. Notice that, since each profile page maintains a "footprint" box, multiple visits by one single user will not be recorded as multiple page count, except there are interruptions from other visitors. The value of page count in Renren is of great importance, since it is directly involved in the ranking of "popular users". The users in a particular network with top page counts(not the number of friends as indicated in [5]) are considered as "popular users"(see Fig.1).

Fig. 1. Popular users in the Network of Seoul National University

Second, Renren supports love space, which is a public page for two users in a relationship. Other users in Renren can visit thos love spaces and interact with their owners with photos, multimedia streams and a plenty of web 2.0 applications.

Despite of these, Renren also feature itself in other ways: 1. user status is twitter-like, which can be commented and retweeted with all intermediate users' links on it; 2. each user maintains a specified login level, which encourages them to login continuously(hopefully everyday) for some advanced privileges, such as colored comments; 3. Customized profile pages, including wallpaper, mouse shape, animations, are supported; and so on. As a matter of fact, Renren has localized itself to the Chinese market.

III. Methodology

In this work, we focus on how users establish friendship connections in OSNs. Take no account of the impact of off-line activities, the general 4 steps for two strangers A and B to became friends are: 1. A found B's link in a page or seed related to B; 2. A click through the link and visit B's profile; 3. A send friend request to B; 4. B accepts or rejects A's friend request.

TABLE I
TAGS OF VISIT TYPES

Tag Name	Portal indicated by the Tag
hotnewsfeed	the news feed on user's homepage
minifeed	the news feed on profile page
lover	"footprint" on love space
page	fans list on public page
homeStar	"popular users" box
profileFriendlist	public friend list on profile page
homeFootprint	"footprint" on profile page
pub_sharefriends_a_profile	mutual friend list on profile page

A. Crawl the Network with URLs

Different from Facebook, Renren illustrates many network information in its URL tags[6], including how users enter a profile page. It enable us to crawl the network and explore how a friend request is generated. Here are two examples of the featured URLs.

http://www.renren.com/profile.do?portal=homeStar&id=38667

http://www.renren.com/profile.do?id=224227028&ref=minifeed

The first URL indicates the current profile visit is through a link in the "popular users" box, since there is a segment of "portal=homeStar". In contrast, we can infer from the second URL that, the particular visit is a redirection from a "minifeed". According to our study, Renren differentiates 9 types visits with identified URL tags.

Table I shows the tags of visit types in Renren and their explanation. Those tags indicates the different portal for one specific profile visit. With the tags in URLs, the portal of each visit can be classified and summarized for further analysis.

B. Statistics of Friendship Establishment

For one particular user u, we can accumulate all of his page visits in a period of time T. More specifically, these visits can be categorized by 10 types of portals, including 9 ones as indicated in Table I and others which have no tags in the URLs.

We would like to measure $P_i^R(u)$, the probability for one single visitor to send friend request. Denoted $V_i(u), i \in [1, 10]$ as the total number of visits for user u through ith type of portal. Once a friend request is sent, the portal of the corresponding visit is recorded in $R_i(u)$. Hence, we have

$$P_i^R(u) = \frac{R_i(u)}{V_i(u)} \tag{1}$$

Similarly, $P_i^A(u)$, the probability for a user to accept a friend request from ith portal can be calculated by:

$$P_i^A(u) = \frac{A_i(u)}{R_i(u)} \tag{2}$$

where $A_i(u)$ is the number of request from ith portal being accepted.

As a result, we can calculate $P_i^F(u)$, the probability for two strangers to establish friendship from ith portal as

$$P_i^F(u) = P_i^R(u) \times P_i^A(u) = \frac{A_i(u)}{V_i(u)} \tag{3}$$

For a selected group of Renren user U, a statistics of friendship establishment can be derived, including the expectation and derivation of $P_i^R(u)$,$P_i^A(u)$ and $P_i^F(u)$. For each portal i, a corresponding Cumulative Distribution Function(CDF) illustrates the distribution of users' possibility whose $P_i^F(u)$ is less than q.

$$P_q = \int_{q'=0}^{q} p(q')dq \tag{4}$$

We can draw a series of figures from our ongoing work to indicate how users are making friends and give guidance for the Renren web site to enhance users' experience.

IV. DISCUSSION

As most of the work on identification of user behavior, Renren users can be classified as several distinct groups with unique features. For example, those users who appears in "popular users" boxes tend to be more active than those not. Their updates on status, photos and diaries are more frequent, which will result more visit and their profile pages become a hub of local network. Consequently, it is necessary to extract those users' information in our future work. The comparison of popular users and common ones would result significant difference.

V. CONCLUSION

Getting to know with strangers and becoming friends is the most attracting part of user behavior in OSNs. In this work, we study the related unique features in Renren OSNs, such as the "popular user" box, "footprint" box, ect. Motivated by the tags in URLs, we proposed a novel scheme to measure the possibility for two strangers to become friends in Renren.

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