Development of Online Social Media for Fan Groups: How to Exploit Existing Social Networks

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Abstract

In this study, we studied development of online social media for fan groups. Existing popular social networking sites offer attractive features, but they have significant problems. We described desirable features of a social network site for fan groups. We considered development of own social medium and studied the ways of exploiting existing networks for increasing its popularity. We also studied several methods based on social network analysis for identifying influential nodes that have high potential to attract new fans to the network. We justified our work with a case study by performing numerical tests in real environment.

1 Introduction

Online social media play an important role for connecting friend groups via sharing interests and activities. Social networking services gather information on users' social contacts, construct a large interconnected social network, and reveal to users how they are connected to others in the network. [1] Through social media, online communities are created where different kinds of relationships with diverse people are encouraged through kinship, friendship, financial exchange, common interest, dislike and relationships. Currently there are many popular online social networking (OSN) sites like Facebook (FB) [2], Twitter (TW) [3], Google+ (G+) [4] etc. which not only provide connection to existing friends, but also enable new social connections.

These OSNs supply the means for so many things like various information distribution, means of communication, selling different products and playing online games. Most of them also enable features for forming some special social groups. Hence, many fan groups exchange their activities, feelings, knowledge, etc in these popular OSNs by creating a shared profile for their group. However, although there are many positive sides of using these popular OSNs, there are also many negative sides. Although some problems like privacy have been studied extensively [5, 6], we mainly focused on fan groups as a target and provide a thorough study in this context.

In this work, firstly we clarify the benefits of popular OSNs. Then, according to our experiences, we describe the deficiencies and shortcomings of using these OSNs as a shared media for fan groups, in various contexts including security, privacy, efficiency, morality, and continuity. Next, we clarify the desired properties of an efficient fan sharing site. Rather than using popular OSNs such as FB directly, we described a model for developing a more secure and more influential social media by exploiting positive features of the popular OSNs. In this context, we also offer some methods based on Social Network Analysis (SNA), in order to increase popularity of the developed social media. Using some tools such as Gephi [7], we extract several SNA measures (such as degree centrality, betweenness centrality, etc.) of existing FB networks and investigated how to exploit this information for reaching larger masses including many potential fans. In a case study, we justify our work by applying our methods to develop a successful social media that brings together hundred thousands of fans of Bursa, a historical capital city in Turkey.

The rest of this paper is organized as follows. Section 2 presents the positive and negative sides of popular OSNs as a potential shared media for fan groups. Section 3 describes a model for developing own social fan sharing site with desirable features. Section 4 illustrates some methods for increasing popularity by using SNA. Finally, Section 5 concludes this work.

2 Popular Online Social Networks

Social network web sites are created to assist in online networking. These sites are virtual communities [8] created to support a common theme and idea. Since the creation of social networking sites such as FB, TW and G+ individuals are given opportunities to meet new people in their own society and across the world. OSNs provide a basis for maintaining social relationships, for finding users with similar interests, and for locating content and knowledge that has been contributed or endorsed by other users [9]. But there are many vulnerabilities, deficiencies and weaknesses of these existing social networks. In this chapter, we briefly describe some benefits and deficiencies of existing popular OSNs, especially in using as online sharing media for fan groups.

2.1 Benefits of Using Existing OSNs

OSNs provide a wonderful way to stay in touch with various types of people whom we want to connect around the world. Busy lives make it difficult to set up contact via phone calls and e-mail communication but it is fairly possible staying connected through the use of OSNs. Social networks give the sharing flexibility and a skill of spreading information that does not fill out enough details a conventional newspaper needs. Internet has become a place where many narratives can exist and live.

Thanks to social networking sites, it is an excellent way to declare announcements, publish advertisements associated with special events, surveys, activities, parties, meetings, organizations and any beneficial programs to its subscribers. With the beginning of 2010, the major share of the market was dominated by a handful of OSNs. [10] OSNs can bring thousands of people together for a common idea within real objectives of live.

FB is one of the most popular OSNs with hundreds of millions of users. It provides a good way to make connections with people with similar interests and goals. It is easy to use and allows connecting with or meeting new people around the world. It has many advantages. It offers advertising to its subscribers. Business issues can be handled easily. Sharing pictures, videos, notes, updates and commenting to walls help expanding ideas, thoughts and values. One of its major properties is FB Insights application which allows understanding information about the followers, such as what they like and don't like, where they're from and which links they visit more, etc.

As another popular OSN, Twitter is a powerful tool for obtaining up-to-date information via short tweets, to strengthen personal and product awareness and to get fast feedback. Other popular OSNs such as G+ and MySpace [11] have also their own benefits. [12] provides a nice overview on functionalities and potential business value of popular OSNs.

2.2 Deficiencies of Existing OSNs

Although existing online social media have many benefits, they have also significant amount of problems. Since, as an initial effort, we tried to create a shared medium for fan groups by only using facilities of existing popular OSNs, we thoroughly experienced these problems. According to our experiences and also our investigations, we can classify main deficiencies and shortcomings of existing popular OSNs as follows:

a. Privacy: Privacy problems of OSNs like FB has been investigated extensively [5, 6]. As an example, Gross et. al [5] showed that users expose themselves to various physical and cyber risks, by providing personal information to OSNs.

b. Morality: Existing OSNs are open to attack and aggressive comments, spam messages, swearing, revilement and negative campaigns. In FB, comments are made without control of administrators when the fan site was liked without being membered of the site. The shared media is vulnerable to any kind of immoral interventions, such as holiganism.

c. Copyright problems: Existing OSNs can take over copyright privileges in unlimited ways if blog, music, video or any news content is published at a social network site. Not many writers, artists, musicians and directors are aware of this situation and forget to read the terms of understanding and policies in order to uncover what can happen to their studies. The site can change its policy at any time without notice even if the terms of understanding put forward that no personal information will be sold.

d. User Interface: The user interface of the existing OSNs is not flexible and may not answer all the requirements of social media for fan groups. Also users generally find the FB Timeline application harmful about mismanagement of personal information of user's lives. It has been the best place for hackers to steal valuable information unless users protect their information. In addition to this, the necessary information can't be easily found in categories because of the wall application that all shares flow through it. The older shares fly on the wall and we must search them by scrolling down as it takes too much time.

e. Continuity: Due to giant size of popular OSNs, it is very likely to face some support problems about administrator services. The questions, advices, issues and complains usually remain unanswered and this significantly effects the continuity of the work. Moreover, these popular OSNs usually do not give any guarantee for permanency of the shared media which was formed and popularized after huge efforts.

f. Loss of control: Loss of control in popular OSNs may lead to reputation risks and unexpected results. The shared medium is vulnerable to spread of untruthful negative campaigns. [12]

3 Development of Own Social Networking Site for Fan Groups

As listed in the previous section, there are significant deficiencies and shortcomings of existing popular OSNs, especially for using as a social media for fan groups. A natural way to overcome these deficiencies is to build up own social networking site for a fan group. This needs extra effort, but it is the only way to have manageable and flexible media with desirable features. Nevertheless, popular OSNs should also be exploited in order to take advantage of their benefits. In this section, we first list the desirable features of a social networking site for fan groups. Then, we describe several ways of exploiting existing popular OSNs to increase popularity of own social network. Furthermore, we justify our ideas by illustrating a successful case study, BursaFan.net, which is a social network platform that brings together hundred thousands of fans of Bursa, a historical capital city in Turkey.

3.1 Desirable Features of a Social Networking Site for Fan Groups

We can classify desirable features of OSN for fan groups as follows:

a. Website manageability: A good OSN site should be managed through a user friendly panel. All fans, different types

of media content, news, custom pages, settings etc. is managed, reviewed and configured via the control panel.

b. Authentication: An OSN should provide fan approval system to verify their emails before they can use our website. Also, it can permit to approve fans accounts automatically or review each account manually.

c. Security and privacy: A comprehensive OSN should protect fan groups from possible spammers or abusive content. A good security policy must be defined and applied. Additionally, the reports submitted by fans, must be reviewed to identify the problems. Fans should also configure their privacy settings to ensure that their crucial data is not revealed.

d. Moral issues: Avoiding comment and ad boom and avoiding inappropriate contents are the necessities for a better OSN. If we create engagement and attract our target audience by maintaining this, our followers will be strongly faithful to each other and to our social media.

e. Flexible user interface: One of the interesting necessities for an OSN website is to allow fans to change their profiles according to their demands. Fans can choose not to enable comments if they don't want anyone commenting on their content or what content can be viewed by other fans. Also we can customize each fan group to allow various permissions and limits such as uploading twice as many pictures or increasing the size of their private message box.

f. Interactive information sharing: For interactive communication and information sharing between fans, a forum module and instant messaging feature is desirable. Moreover, via a blog module, fans would write their own blogs, upload pictures and share their thrilling thoughts. Besides, they may become candidate for headline of the news part. A powerful OSN would also provide its fans WebTV programs to discuss various topics as it is a simple and convenient service for the fan satisfaction. Interactive information sharing would also enable promotion and organization of real life social events. It will be easy to bring thousands of people who share the common idea through a glorious activity of a social media.

g. Financial issues: An OSN should provide all of its properties free of charge. For the financial issues, it would allow creating and managing banners and organizing them into groups. Hence, it would be possible to track how many times each banner has been viewed and clicked and to determine which banners are performing well.

h. Data storage: Fans must be sure that any uploaded and approved content such as video, music, photo album, friends list, private messages, comments and blogs will be kept persistently.

i. Website statistics: It should be possible to gather page analytics and provide detailed reports about website activity over different periods of time.

j. Continuous support: An OSN should meet all reasonable requirements of its fans and be interested with the feedbacks of its community every time.

3.2 Exploiting Popular OSNs

Increasing popularity of own OSN is very important. In order to reach all potential supporters, it is better to maintain parallel profiles in popular OSNs and provide links to own OSN. This way it will be possible to increase awareness of the developed social networking site, brand organization and foundation values. Popular OSNs are excellent way for providing free advertisement.

Most of the popular OSNs also provide search property which can be used (with related keywords) to find potential supporters. This way it is possible to reach people without any prior individual connection.

Another way of exploiting existing OSNs is to use SNA. There are several tools to extract social network from profiles in existing OSNs such as FB. There also exist several tools to analyze the extracted network and provide values of various SNA metrics, such as centrality measures, connected components and modularity measures. These values can be used to determine influential nodes and to increase popularity via attracting those nodes to the own social network. Details with some numerical examples are given in Section 4.

3.3 A Case Study

Due to strong emotional relationship with historical city of Bursa, we decided to develop an online social media for Bursa fans. In our past experiences, we encountered many problems with existing popular social media as we described in section 2.2. Therefore we decided to build up our own online sharing website, namely BursaFan.net [13] with desirable features described in section 3.1. The main goal of this effort is to enable Bursa fans to harness a fully functioning website with numerous advanced features not satisfied by existing popular social networks.

BursaFan.net as an endure and interactive social network web application has lots of distinctive sections including latest news, photo albums, video categories, music audios, blog writings, events, polls, social communication channels, guestbook, forum, web TV and advertising options. It enables making new friendships via its social capabilities, competencies and resources. It has a powerful management panel to keep track of entire content in application. Hence, it provides customizable banner management, fan moderation, content consideration, poll production, custom page creation with the OSN application activity statistics and graphical charts. It aims to produce social projects to contribute the individuals or organizations in various subjects. To increase awareness about a particular issue, to create conscious relationships between its fan communities and to figure out any problem by using BursaFan.net social media is very simple comparing to existing OSNs. Furthermore, we made our best to provide satisfactory contents that attract Bursa fans, emphasize national and moral values with strong virtues and also announce special values of Bursa to all over the world.

Besides all of these appealing features, we exploited existing social networks in order to increase popularity of this new online social platform. We supported BursaFan.net with a new BursaFan FB profile and provide links to our

platform. Currently, we observe that 10.3% of visitors accessed our website directly without any referrer, while 89.7% of visitors came from referrer websites. Among all referrer websites, FB has a huge share with 99.6%. This shows the importance of exploiting positive sides of existing popular online social media.

Moreover, we proposed and used several SNA methods in order to further increase popularity. These methods are described in the next section.

As a result of these efforts, the popularity of the website increased swiftly and the page views exceed 1 million per month in only three months after being established in July 2011. Figure 1 illustrates page view analytics for the year 2011 provided by Histats [14].

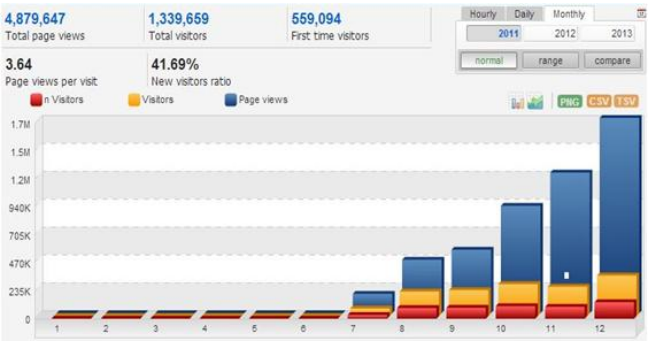


Figure 1 Page view analytics of Bursafan.net in year 2011

Figure 2 Total Daily Stats for December, 2011

In December 2011, it is observed that approximately 41% of the followers are the new visitors, as shown in Figure 2. This clearly shows the rapid increase in popularity.

4. Increasing Popularity Using SNA

4.1 SNA Overview

Social network aspect gives a certain way of analyzing the construction of entire social entities. The study of these constructions uses social network analysis techniques to determine influential patterns and locate powerful entities. An OSN can be modeled by nodes which show the people and edges which connect the nodes.

SNA is the systematic analysis of social networks. It is of great importance that we can use social network metrics for exploiting popularity. As Friedkin observed [15], we cannot take into account only direct ties to evaluate how central a node is in the network, but also indirect paths that link one actor to another. By analyzing social network statistic with the social network concept parameters like betweenness centrality and closeness centrality we can detect and study communities. We can easily open, visualize, manipulate and render a network file with SNA tools such as Gephi. Network visualization and manipulation helps SNA a lot.

By using SNA techniques we expect that similar capabilities of people within their own network can be found. It may help for targeted audiences to put parallel value within an organization. Another advantage of SNA is to meet with other people who are concentrated on certain topics. SNA offers comprehensive solutions and services in the complex social networks. It helps better understand the relationships within OSN and the strength of individual's and organization's network links. It examines relational networks and value modifications. It uses precise attributes of social networks to better interpret the potential of marketing. Marketing measurements can be obtained by defining better objectives with proper data gathering. [16]

By analyzing and assessing the interactions of advocates, SNA provides an effective way to identify the fan communities and impact competition on the social network. This utilizes better targeting and messaging to these fan masses. On the other hand, there are some challenges which effect SNA design. Large number of nodes increases the complexity which also turns network into a target from the point of reliability, generalization and manageability.

4.1 SNA Metrics

SNA comprises lots of metrics which can be utilized to bring out the concerned state of individuals and additionally all measures of the connectedness of the social network. Information about the concerned importance of nodes and edges in a graph can be obtained through centrality measures. There are four major measures of centrality which are degree centrality, betweenness centrality, closeness centrality, and eigenvector centrality. In this work we mainly utilize the former two:

1) *Degree Centrality (DC):* Degree Centrality of a node is measured by the number of edges attached to this node. The most popular node is the node which has most connections.

2) *Betweenness Centrality (BC):* Betweenness centrality quantifies the number of times a node acts as a bridge along the shortest path between two other nodes.

We also used some other SNA metrics such as number of connected components. We observed various SNA measures and utilize these values in order to determine most influential nodes and increase popularity of our new social network. We evaluated experiment results to identify fan communities for better targeting and messaging them.

4.2 Determining the Influential Nodes

In order to increase popularity of the developed social media, we decided to find some influential nodes and attract them to our new network. In order to find influential nodes we followed several strategies:

a. Firstly, we used our existing individual FB network and extract the degree centrality value ($DC^I(n_i)$) of each node n_i in this individual network, using NetGet and Gephi. Then we extracted the degree centrality value of these nodes in the general FB network, i.e. $DC(n_i)$. The most influential nodes are the nodes that have larger number of connections

to the outside of our individual network. In other words, influential nodes have greater value of $DC^{FB}(n_i)$-$DC^{I}(n_i)$.

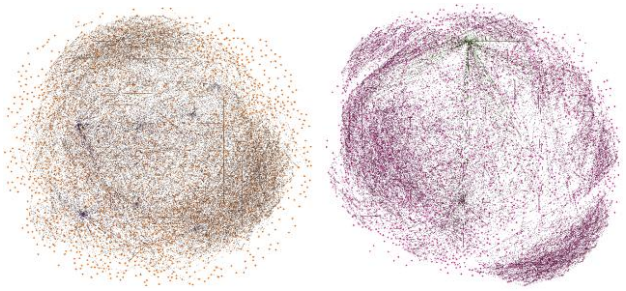
b. Secondly, in the general FB network, we searched several nodes with some keywords that are related to our social media context, such as names of some societies in Bursa. From these nodes, the ones with high degree centrality are considered as influential nodes.

c. In the new network, we know that there are several subgroups and some key nodes that acts as a bridge between these subgroups. In order to identify these nodes, we calculated betweenness centrality (BC) of each node in our new network. The nodes with higher betweenness centrality are more critical nodes and possibly have high potential to attract new followers to our new social network.

d. In the new network, we calculated the number of connected components. Nodes that are in small components, but have high degree centrality in general FB network, can be considered as influential nodes.

4.3 Numerical Results

In the development stage of BursaFan.net, we applied the proposed methods, using the individual FB network of the corresponding author as a means to find the influential nodes. We extracted this individual network (Net 1) from FB using NetGet tool. Then we input it to Gephi in order to apply SNA. Figure 3(a) illustrates the individual FB network (Net 1), after Force-Atlas layout algorithm applied. Figure 3(b) illustrates Bursa fan network (Net 2) in its development stage (after applying some SNA methods for increasing popularity). Basic properties of Net 1 and Net 2 are given in Table I.



(a) (b)

Figure 3 Force Atlas Layout of (a) Individual FB Network - Net1 and (b) BursaFan Social Network - Net 2 (in development stage)

	# Nodes	# Edges	Average Degree	Average Path Length
Net 1	1294	4830	7,465	3,542
Net 2	1411	5529	7,837	4,152

Table I Basic Properties of Net 1 and Net 2

Gephi provides various SNA metrics such as centrality measures for the overall network and also for each node. Firstly we run Gephi for Net 1 in order to determine which of the current friends have much potential to increase the popularity of new network, in case we attract them. After obtaining the degree centrality values of every node, we chose several nodes as influential nodes according to their number of connections to outside of Net 1. Table II illustrates a part of these nodes. Due to privacy, we just give the first letter of names and surnames of the nodes. The first row illustrates the degree of the nodes in Net 1. Second row illustrates their degree in general FB network and the third row is the difference. We sorted nodes according to the values in the third row. Final row illustrates the degree of these nodes in the new network.

	M.G.	S.Y.	Y.B.	E.Y.	S.Y.T	N.C.
DC^{Net1}	123	154	147	42	10	0
DC^{FB}	5352	4784	1376	552	240	131
DC^{FB} - DC^{Net1}	**5229**	**4630**	**1229**	**510**	**230**	**131**
DC^{Net2}	75	83	69	235	44	59

Table II Degree centrality of fans that are both in Net 1 and Net 2

Given that the average degree of Net 2 is 7,837, the degree of all the nodes considered in Table II in Net 2 is quite above the average. This means that these nodes most probably attract their own friends and have more connections in Net 2, compared to most of the other nodes. Additionally, it is worth to say that E.Y is the most influential node in Net 2 whereas she has approximately five times greater connections than Net 1. Furthermore, N.C node has interesting importance that he has no any tie among Net 1 but there are 59 connections in Net 2. It seems that both E.Y and N.C have an active role in spreading information and creating engagement through new social network.

We also consider the nodes that are not in Net 1. We search several nodes in the general FB network that acts an active role in some social projects related to Bursa, and identify those nodes as influential nodes. Degree centrality values (both in general FB network and Net 2) of some of those nodes are given in Table III. When we analyze these results, S.K is the most connected node with 110 edges. He is a professional sports programmer in Bursa. I.O is a professional Bursaspor football player who is well known around the world. On the other hand, although number of total connections of E.D. and R.T. are not so high, they are included in Table III because E.D is a grandstand leader who has important connections over large supporters, and R.T is a media boss who is interconnected with many various sources. Similarly the rest of the people listed in Table II have strong ties among their individual networks. As a result, although they are not in our individual network, these nodes have high degree in Net 2, which means that they attract new people to Bursa fan network.

	S.K.	I.O.	A.K.	G.B.	R.T.	E.D.
DC^{FB}	5661	5036	4998	4981	196	102
DC^{Net2}	110	66	46	45	55	62

Table III Degree centrality of fans that are not in Net 1

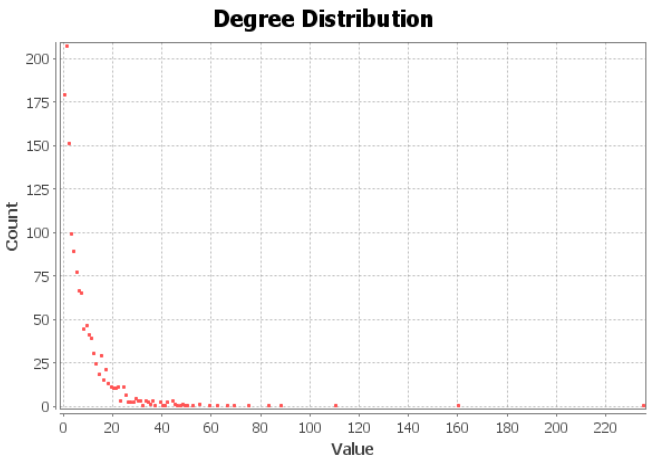


Figure 4 Degree distribution of nodes in Net 2

Figure 4 illustrates degree distribution of nodes in Bursa Fan network in development stage. We observed that most of the nodes with highest degrees are the nodes that are determined to be influential.

Furthermore, we extracted betweenness centrality values. Table IV illustrates betweenness centrality values of several nodes in Net 1 and Net 2. BC value of E.Y. is very high in Net 2, which means that E.Y. interconnects many peers. BC value of Y.B. almost doubled, although his degree in Net 2 is much lower than his degree in Net 1. For some nodes such as S.Y., BC values are almost equal, although his DC value is almost half of his DC value in Net 2. Influential nodes that are not in Net 1 have also high betweenness values in Net 2. In general, our observation is that betweenness centrality of influential nodes in Net 2 is mostly much higher, even if their degree centrality is lower compared to Net 1. The reason is that there are more subgroups in BursaFan network and the influential people acts as a bridge between these subgroups.

	E.Y.	Y.B.	S.Y.	N.C.	S.K.	I.O.
BC^{Net1}	**11073**	**102368**	**50151**	**0**	-	-
BC^{Net2}	**253603**	**193365**	**45995**	**35665**	**61083**	**25128**

Table IV Betweenness centrality of some nodes in Net 1 and Net 2

In the FB network of Bursa Fan, there are currently 155.403 followers and 29.764.568 friends of these followers. This shows that attracting people with high betweenness centrality has huge potential of spreading the means of Bursa fan social media to great masses.

Another metric we considered is the connected components. In Net 2, 1224 nodes out of 1411 nodes belong to the giant component. The size of other components ranks between 1 and 5, while most of them consist of single nodes. Nodes in these small components are most probably found and joined to our network by coincidence, i.e. not by an advice from their friends who are already in the network. These people have a potential to increase reachability to different groups that include potential Bursa fans.

We have to note that most of the presented analysis and discussions are for the initial deployment stage of BursaFan.net. The next step of our work would be analyzing the current network with hundred thousands of nodes and extracting additional information by using similar SNA methods.

5 Conclusion

Popular online social networks such as FB can be used as online sharing media for fan groups. However, besides their advantages they have significant deficiencies and shortcomings. In this work, we described the pros and cons of popular social media. Then we studied development of own online sharing media instead of directly using existing ones. We described desirable features of online social network sites for sharing within fan groups. Furthermore, we described several methods for using existing networks in order to increase popularity. We described several methods based on social network analysis, for finding influential nodes that have high potential of attracting new fans to the own social media.

We applied the proposed methods in a case study, where we developed a through social network web application, BursaFan.net, that brings Bursa fans together. We evaluated the effect of supporting this application via parallel FB profile in a real environment. Furthermore, we applied the proposed SNA methods for increasing popularity of our new network by identifying several influential nodes. We also extracted centrality measures and component statistics of the new fan network in its development stage. According to these values, we observed that the developed social network application plays an important role in interconnecting various fan subgroups. We also showed that the determined influential nodes act an active role in attracting new members to our new network. As a future work, we are going to incorporate more SNA metrics such as eigenvector centrality and modularity. Moreover we are planning to extend our analysis for the current network with hundreds of thousands members, rather than the relatively small network in the development stage, that is considered in this work.

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