1 PROJECT #1: DETECTING FACEBOOK COMMUNITIES TO MANAGE PRIVACY SETTINGS

Facebook is an extremely popular tool to set up, create and maintain social relationships. An intriguing research question is whether Facebook is yet another means for humans to establish and maintain social relationships, in addition to e.g. phone, e-mail, letters, postcards, … Or, if it is a tool by which humans drastically change the way in which they relate to each other.

This question is prompting analysis on Facebook data sets and the development of new Facebook Apps, aiming at collecting evidence to support one of the two hypotheses. Recently, two results have been obtained (see reference [1] and [2], respectively):

1. Analyzing the interaction between FB users from a publicly available dataset, it has been shown that the relationships of each user present a nested clustered structure, whereby the most internal cluster groups other users with whom s/he is most intimate, while external clusters group relationships with lesser and lesser intimate friends. Such a structure is remarkably similar to what has been found in the sociology literature considering relationships maintained by other types of communication, such as postcards and/or phone calls (see, e.g. [3]).
2. Facebook Apps have been designed to automatically detect communities of Facebook users, based on profile similarity (called "homophily" in the literature). Initial tests have shown that automatically detected communities are quite similar to those in which they themselves would group their friendships.

An unanswered question is to what extent such findings are correlated and overlapping with each other. I.e., if the nested clusters highlighted by looking at the frequency of interactions are related in some way to the communities highlighted by commonality of profiles (i.e., if frequency of interaction and homophily are related in Facebook). Answering this question would open up to a number of concrete applications in Facebook. For example, this could be used to suggest default privacy policies (more open towards "inner" friends, and progressively less open towards "outer" friends).

The proposed project should seek two results (with an optional third one):

1. starting from the results in [1] and [2] assess, by analyzing real Facebook datasets, whether nested clusters and homophily communities are correlated, and to what extent
2. use these types of clustering (based on frequency of interaction, homophily, or both) to set default Facebook privacy settings, and conduct a user study to see how well these settings match the users' understanding of trust
3. (optional) exploit the myPersonality app to correlate the detected structure of Facebook friendship with various aspects of the user's personality (extrovert, introvert, etc.)

[1] Valerio Arnaboldi, Marco Conti, Andrea Passarella and Fabio Pezzoni, "Analysis of Ego Network Structure in Online Social Networks", *ASE-IEEE International Conference on Social Computing (SocialCom 2012)*, Amsterdam, Netherlands, 3-5 September 2012

[2] Yabing Liu, Bimal Viswanath, Mainack Mondal, Krishna P. Gummadi, and Alan Mislove. 2012. Simplifying friendlist management. In *Proceedings of the 21st international conference companion on World Wide Web* (WWW '12 Companion). ACM, New York, NY, USA, 385-388.

[3] Roberts, S., Dunbar, R.: Communication in social networks: Effects of kinship, network size, and emotional closeness. Personal Relationships 18(3) (2011) 439-452

2 PROJECT #2: INFLUENCE MITIGATION IN SOCIAL NETWORKS

It has been shown that the opinion of highly popular users in social networks (e.g. Twitter) is very influential, thanks to the fact that they can easily reach other users due to their high degree. However, popularity and influence are two processes that feed each other: one is influent because is very popular, and become more popular thanks to the influence of their opinion. In modern social networks, this generates a sort of quadratic effect along the "rich-get-richer" dimension, which may end up making a few nodes disproportionately influent (and popular) in the overall network.

The goal of the project is to better characterize this phenomenon related to information diffusion in social networks, and to see the effect of various possible countermeasures that could be included in the network design so as to mitigate such a wind-up effect (see, e.g., [2]). In particular, the project will:

1. Analyse, by possibly looking at real datasets as well as synthetic social network graphs (explained below) under which conditions such wind-up effect occurs, and quantify its magnitude.
2. Exploit recently proposed tools to generate synthetic social network graphs to propose and measure the effect of different countermeasures to mitigate this effect, such as slowing down tweets or randomly dropping tweets in the case of Twitter.

To carry out the project, the simulation tool recently presented in [1] could be used. This tool generates synthetic social network graphs that (i) reproduce well-known structures regarding the strength of social relationships between individuals, and (ii) generates synthetic graphs that present macroscopic features similar to those highlighted in large scale social networks (e.g., clustering degree, diameter, etc.). The project could use the simulator to understand the effect of the mitigation measures on the spread of information on social graphs, and the resulting influence of most popular users.

[1] M. Conti, A. Passarella, F. Pezzoni, "A Model to Represent Human Social Relationships in Social Network Graphs", 4th International Conference on Social Informatics (SocInfo 2012), 5-7 December, Lausanne, Switzerland

[2] Encouraging moderation: Clues from a simple model of ideological conflict http://arxiv.org/abs/1209.3546v1

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