Raise of influential individuals in Online Social Networks

A. Legout (EPI Diana) and G. Neglia (EPI Maestro)

1 Internship topic

The participation and the role of individuals to online social networks exhibit a large heterogeneity. In particular some members have a huge number of followers and are then highly influential. Among them, some are VIPs whose popularity on the online social networks is simply a reflection of their popularity in other mass media and is almost independent from their actual online activity, others have gained their popularity through their contribution to the online social network and their networking strategy. The important role of such influential members is evident for example for the role of some of them during the "Arab Spring".

The purpose of this internship is to propose and validate models explaining the raising of such highly influential individuals in online social networks. Our research could answer the following questions: who you should *follow* (/or propose your friendship to) to have the maximum chance to be reciprocated? is there a "the rich becomes richer" effect? does it appear above a given threshold? is reposting other members' posts an effective strategy? From the modeling poing of view we are going to use two different approaches. As in [1] we plan to adopt a statistical mechanics approach, by considering simple connection rules for the members, derive fluid models in the limit for large populations and see what is the effect on the evolution of the network topology. At the same time we want to address the study using game theory and in particular the framework of network formation games [2]. In this case the members are considered as rational players who tries to establish connections in order to maximize an individual utility. We think that the real behavior is someway in the middle and we hope that the two points of view will highlight some characteristics of the actual members. The proposed models will be validated on real dynamic traces that show how social networks evolve over time.

2 Link with the *Action Transverse* Network Science

The identification of the basic network formation dynamics and the study of their effect on network topology is a typical subject of network science. This research activity will benefit from Maestro's background on fluid models and game theory and Diana's extertise on Internet measurements. In particular A. Legout has recently collected the complete graph of Twitter, one of the largest online social networks.

References

[1] Albert, Rka; A.-L. Barabsi (2002). "Statistical mechanics of complex networks". Reviews of Modern Physics 74: 4797.

[2] M. Jackson. "A Survey of Models of Network Formation: Stability and Efficiency". In G. Demange and M. Wooders, editors, Group Formation in Economics: Networks, Clubs, and Coalitions. Cambridge University Press, 2004.