

Computational Social Science: Analysis and Modeling of Human Sociality

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Abstract

In today's society social interactions take place increasingly through ICT, the events of which leave behind digital traces of individual behaviour as ever-growing datasets. The study of such data using computational analysis and modeling with Network Theory approach can give us unprecedented insight into human sociality. This was well-demonstrated by our analysis of the dataset of mobile phone communication-logs, confirming the Granovetterian picture for the social network structure, i.e. being modular showing communities with strong internal ties and weaker external ties linking them [1]. More recently the same dataset has allowed us to look at the nature of social interaction in more detail and from a different Dunbarian egocentric perspective, due to it including demographic data in the form of gender and age information of individual service subscribers [2]. With this we have got a deeper insight into the gender and age-related social behavior patterns and dynamics of close human relationships. Our analysis results demonstrate sex differences in the gender-bias of preferred relationships that reflect the way the reproductive investment strategies of both sexes change across the lifespan, in particular women's shifting patterns of investment in reproduction and parental care. These empirical findings inspired us to take the next step in network theory, namely developing models to catch some salient features of social networks and processes of human sociality in them. One of our first models, based on network sociology

mechanisms for making friends, turned out to produce many empirically observed Granovetterian features of social networks, like meso-scale community and macro-scale topology formation [3]. In another model we have investigated the social implications of deception for opinion formation in coevolving social network, where we find that white or pro-social lies glue society together while black or anti-social lies create diversity [4]. To summarize we believe that the network theory approach to social systems combined with computational data analysis and modeling opens up a new perspective for studying and even predicting collective social phenomena.

References

- [1] JP Onnela, J Saramäki, J Hyvönen, G Szabó, D Lazer, K Kaski, J Kertész, AL Barabási, PNAS 2007, **104**, 7332-7336.
- [2] V. Palchykov, K. Kaski, J. Kertész, AL Barabasi, RIM Dunbar, SCIENTIFIC REPORTS, 2012, **2**, 370.
- [3] JM Kumpula, JP Onnela, J. Saramäki, K. Kaski, J. Kertész, Phys. Rev. Lett. 2007, **99**, 228701.
- [4] G. Iñiguez, T. Govezensky, R.I.M Dunbar, K. Kaski and R. A. Barrio et al., Proc. R. Soc. B 2014, **281**, 20141195.