

Egocentric social networks from communication data

J. Kertesz

*Institute of Physics, Budapest University of Technology and Economics,
8 Budafoki Str., H1111 Budapest, E-mail: kertesz@phy.bme.hu*

The data deluge due to the modern info-communication technology enables unprecedented analysis of social interactions. Most of the studies have dealt with the topology and community structure of the related networks as well as spreading phenomena taking place on them. In sociology, however, one of the focus issues is the understanding of the behavior of the individuals (“ego”-s) in interaction with his/her immediate neighborhood. We analyzed several millions of such egocentric networks by using mobile phone data.

The temporal behavior of the egos is highly inhomogeneous; it can be characterized by bursts. There two main origins of that. The trivial one is the circadian pattern, for which the data can be detrended. The remaining intrinsic burstiness roots in the human behavior. Usually burstiness is characterized by the broad inter-event time distribution. However, this measure does not tell anything about the real correlations between the events. We defined the number of events in a bursty period, which turned out to be sensitive to these intrinsic correlations, moreover, it can be directly related to a memory process. We also show that burstiness is a link property rather than a node one, i.e., bursty trains of activities are localized to a pair of individuals.

Using information about age and gender of the individuals we demonstrate striking sex differences in the pattern in the gender-bias of preferred relationships that reflect the way the reproductive investment strategies of the two sexes change across the lifespan: these differences mainly reflect women’s shifting patterns of investment in reproduction and parental care. The findings support earlier assumptions of evolutionary theory about post-weaning investment, which plays an important role in maximizing fitness.