AKSOE 5 Social-, Information-, and Production Networks II

Time: Tuesday 09:30–10:15   Room: BAR 205

Invited Talk   AKSOE 5.1 Tue 09:30 BAR 205

Communities, weak links, and small world: Empirical analysis of a huge network — •Janos Kertesz[1,2], Jukka-Pekka Onnela[2], Jari Saramaki[2], Jorkki Hyvonen[2], Gabor Szabo[3], and Albert-Laszlo Barabasi[3] — [1]Budapest University of Technology and Economics — [2]Helsinki University of Technology — [3]University of Notre Dame

We study data obtained from a major mobile phone provider which contains records of all phone calls aggregated in periods of two weeks. We construct a network from these data where the nodes are the consumers and the links between them are created if they call each other. The duration of the calls is a natural measure of the intensity of the social relationship between two persons. The weighted network obtained this way consists of more than 7 million nodes which is probably the largest social network, which have been analyzed in detail. Using percolation theory as well as concepts of motif intensity and coherence we identify communities in the network. Such communities are connected by links of high weights while they are bridged by weak links, in good agreement with Granovetter's hypothesis. If in a percolation process is carried out by removing the links in the order of their weights starting with the strongest one, there is no percolation transition in the system, while there is a sharp transition if the procedure is started with the weakest link. Although for 95 % of the links the monotonous relationship between the strength and the overlap of neighbors is verified, a considerable role in intercommunity information transfer is played by strong links with low overlap.