Leader's benefits of network regeneration after consecutive splits

M.J. Krawczyk, K. Kulakowski

Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Krakow, Poland

The idea of the network resistance to attack is well established in literature, and an influence of numerous characteristics of the network topology has been investigated [1]. Up to our knowledge the process of regeneration of a network after its split has not been discussed directly. Here we investigate the evolution of the network structure under periodic splitting and regeneration. The process of splitting once has been considered in [2]. There, the largest hub has been identified as a leader, and links are cut successively as to cut off a rival hub, which is the second largest hub in a distance not smaller than three links. Here the splitting is intended to mimic a conflict between leaders. The regeneration is the grow with or without preferential attachment. Accordingly, we can expect scale-free or exponential topology of the network.

During the grow, some information can be preserved in the network structure. In [3] marks of the shape of the cluster, on which the growth process was initialized, have been encoded in the node-node distance distribution. Here we expect that successive splittings modify the topology of the core cluster with the hub. Our aim is to detect these modifications. To refer to the topology of social networks, the calculations are performed for scale-free and exponential networks with enhanced clusterization coefficient [4].

We measure the parameters of the largest hub: the degree, the closeness centrality and the betweenness centrality. These characteristics have been attributed to measure prestige in a social network [5]. Our numerical results indicate, that both kinds of centrality are strictly correlated. Also, during the consecutive splits and regeneration all the three parameters increase in the long run. These results indicate, that conflicts can be profitable for a leader in a social network. On the other hand, the clustering coefficient of the hub decreases during the simulated process. This result suggests an analogy to the ability of a leader to profit communication through weak ties. Our conclusions can be relevant for an identification of techniques of 'management by conflict'.

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