Cluster Structures in Topology of Large-Scale Social Networks Revealed by Traffic Data

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Abstract: Many studies of social networks have recently been published. Interest in topological structures, such as scale-free characteristics, has been particularly strong. In this paper, we focus on the analysis of macro traffic data in a communications network of cellular phone users as a way of investigating large-scale social networks. Behaviors of information exchange between pairs of cellular phone users are reflected in traffic data, which thus reflects interesting features of social networks. We analyze the relationship between the number of customers and the volume of traffic with a view to finding clues about the structure of social networks among the very large set of potential customers. We then demonstrate some investigating features that our analysis reveals: a scale-free topology of human relations, their cluster structures, and behaviors of user-dynamics. In addition, we consider the relationship between traffic volume and the number of customers depending on the situation.