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"Weak Links and Strong Cliques in Social Networks"

The ubiquity of mobile phones provides an unprecedented opportunity for scientists to collect enormous amounts of quantitative data on human behaviour. We study this complex system within the framework of network theory using thresholding analysis. This simple new method, which may be applied to any weighted network, reveals the different structural and functional roles played by links of different weights. On removing the weak links, the system undergoes a phase transition at the critical threshold, as witnessed by different percolation and network characteristics. If, however, strong links are deleted first, the network is very robust and dies out without exhibiting a transition. These results are related to Mark Granovetter's well-known hypothesis on weak ties.
Using the largest weighted social interaction network studied so far, we also provide a direct empirical verification for both the hypothesis and its corollary. Since most human activities take place within an evolving social network, the results shed new light on the structural organisation of societies with direct implications for various spreading phenomena from viruses to opinions.