Structure and tie strengths in mobile communication networks

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Abstract

Electronic databases, from phone to emails logs, currently provide detailed records of human communication patterns, offering novel avenues to map and explore the structure of social and communication networks. Here we examine the communication patterns of millions of mobile phone users, allowing us to simultaneously study the local and the global structure of a society-wide communication network. We observe a coupling between interaction strengths and the network's local structure, with the counterintuitive consequence that social networks are robust to the removal of the strong ties, but fall apart following a phase transition if the weak ties are removed. We show that this coupling significantly slows the diffusion process, resulting in dynamic trapping of information in communities, and find that when it comes to information diffusion, weak and strong ties are both simultaneously ineffective.