Why rumors spread fast in social networks

May 21 2012

Information spreads fast in social networks. This could be observed during recent events. Now computer scientists from the German Saarland University provide the mathematical proof for this and come up with a surprising explanation.

"It is fascinating," Tobias Friedrich of the Cluster of Excellence on "Multimodal Computing and Interaction" says. He points out that so far, it has been assumed that the uncontrolled growth in social networks creates a structure on which information spreads very fast. "But now we can prove it in a mathematical way," says Friedrich, who leads the independent research group "Random Structures and Algorithms."

Together with his research colleagues Benjamin Doerr, adjunct professor for algorithms and complexity at Saarland University, and the PhD student Mahmoud Fouz he proved that information spreads in social networks much faster than in networks where everyone communicates with everyone else, or in networks whose structure is totally random.

The scientists explain their results through the successful combination of persons with many contacts and persons with only a few contacts. "A person who keeps only a few connections can inform all of these contacts very fast," Friedrich says. Additionally, it can be proved that among these few contacts there always is a highly networked person who is contacted by a lot of other people in the social network, the scientist points out. "Therefore everybody in these networks gets informed rapidly."

To model how people connect with each other in a social network, the scientists chose so-called preferential attachment graphs as a basic network model. It assumes that new members of a social network would more likely connect to a person maintaining many connections than to a person with only a few contacts. The communication within the network is based on the model that every person regularly exchanges all information with his or her contacts, but never speaks to the person contacted in the previous communication round.

More information: It took the scientists twelve pages to write down the mathematical proof. They explain the concept of the proof more simply in the article "Why Rumors Spread Fast in Social Networks," published in the peer-reviewed magazine *Communications of the ACM* in June.

See also:
Social Networks Spread Rumors in Sublogarithmic Time www.mpi-inf.mpg.de/~tfried/paper/2012CACM.pdf

Provided by Saarland University