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Researchers Draw Romantic Insights From Maps of Facebook Networks

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It's not in the stars after all. Instead, it seems, the shape of a person's social network is a powerful signal that can identify one's spouse or romantic partner — and even if a relationship is likely to break up.

So says a new research paper written by Jon Kleinberg, a computer scientist at Cornell University, and Lars Backstrom, a senior engineer at Facebook. The paper, posted online on Sunday, will be presented at a conference on social computing in February.

The pair used a hefty data set from Facebook as their lab: 1.3 million Facebook users, selected randomly from among all users who are at least 20 years old, with from 50 to 2,000 friends, who list a spouse or relationship partner in their profile. That makes for a lot of social connections to analyze, roughly 379 million nodes and 8.6 billion links. The data was used anonymously.

Their key finding was that the total number of mutual friends two people share — embeddedness, in social networking terms — is actually a fairly weak indicator of romantic relationships. Far better, they found, was a network measure that they call dispersion.

This yardstick measures mutual friends, but also friends from the further-flung reaches of a person's network neighborhood. High dispersion occurs when a couple's mutual friends are not well connected to one another.

In the graphic of one person's network neighborhood (above), the cluster at the top is the individual's co-workers. The cluster at the right is old college friends. The node (friend) in the lower left quadrant of the graphic, with links to the two dense clusters — but at a distance from those clusters — is the user's spouse.

"A spouse or romantic partner is a bridge between a person's different social worlds," Mr. Kleinberg explained in an interview on Sunday.

Their dispersion algorithm was able to correctly identify a user's spouse 60 percent of the time, or better than a 1-in-2 chance. Since everyone in the sample had at least 50 friends, merely guessing would have at best produced a 1 in 50 chance. The algorithm also did pretty well with people who declare themselves to be "in a relationship," correctly identifying them a third of the time — a 1 in 3 chance compared with the 1 in 50 for guesswork.

Particularly intriguing is that when the algorithm fails, it looks as if the relationship is in trouble. A couple in a declared relationship and without a high dispersion on the site are 50 percent more likely to

break up over the next two months than a couple with a high dispersion, the researchers found. (Their research tracked the users every two months for two years.)

For Facebook, the research is part of its automated efforts to look more closely at the relationships among its users to tailor content and ads. Mr. Backstrom is the engineering manager in charge of Facebook's News Feed, which delivers content from a user's friends.

The more Facebook knows about a user's relationships, the more appropriately tailored the News Feed can be. Do you want to see pictures of a child's swimming lesson yesterday? Probably yes, if it's from a family member or close co-worker, but probably not from someone on the fringes of your network of 2,000 "friends."

So much of social-network analysis confirms what we already know. Relationships that last are ones in which the other person widens our world? Well, yes. Still, it's kind of nice to have it confirmed with lots of data and algorithms. "We hadn't had this view of it before," Mr. Kleinberg observed.