

A system detects global trends in social networks two months in advance

April 28 2014

A new method of monitoring identifies what information will be relevant on social networks up to two months in advance. This may help predict social movements, consumer reactions or possible outbreaks of epidemics, according to a study in the Universidad Carlos III of Madrid (UC3M) is participating.

The aim of the research, on which scientists from the Universidad Autónoma of Madrid, the NICTA of Australia, and the American universities Yale and the University of California-San Diego have also collaborated, was to test what is known as the "sensors hypothesis" on the social networks: Is it possible to find a group of people (sentinels or sensors) with a special position that would allow the information that "goes viral" globally on the internet to be monitored? "If we could do that, we would be able to predict that viral spread, which would allow us to better understand social mobilization, debates regarding opinions, health, etc., and to determine how they become global," explains one of the researchers, Esteban Moro Egido, of the Interdisciplinary Complex Systems Group at UC3M (Grupo Interdisciplinar de Sistemas Complejos).

To do this, the scientists made use of one of the properties of the social networks that can also be observed in Twitter; it is known as "the friendship paradox": your friends have, on average, more friends than you. In the case of Twitter, after analyzing a sample of data from 40 million users and 15 billion followers in 2009, the researchers were able to show that each user had an average of 25 followers, who in turn had

an average of 422 followers, that is, almost twenty times as many. "This means that a person's followers have a role in a social network that makes them very relevant when it comes to spreading or receiving information," explains another of the researchers, Manuel García Herranz, of the Computer Engineering Department at the Universidad Autónoma of Madrid.

What they have done in this study, which has been published in the journal *PLoS ONE*, is to randomly select a group of users and take some of their followers as the sensor group. And what they have found out is that those "sensor-friends" play a more important role than what was previously believed, because they receive information long before the previously chosen users. "We were really surprised. We thought the method would give us a few hours early warning, but instead it gave us several days, and sometimes even weeks or months," says co-senior author of the authors, James Fowler, professor of medical genetics and political science at the University of California-San Diego (USA). For example, the sensor model predicted the "viral" rise of the hashtag "#Obamacare" as a Twitter trend, detecting it two months before it peaked on Twitter, and three months before it reached the highest number of Google searches with that name.

Simple and effective

In general, this new method turns out to be very simple and effective for monitoring social networks, according to its creators. Data from just 50,000 Twitter is enough to achieve these levels of prediction and to know what will "go viral" across the entire Internet. It can be used in real time, about different topics, in different languages and geographical areas, thus allowing for different contexts to be covered: discovering new opinions in a political debate, predicting [social movements](#), obtaining previous knowledge of consumers' reactions to new products, or analyzing how messages regarding certain illnesses or epidemics are

spread in the public health arena.

This system has certain limitations. It cannot predict how information associated with a particular event, such as a football match, or daily news or natural disasters is going to spread "virally", the scientists warn. However, there are other types of news that it is able to predict, such as social movements (the 15M in Madrid) or ideas that have been moving around the web for a while on a small scale and then later reach the general public. "We found that monitoring social media in this manner offers a whole new way of monitoring the global spread of information about all sorts of topics," comments another one of the researchers, Nicholas Christakis, co-director of the Yale Institute for Network Science, USA. This is undoubtedly a new way of predicting the future by analyzing the data that circulates on the social networks.

More information: Garcia-Herranz M, Moro E, Cebrian M, Christakis NA, Fowler JH (2014). Using Friends as Sensors to Detect Global-Scale Contagious Outbreaks. *PLoS ONE* 9(4): e92413. Published 09 Apr 2014. [DOI: 10.1371/journal.pone.0092413](https://doi.org/10.1371/journal.pone.0092413)

Provided by Carlos III University of Madrid

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