УДК004.946
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HOW SOCIAL NETWORKS PREDICT EPIDEMICS

As social networks become emerging platforms that people connect, communicate and share, there is tremendous knowledge on social networks and the online social structures reflect the social relations. Social role and status is one primary concept on individual users of a society. Social roles and statuses are defined as the part that people act as members in the society. They represent the degree of honor or prestige attached to the position of each individual [1].

In online social networks, people behave differently in social situations because they carry different latent social roles and statuses, which entail various expectations that society puts on them. There are diversified roles and statuses on different social network platforms. For example, the social roles in Twitter can be advertiser, company supporter, content contributor, information receiver, etc; the social roles in the professional network Linked in can be engineer, salesperson, recruiter, manager, etc. Studying social roles and statuses is very helpful to gain the insights of the whole society as well as manage social resources at the individual level. Understanding social roles and statuses is crucial to many social network applications, including advertising targeting, marketing, personalization, recommendation, etc.

Analysis of the records of **Twitter** users enables to predict the movement of **market indices** with 70 percent accuracy, Russian economists discovered. It turns out that psychological state of people closely related with their economic behavior. Thus, an abundance of tweets with the words "fear", "excitement" and "hope" foreshadows the imminent downtrend of market quotes.

For the first time the idea to predict epidemics by using social media appeared a few years ago.

When it comes to the influence of social networks, Prof. Christakis's research has shown that it obeys a rule called "Three Degrees of Influence", which means that everything we do tends to ripple and flow through our social network, having an impact on our friends (one degree), our friends' friends (two degrees), and then our friends' friends' friends (three degrees).

In other words, behaviors of the friends of your friends' friends can predict your behavior.

For example, obesity can be contagious, according to his study.

"If your friends are obese, your risk of obesity is 45 percent higher. And if your friend's friends are obese, your risk of obesity is 25 percent higher. And then if your friend's friend's friend, someone you probably don't even know, is obese, your risk of obesity is still 10 percent higher," he said.

"It's only when you get to your friend's friend's friend's friends that there's no longer a relationship between that person's body size and your own body size," he said.

As a matter of fact, the principle of "Three Degrees of Influence" applies broadly in social phenomenon of predicting epidemics. So what is the mechanism behind it? According to Prof. Christakis, there are at least three reasons for such phenomenon.

"One possibility is a kind of induction or spread from person to person, like my weight gain is causing your weight gain. For example, your friends say to you: "Let's go have muffins and beer". You follow along and start gaining weight like them. Another more subtle possibility is that they start gaining weight, and it changes your idea of what an acceptable body size is. What's spreading from person to person is not a behavior, but rather a norm: An idea is spreading."

A research team tested the idea with an outbreak of H1N1 flu at Harvard College in the fall and winter of 2009. They took 1,300 randomly selected undergraduates and asked them to nominate their friends. And then they followed both the random students and their friends daily in time to see whether or not they had the flu epidemic by looking at whether or not they had gone to university health services. And also, they asked the students and their friends to email them a couple of times a week. In the end, exactly what they predicted happened. By monitoring the friends group, they could get 16 days advance warning of an impending epidemic in this human population.

By learning about the structure of various networks, we can identify where the hubs are, those who are likely to spread an idea or behavior quickest, and intervene at those points to stop the spread of an unhealthy behavior, or to promote a positive one, or to facilitate the diffusion of innovation or coordination in groups.

By understanding our social networks and how valuable they are, it's possible for us to improve the society and human well-being.

REFERENCES

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