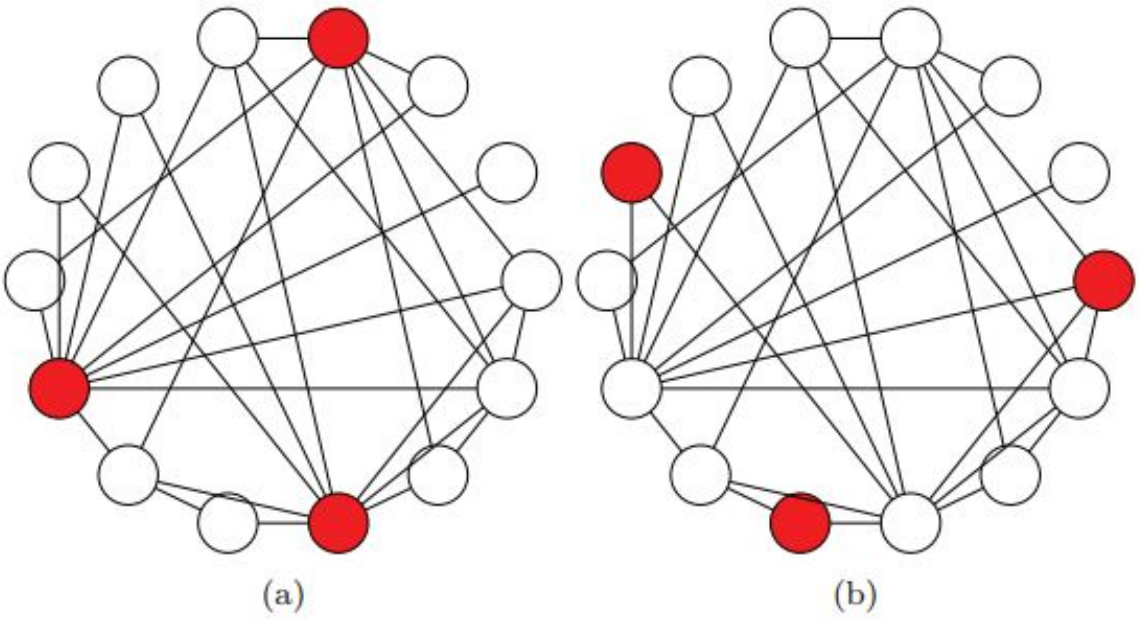
A social-network illusion that makes things appear more popular than they are

July 3 2015, by Bob Yirka



An illustration of the “majority illusion” paradox. The two networks are identical, except for which three nodes are colored. These are the “active” nodes and the rest are “inactive.” In the network on the left, all “inactive” nodes observe that at least half of their neighbors are “active,” while in the network on the right, no “inactive” node makes this observation. Credit: arXiv:1506.03022 [cs.SI]

A trio of researchers at the University of Southern California has uncovered a social-network illusion that might explain why some things

become popular in cyberspace while others do not. Kristina Lerman, Xiaoran Yan and Xin-Zeng Wu have written a paper describing the illusion and how it works and have posted it on the preprint server *arXiv*.

Social networks are not new of course, they have been going on for thousands of years, if not longer—what is new is the venue and size. As they have grown online, scientists have begun studying them in earnest and have found some interesting things, one of which is the friendship paradox—where any given person's "friends" will have more friends than they have. This illusion is created by the slewing of the average by one or more friends that have a lot of friends. And it is not restricted to just friending sites, studies have shown that for the average Twitter user, their friends will Tweet more than they do, and again, it is an illusion that comes about due to slewing by just a few other users. In this new effort, the researchers have found a similar illusion, where ideas, photos or other information can appear to be much more popular than they really are.

The illusion comes about, the team explains, due to just a few nodes (people) having links to a lot of others—they provide an illustration of two views of a simple 14-node network, the only difference between them is that different nodes have been colored red. In one view, nodes with multiple links have been colored, in the other, those with just a few links have been colored. The researchers then suggest the viewer consider the perspective of nodes that are not colored, under the first scenario—any of them will see whatever message is being given by one of the more popular (red) nodes—and that is where the illusion occurs. In the real world, it appears possible that such networks would allow something to seem much more popular than it really is, because it is being disseminated by just a few well-connected nodes, whether it is a video of a cat doing something stupid, or a minority opinion about a well known topic.

More information: The Majority Illusion in Social Networks, arXiv:1506.03022 [cs.SI] arxiv.org/abs/1506.03022

Abstract

Social behaviors are often contagious, spreading through a population as individuals imitate the decisions and choices of others. A variety of global phenomena, from innovation adoption to the emergence of social norms and political movements, arise as a result of people following a simple local rule, such as copy what others are doing. However, individuals often lack global knowledge of the behaviors of others and must estimate them from the observations of their friends' behaviors. In some cases, the structure of the underlying social network can dramatically skew an individual's local observations, making a behavior appear far more common locally than it is globally. We trace the origins of this phenomenon, which we call "the majority illusion," to the friendship paradox in social networks. As a result of this paradox, a behavior that is globally rare may be systematically overrepresented in the local neighborhoods of many people, i.e., among their friends. Thus, the "majority illusion" may facilitate the spread of social contagions in networks and also explain why systematic biases in social perceptions, for example, of risky behavior, arise. Using synthetic and real-world networks, we explore how the "majority illusion" depends on network structure and develop a statistical model to calculate its magnitude in a network.