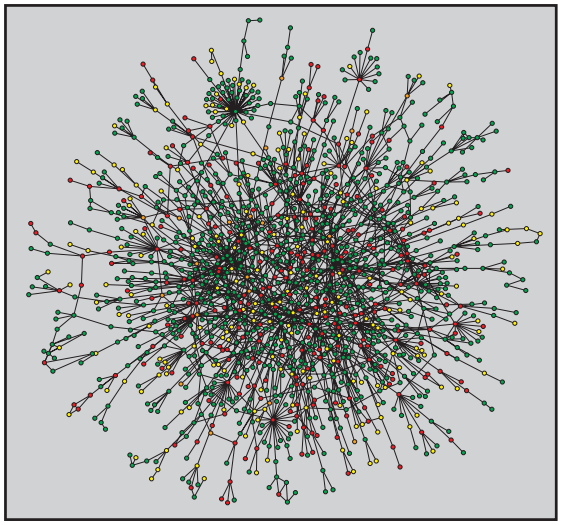
Making Connections

People in a society, neurons in the brain, and pages on the Web, along with their connections, are all examples of networks. Mathematicians study characteristics of networks, such as the number and distribution of connections, to discover what such attributes may reveal about the intrinsic nature of a network. For example, the colors in the picture below indicate how disruptive deleting a node would be to the network, in this case a living cell. The discovery and verification of network properties such as this has significance for applications ranging from the microscopic to the worldwide, including the protection of both computers and humans against viruses.

The study of networks spawned the phrase "six degrees of separation", the theme of a game involving actors' connections via common film appearances. In an experiment done in the 1960s, over 100 randomly chosen people in the Midwest were found to be connected to a Massachusetts stockbroker (by a friend of a friend of a friend, and so on) in an average of just six steps. That people halfway across the country could be so closely connected was quite a revelation and proved that even a large network could be a "small world". Today, researchers use parameters from graph theory and probability in analyzing networks to determine whether an elaborate network, be it a power grid or actors connecting to Kevin Bacon, is indeed a small world after all.

For more information: "Scale-Free Networks", by Albert-László Barabási and Eric Bonabeau, *Scientific American*, May 2003



Image, protein-protein interactions, courtesy of:
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