Friendship Paradox: Instructions

In this activity module, we will introduce students to the Friendship Paradox discovered by Scott Feld in 1991, that most people have fewer friends than their friends. The main objectives are to help students realize that things on networks may sometimes appear or behave counter-intuitively, and also to help them learn how to do some basic statistical analysis (e.g., counting, calculating averages, comparing values, etc.).

The instructor will first mention to students that they will study the number of friends in this activity. Students will be instructed to write names of their close friends in a piece of paper (this information doesn't have to be shared with others). Then they will count how many friends they are able to list.

Next, students will be instructed to write how many friends each of their friends they think has, next to the names. If this is difficult, they can just indicate "more than mine" ("+") or "fewer than mine" ("-"). Once this is over, they will calculate the average of those numbers (or the fraction of "+"s) and compare the result with the number of their own friends. About five to ten minutes will be spent to discuss the result they obtained and what they think about it.

The instructor will then circulate the handout of the Friendship Paradox. He/she will explain what this paradox is about, and how its implication compares with what the students discovered in the activity above. A few minutes will be used for Q&A's on the paradox.

The instructor will then circulate the diagram of the Karate Club network and assign each student to a task to calculate (1) the degree and (2) the average neighbor degree for one or two nodes in this network. Students will work on the task and report their results to the instructor, who will enter the results into a spreadsheet.

Once all the results are in, the instructor will calculate (1) the global average node degree and (2) the global average neighbor degree to show that the latter is much larger. Real world implications and applications will be discussed, followed by free Q&A's to wrap up the activity.

Friendship paradox

From Wikipedia, the free encyclopedia

The **friendship paradox** is the phenomenon first observed by the sociologist Scott L. Feld in 1991 that most people have fewer friends than their friends have, on average.[1] It can be explained as a form of sampling bias in which people with greater numbers of friends have an increased likelihood of being observed among one's own friends. In contradiction to this, most people believe that they have more friends than their friends have.[2]

(snip)

Mathematical explanation[edit]

(snip)

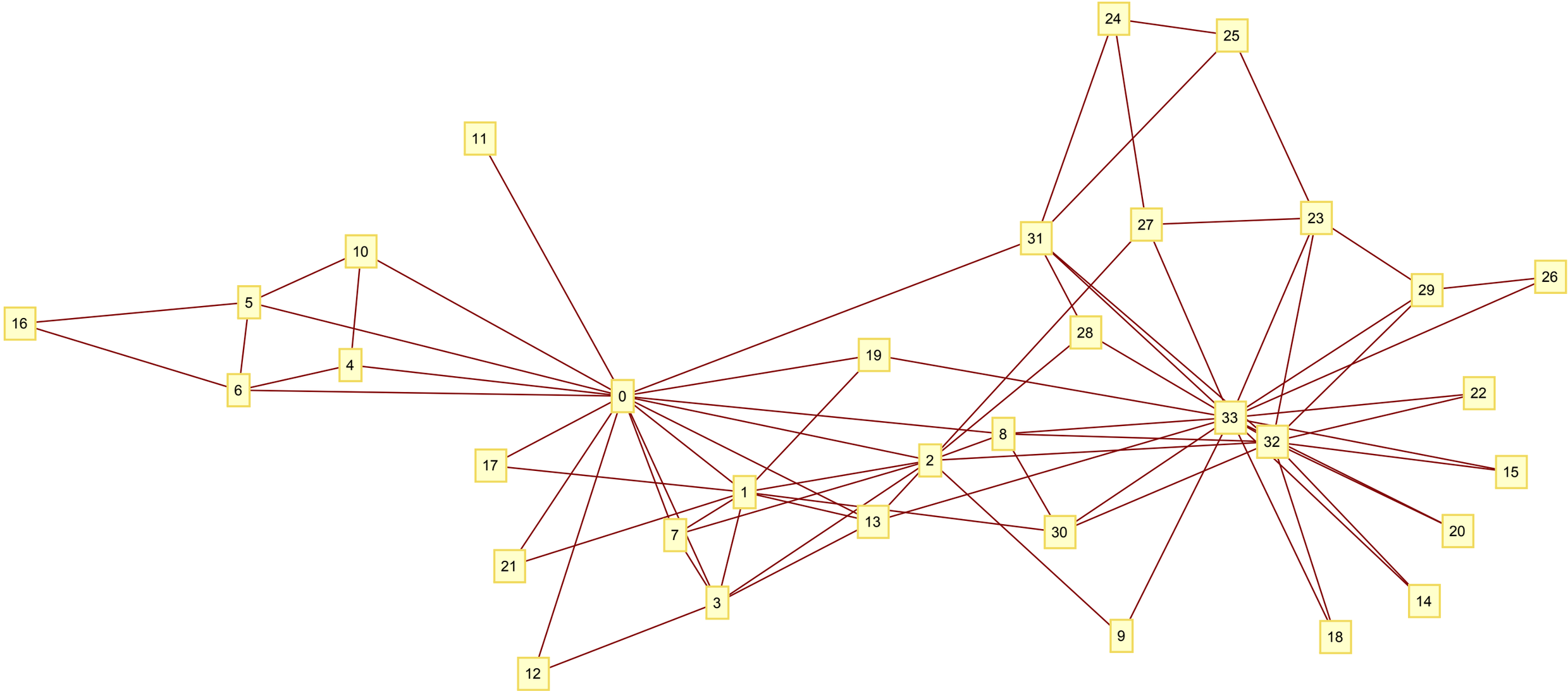
Intuitive explanation[edit]

People with more friends are more likely to be your friend in the first place; that is, they have a higher propensity to make friends in the first place. Another example deals with Twitter: The people a person follows almost certainly have more followers than they. This is because people are more likely to follow those who are popular than those who are not. Thus, over 98% of users are subject to the friendship paradox.[5]

Applications[edit]

The analysis of the friendship paradox implies that the friends of randomly selected individuals are likely to have higher than averagecentrality. This observation has been used as a way to forecast and slow the course of epidemics, by using this random selection process to choose individuals to immunize or monitor for infection while avoiding the need for a complex computation of the centrality of all nodes in the network.[6][7][8]
A PLoS One study found that those in the center of their social networks can detect flu outbreaks almost 2 weeks before traditional surveillance measures can. They found that using the Friendship paradox to analyze the health of central friends is "an ideal way to predict outbreaks, but detailed information doesn't exist for most groups, and to produce it would be time-consuming and costly." [9]

The "generalized friendship paradox" states that the friendship paradox applies to other characteristics as well. For example, your co-authors are on average likely to be more prominent than you, with more publications, more citations and more collaborators [10][11] or your followers on Twitter have more followers than you.[12]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