CIS-677: Knowledge-Based Interfaces
Homework #6

Mojtaba Torkjazi
moji@cs.uoregon.edu

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(a) Who are important individuals within Twitter who are paid attention to by lots of others, who are themselves paid attention to by lots of others? An analytical technique to measure the importance of a particular user is eigenvector centrality which is borrowed from the web domain. For example, this measure can have potential importance for identifying spammers. Spammers usually have a few number of followers, or they may be followed by a large number of people who are relatively unimportant or have few followers. This in turn means that spammers may have much lower eigenvector centrality compared to normal users.

(b) In addition to importance, we might be interested in how individuals’ position in the network affect their access to information? This question is potential starting point for advertising strategies by which a company can better spread its ads using central individuals. Generally, betweenness centrality measures the centrality of an individual within a network. If an actor has high betweenness, this means that a lot of non-redundant information passes through him; i.e., he is bridging between different parts of the network.

(c) Another interesting research question is to study asymmetric connections of individuals. Asymmetric attention is the key to another important concept, celebrity. Being famous means that a lot of people pay attention to you, but the celebrity does not, for most part, pay any attention to the fans. This can be interpreted to this observation that users with very low percentage of reciprocal connections may be celebrities.

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Figures 1(a) and 1(b) show my Twitter 1.5 and 2.0 ego networks, respectively. I just focus on the 1.5 ego network because I care more about connection between my friends/followers.

Size of each vertex is mapped to vertex eigenvector centrality to show the importance of users. Also, darker vertices have higher betweenness centrality which means that they are potential bridges between different parts of the graph. I hide my corresponding vertex for a better visualization and also I skip individuals with no friends/followers.

I have found that Houman, an old friend of mine (the large dark vertex at the top left star of Figure 1(a)), has a very important role in my 1.5 ego network. It means if I want to leverage my Twitter network for better propagating a piece of information, I may contact Houman for his help.

Note: An individual with high eigenvector centrality or high betweenness centrality in a 1.5 ego network does not necessarily have the same level of importance in larger views of the network. i.e., when we expand our snapshot to ≥ 2.0 ego networks, importance of an individual may increase or decrease according to her
position within the bigger picture of the network.

Figure 1: My corresponding vertex is not shown in these figures for a better visualization. Vertex size is based on the log of the eigenvector centrality (2.0 to 6.0). Vertex opacity is based on the log of the betweenness centrality (30 to 100). Log of the relationship age is mapped to edge width (2.0 to 6.0).

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Instead of “Black Friday” topic network, I downloaded the topic network of #iranelection as shown in Figure 2. In this figure, different clusters are represented by unique color and shape. Also, size of vertices is based on the log of their eigenvector centrality which means the larger a vertex is, the more important it is in this network.

Figure 2: Twitter network for #iranelection after applying the Find Clusters feature. Vertex size is based on the log of the eigenvector centrality (2.0 to 6.0). Vertex opacity is based on the log of the betweenness centrality (30 to 100).

A few interesting patterns of information propagation is visible in this network. Comparing #iranelection with Black Friday, fewer “star” structure appears in the network of #iranelection. Moreover, it is clear in Figure 2 that this topic is propagated more effectively through clusters of people than by celebrities (stars).

The “Green Movement”, who are the main protesters to the results of 2009 presidential election in Iran, always claims that we do not have specific leaders while emphasizing that all Iranians around the world are responsible to make this awareness. Analyzing the topic network of #iranelection clearly supports this claim as we do not see obvious star-like structures in this network.
Twitter can be thought of as a conversational microblog. A user is able to make a conversation about a topic with a group of other users. You may something to somebody (@replies) or say something about somebody (@mention). When you are talking about something, you are probably using Twitter #hashtag feature. When you are retweeting a tweet, you are actually sharing an idea with your followers. Your followers are those people who are interested in what you think/say. Likewise, you are following those individuals whom you find interesting. Finally, if you would like to gossip about a person with a group of your friends, you can directly send them a private message.