

Introduction to Network Analysis

Homework 0

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1 Network software

The Zachary karate club network has 34 nodes and 78 edges. My visualization can be seen in the figure [1](#).

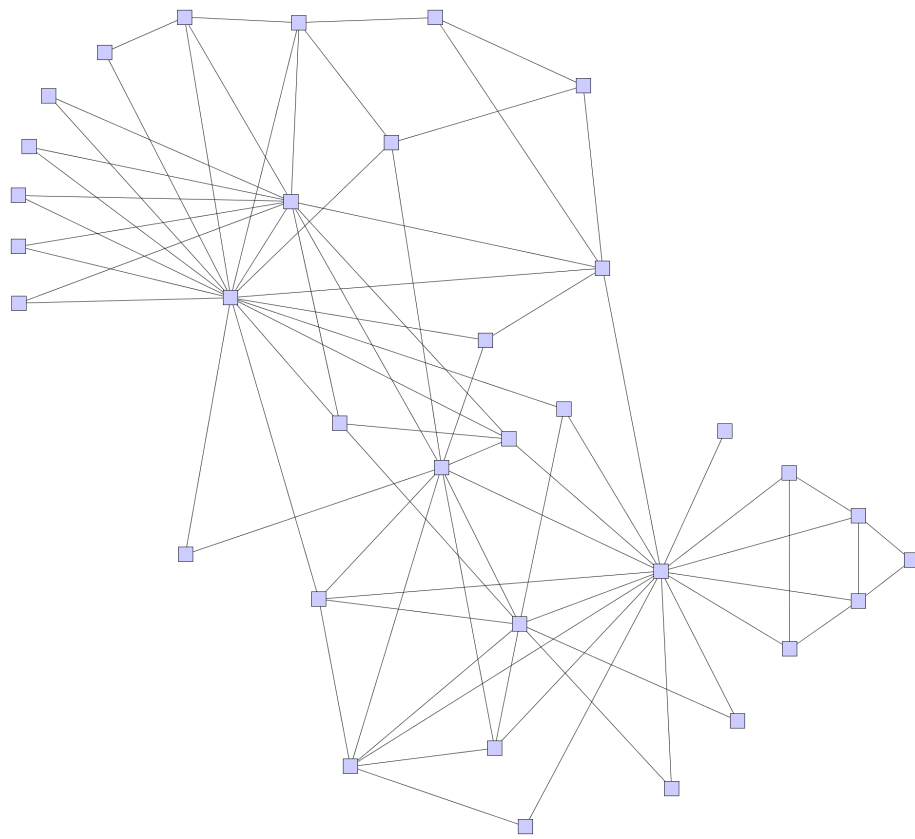


Figure 1: The Zachary karate club network.

2 Network collection

2.1 Your own network

Our network consists of friends list from [Facebook](#). It has 4039 nodes and 88234 edges. The average node degree of this network is 43.69.

2.2 Synthetic graphs

The required parameters in Erdős-Rényi random graph generated with function *gnm_random_graph* from package *networkx* are number of nodes (4039) and number of edges (88234). The average node degree of this network is 43.69.

3 Network analysis

3.1 PageRank algorithm

Table 1 represents the nodes in our network with the highest PageRank score. As we can observe, the most important nodes have high degrees, however in my opinion the most important node in this network is not the one that has the highest degree, but the one has the smallest distance to all other nodes. The first four nodes are equally important, however the difference between first and tenth node is significant (approximately 6.5 times).

Node ID	PageRank score	Node degree
3537	0.00762	547
107	0.00694	1045
1684	0.00637	792
0	0.00629	347
1912	0.00388	755
348	0.00235	229
686	0.00222	170
3980	0.00217	59
414	0.00180	159
698	0.00132	68

Table 1: PageRank score for our network.

3.2 Network vs graphs

Table 2 represents the nodes in our random graph with the highest PageRank score. As we can observe, the most important node is the one with highest degree. the difference between first and tenth node is almost negligible. In comparison, the PageRank score of the most important node is 3.5 times smaller then the tenth most important node in previous section.

Node ID	PageRank score	Node degree
1660	0.000374	70
3571	0.000360	67
2477	0.000359	67
983	0.000359	67
1071	0.000355	66
3726	0.000345	64
1023	0.000345	64
893	0.000345	64
3601	0.000345	64
4021	0.000344	64

Table 2: PageRank score for random graph.