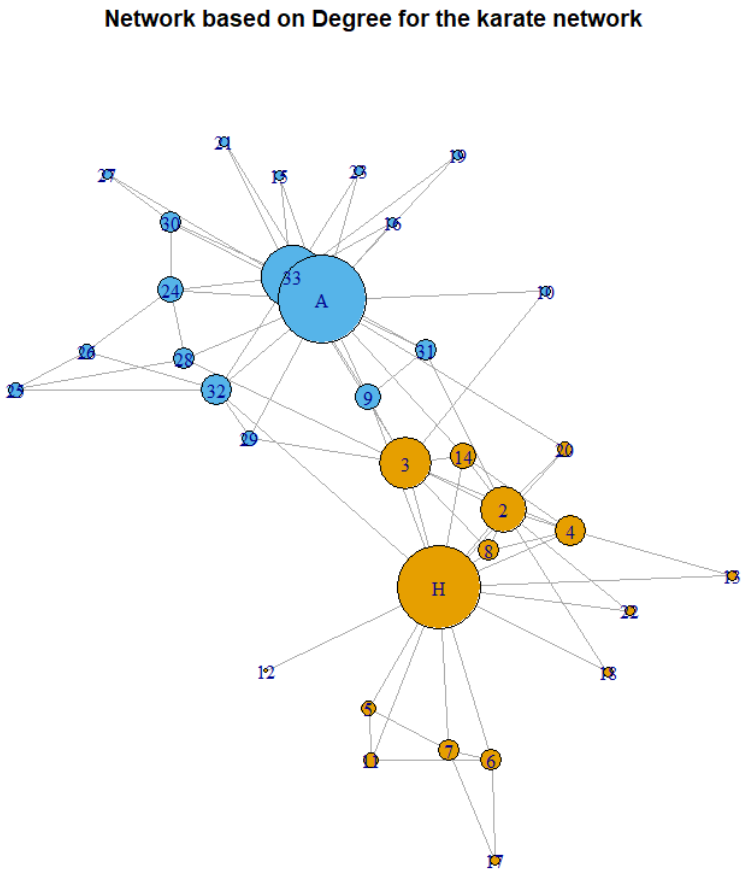
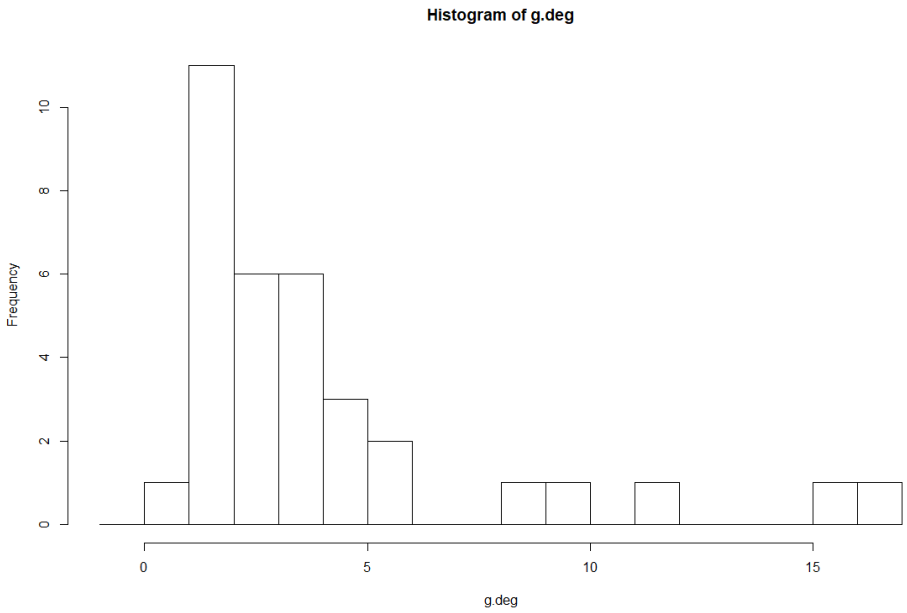
CS-7863 Homework #1 Noah Schrick

Networks Used: Karate and Yeast

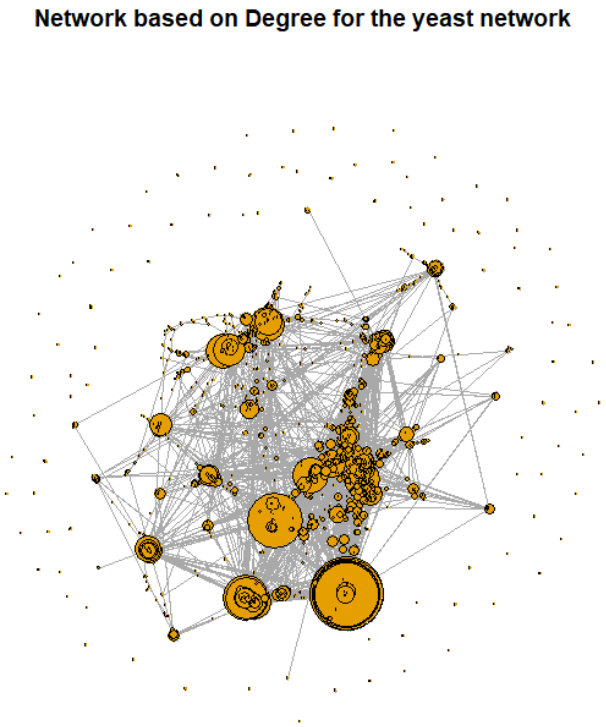
Degree Centrality Results

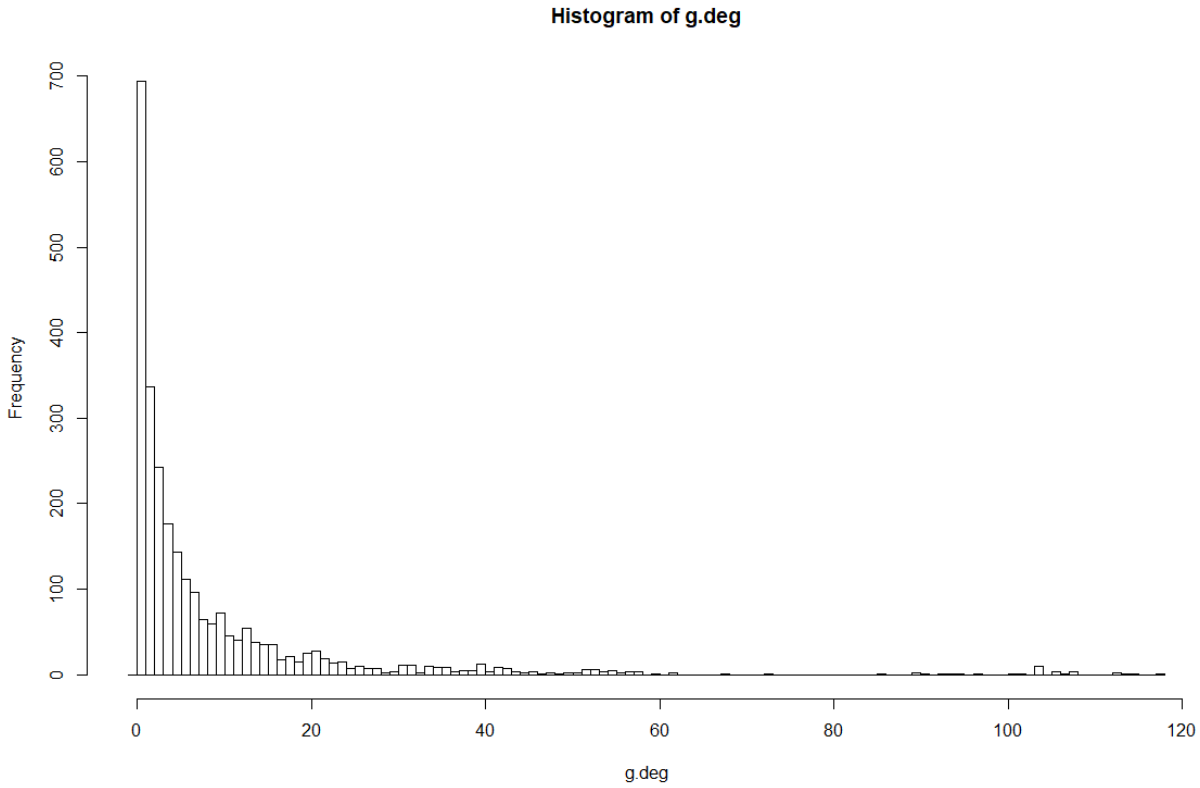
Result Display: Plotting the network and scaling the size based on degree of vertices.
Karate




Histogram of g.deg
Frequency
0
2
4
6
8
10
0
5
10
15
g.deg

Yeast


Network based on Degree for the yeast network

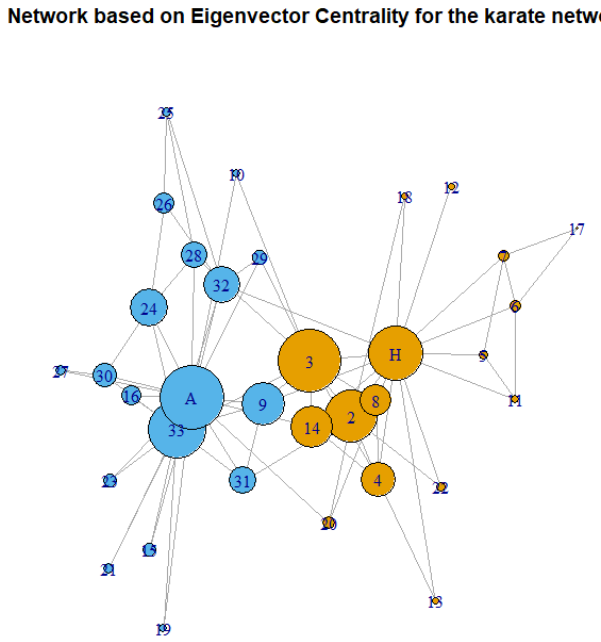


Of interest is the very large discrepancy in terms of vertex degree. An overwhelming majority of vertices have a degree of less than 10, in a network with 2,617 total vertices. 694 vertices (26.5%) have a degree of only 1. A total of 65.2% of the vertices have a degree of 6 or less.

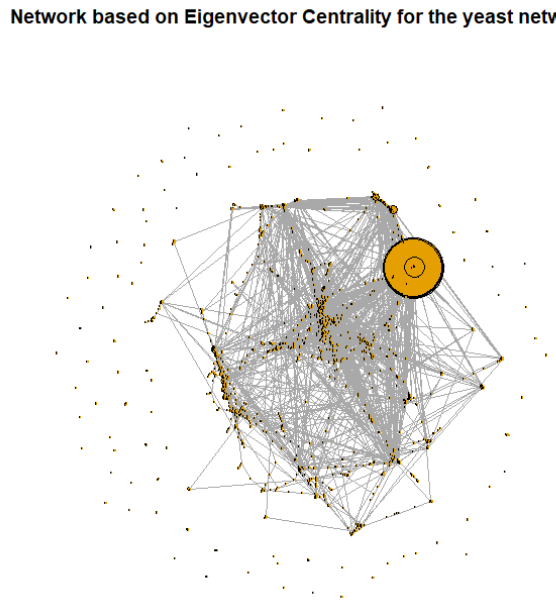
Eigenvector Centrality Results

Result Display: Plotting the network and scaling the size based on eigenvector centrality.

Karate



Yeast

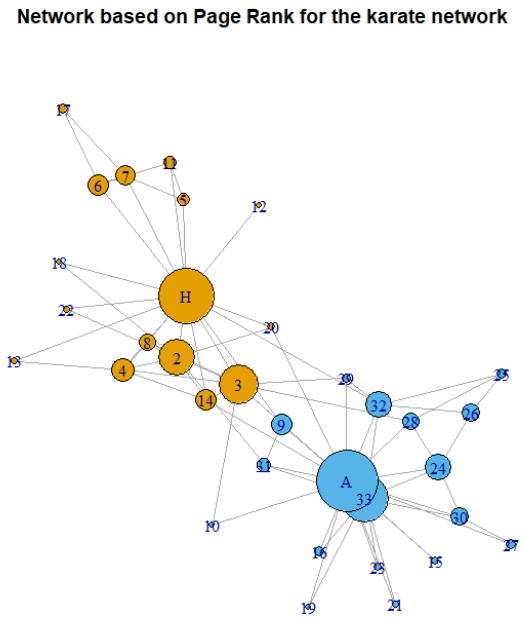


Of interest is the difference between the vertex with the highest eigenvector centrality value, and the second-highest eigenvector centrality value vertex. The highest value is 0.01249941, and the second highest is 0.00194074, a 146.24% percent difference.

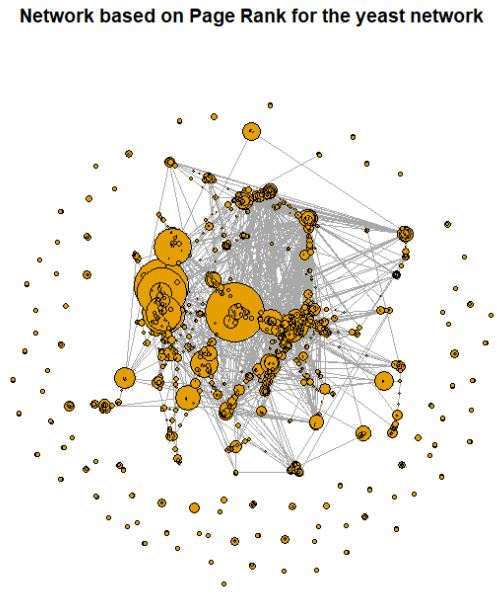
Page Rank Centrality Results

Result Display: Plotting the network and scaling the size based on page rank.

Karate



Yeast

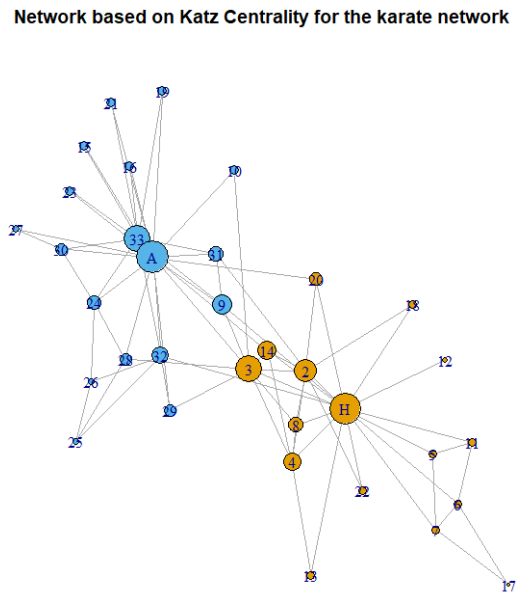


Of interest is the difference in ranking spread in Page Rank versus that in eigenvector centrality for the yeast network. The island nodes also have quite a variety in value, with some having values higher than those located in the cluster itself.

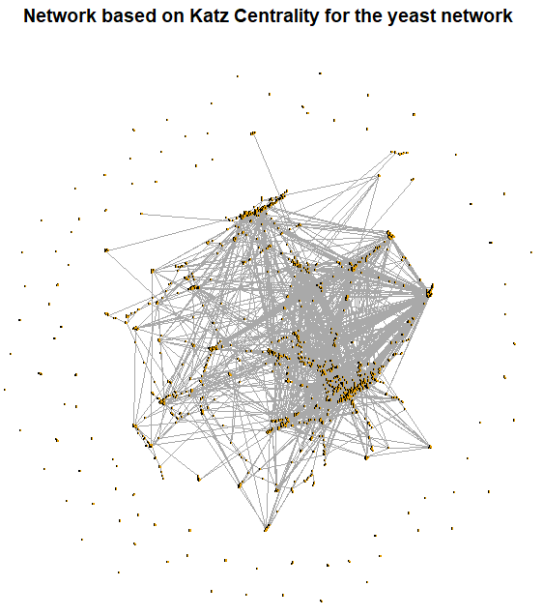
Katz Centrality Results

Result Display: Plotting the network and scaling the size based on Katz centrality.

Karate



Yeast



Poor scaling on my part in regard to vertex sizes. Of interest is the very different “highest ranking” vertices in Katz vs Page Rank. The table below illustrates this. The top 7 highest ranking nodes in Katz vs Page Rank for the Yeast network are completely separate, providing a claim that the centrality system used for analysis should be considered and based on the situation.

Comparison

Karate

Rank	Degree	Eigenvector	Page Rank	Katz
1	John A	John A	John A	John A
2	Mr Hi	Actor 3	Mr Hi	Mr Hi
3	Actor 33	Actor 33	Actor 33	Actor 3
4	Actor 3	Mr Hi	Actor 2	Actor 33
5	Actor 2	Actor 2	Actor 32	Actor 2
6	Actor 32	Actor 9	Actor 24	Actor 9
7	Actor 4	Actor 14	Actor 4	Actor 14

John A remains the top rank across all centrality algorithms, however Mr Hi ranks second in all but eigenvector centrality, where he drops to rank 4. Actor 3 is ranked second in eigenvector centrality, 4th in degree centrality, 3rd in Katz, but does not make the top 7 for Page Rank. The list is fairly consistent across all centrality algorithms, in that there is a fair amount of overlap in actors who make the top 7 list.

Yeast

Rank	Degree	Eigenvector	Page Rank	Katz
1	YPR110C	YPL131W	YNL189W	YPL131W
2	YPL131W	YNL178W	YER016W	YNL178W
3	YNL178W	YOL127W	YNL271C	YOL127W
4	YIL021W	YBR283C	YDL029W	YLR378C
5	YOL127W	YLR378C	YKL113C	YBR283C
6	YJL063C	YNL284C	YBR234C	YGL103W
7	YBR283C	YGL103W	RLY423C	YNL284C

Of interest is that the top 7 for Page Rank and Katz are completely different, and there is no overlap in vertices. Eigenvector centrality and Katz for the top 7 are very similar, both in that there is overlap in the vertices present, but also in their rankings.