Data Analytics - Assignment III

Anup Patel (Sr.No. - 15474)
M.tech CSA

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1 Community Detection using Fiedler Vector

Identify the two communities in the dolphins data set by obtaining the Fiedler vector of the normalised Laplacian. Provide a visualisation of the outcome so that the names of the dolphins, the network, and the two communities are clearly visible. Indicate the approach you have taken in light of the fact that the two communities are of different sizes.
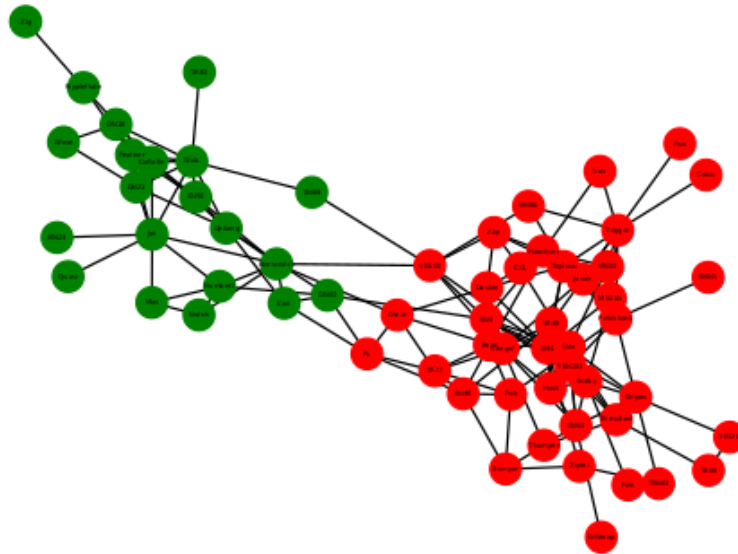**This is how graph looks like:**
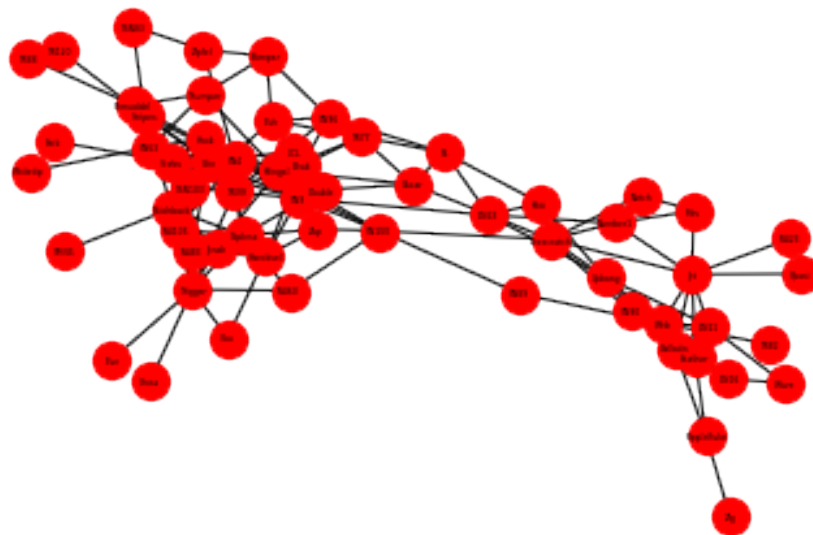
Approach

- Read graph using *networkx* package

- Compute Normalized laplacian matrix using *networkx* package.

- Find Eigen vector corresponding to second smallest eigen value i.e, fiedler vector.

- After getting fielder vector, use K-means to cluster them into two community.

Result

2 Community Detection using Louvain Method

Use the Louvain method to identify the two communities. Provide a picture similar to the one you generated in question 1 i.e through fiedler vector.

Approach

- Read graph using *networkx* package

- Find best partition using **community-louvain** package.

- Find modularity of each combination in which you merge and community with other community. Choose merge in which you are getting highest modularity.

- Repeat above step till total community became 2.

- Plot finally resulted community.

Result
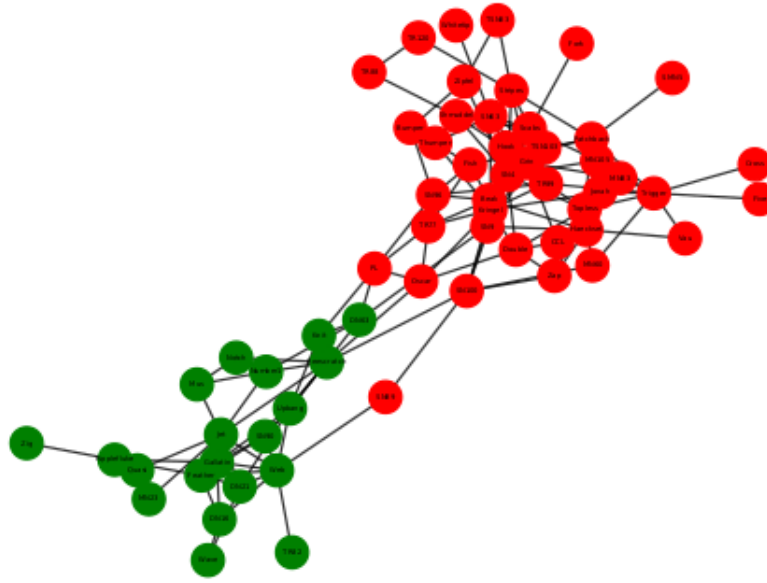
3 Two Circle Clustering

Approach

- Read csv data using *pandas* package
- Compute adjacency matrix by using formula :

$$A(i,j) = \exp\left\{-\frac{||\mathbf{x}_i - \mathbf{x}_j||^2}{\sigma^2}\right\}$$

- Compute Normalized Laplacian matrix by using *csgraph* package
- Find Eigen vector corresponding to smallest and second smallest eigen value.
- After getting these two eigen vector, stack them together and use K-means to cluster them into two cluster.

Result