HW4 - GRAPH SPECTRA

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Group-10

Introduction:

This assignment implements the spectral graph clustering algorithm. The key feature of implementation is the K-eigenvector algorithm, employed to analyze two datasets. The datasets include a real-world graph and another graph constructed synthetically.

Step 1: Load Data and Create Graph:

I start by loading the dataset from the file. The dataset is then used to construct a graph represented by the adjacency matrix.
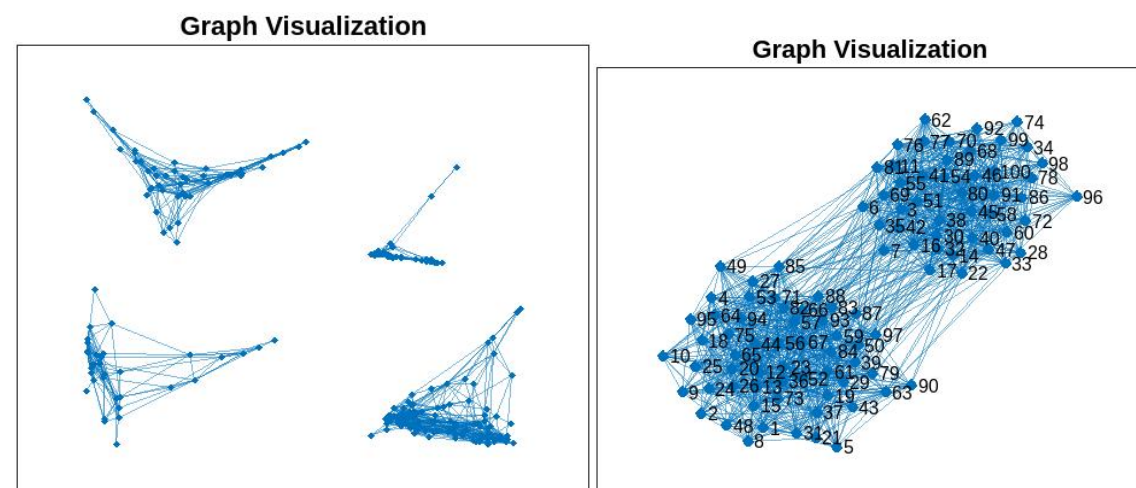
Step 2: Display Adjacency Matrix:

Visualizing the adjacency matrix provides insights into the structure of the graph. Below the output of two datasets(1 and 2) adjacency matrix.
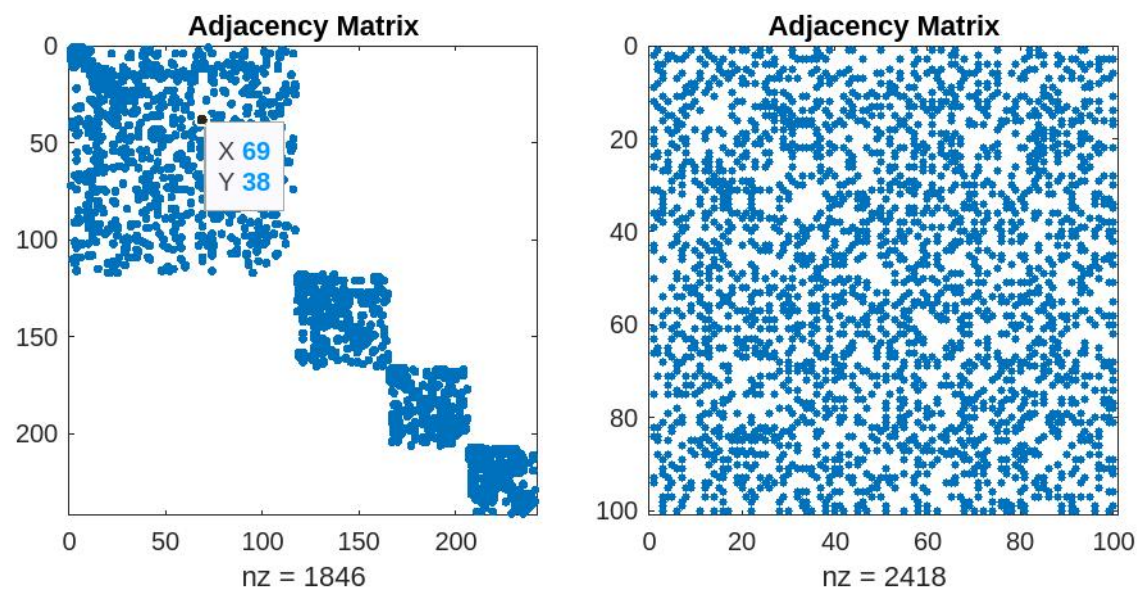

Step 3: Display Graph Visualization

Plotting the graph gives a visual representation of the nodes and edges. Below the output of two datasets(1 and 2) graph visualization -

Step 4: Laplacian Matrix Computation and Visualization

Calculate the Laplacian matrix, both un-normalized and normalized, and visualize their respective Fiedler vectors. Below the output of two datasets(1 and 2) Normalized and Un-normalized Laplacian Matrix.
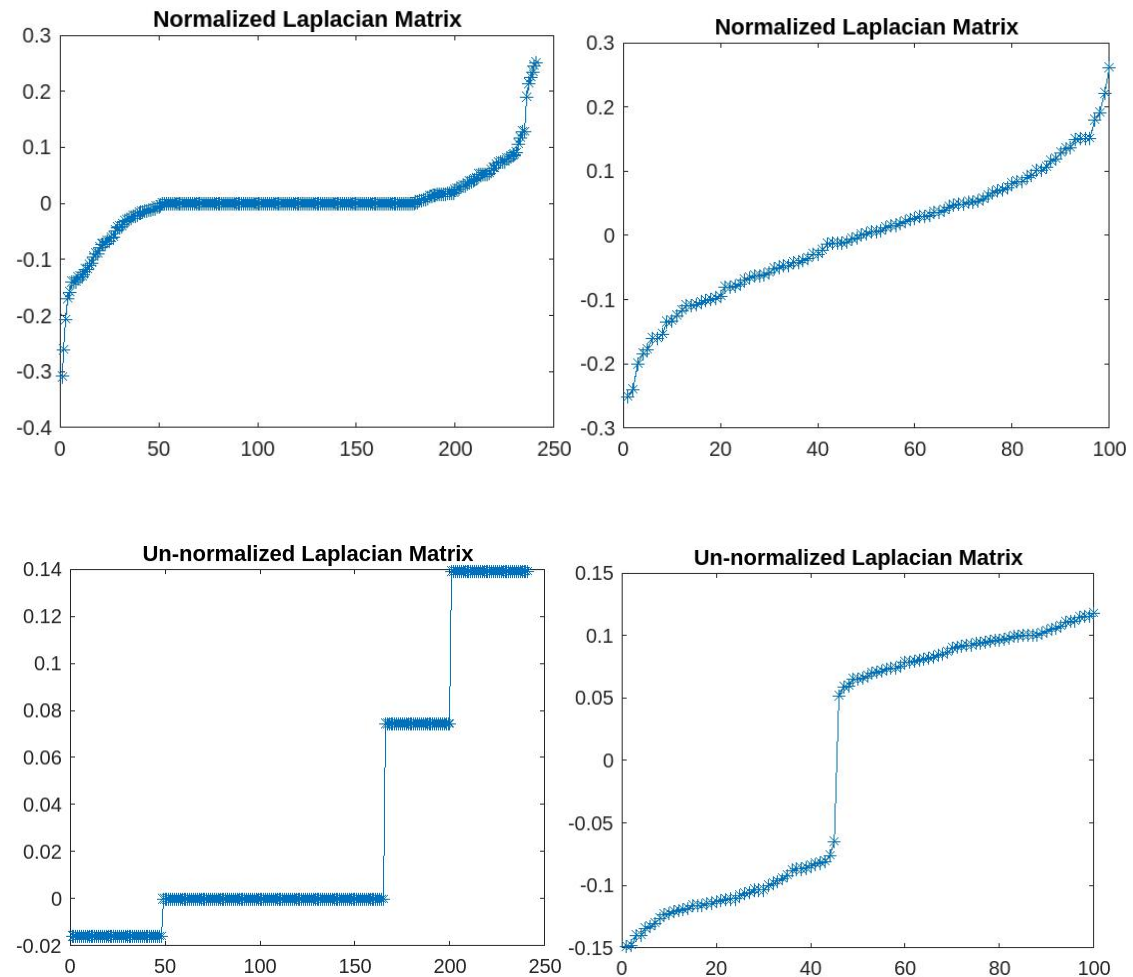

In the second matlab file after computation of laplacian matrix -

Step 5: Spectral Clustering
I applied the K-means algorithm to the eigenvectors obtained from the Laplacian matrix. This step resulted in the assignment of nodes to K clusters.
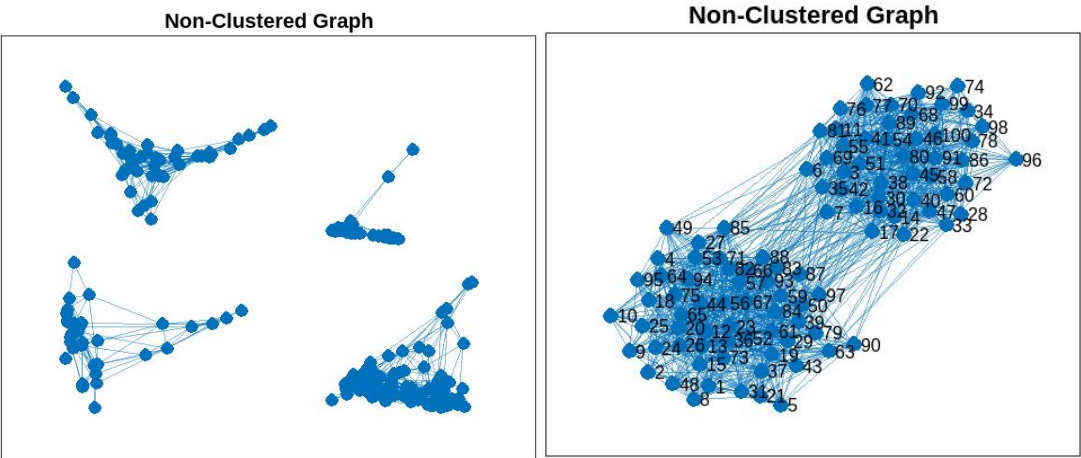
Step 6: Visualization - Clustered Graph
Then visualized the clustered graph by coloring nodes according to their assigned clusters. Below the output of two datasets(1 and 2) Clustered Graph.
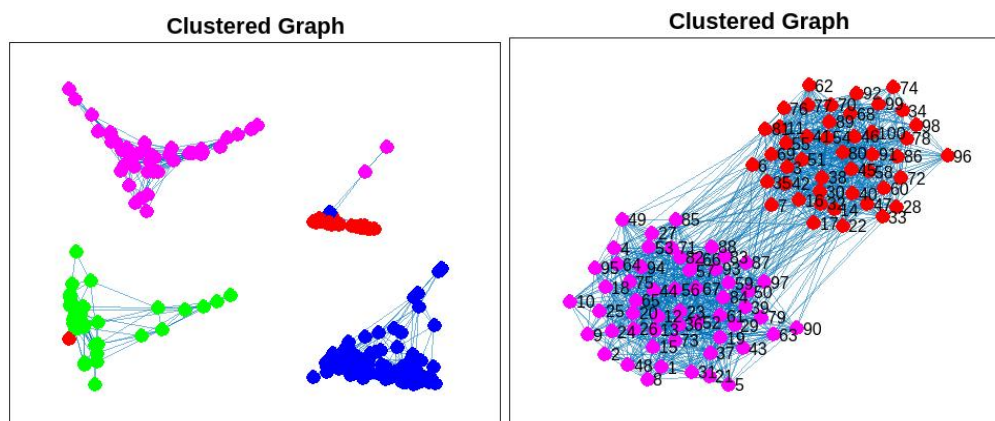
Step 7: Visualization - Non-clustered Graph

Finally visualized the non-clustered graph according to their assigned clusters. Below the output of two datasets(1 and 2) non-clustered Graph.

Conclusion

This report outlines the steps taken to implement spectral graph clustering, including data loading, graph creation, Laplacian matrix computation, and visualization. The findings contribute to a deeper understanding of the structure and clustering patterns within the graph.