MKSE312 Final Project

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1 Introduction

In this report, we analyze the Facebook New Orleans dataset using different community detection techniques: modularity maximization using KL algorithm, spectral bipartition, and the Louvain-Twitter algorithm.

We extracted 5 disjoint subgraphs of 2,500 nodes from the dataset to make the computation more feasible.

2 Modularity maximization using KL algorithm

Hopefully we can get some results here...

3 Spectral bipartition

Figures 1 - 5 show the results for spectral bipartition on the 5 subgraphs. The values for λ_2 for each subgraph respectively are: 0.8992, 0.5614, 0.9856, 0.9116, 0.9352. The λ_2 values tell us how easily the network can be split into two groups.

Subgraph 2 has the smallest λ_2 (0.5614), suggesting that it is the easiest to split, which seems to make sense since we can identify the two groups in the Figure 2.

On the other hand, subgraph 5 has the largest λ_2 (0.9352), suggesting that it is the most difficult to split, which also seems to make sense because Figure 5 shows a cloud of plots that don't seem to have much obvious grouping.

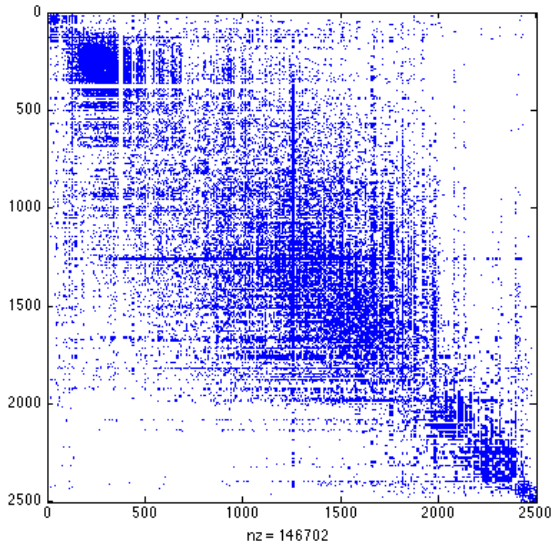

Figure 1: Spectral Bipartition for Subgraph 1

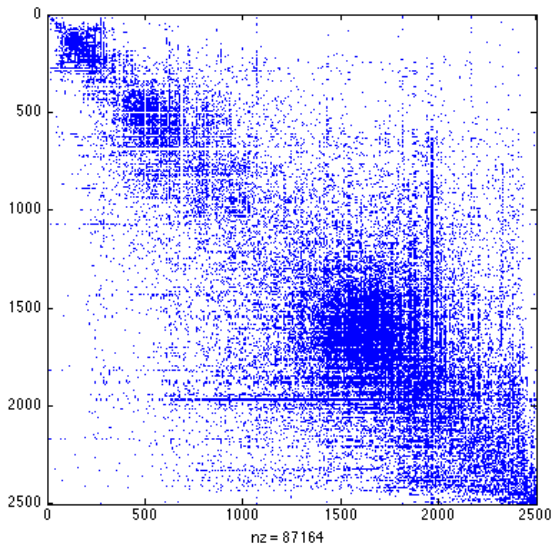

Figure 2: Spectral Bipartition for Subgraph 2

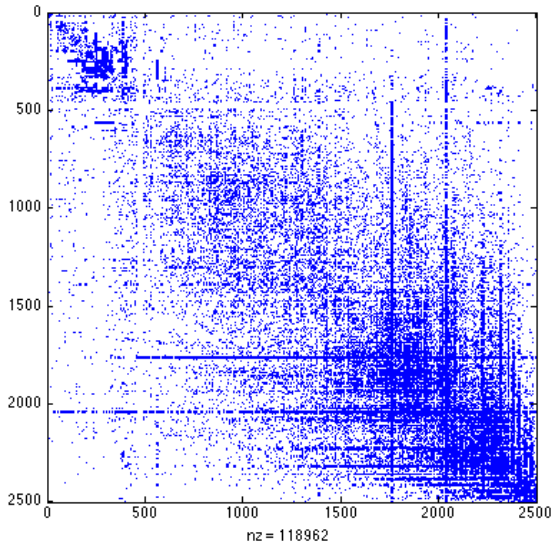

Figure 3: Spectral Bipartition for Subgraph 3

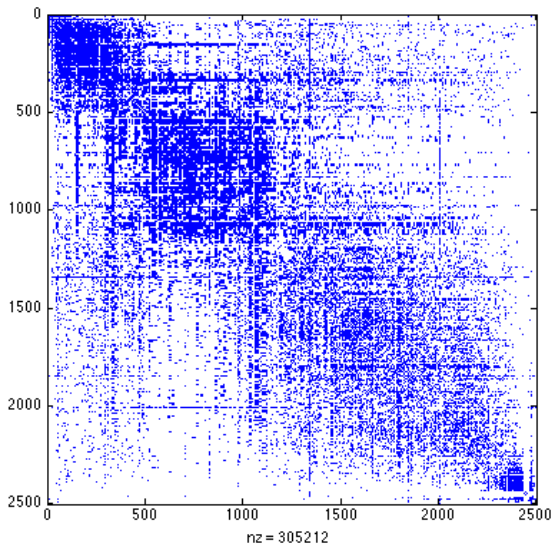

Figure 4: Spectral Bipartition for Subgraph 4

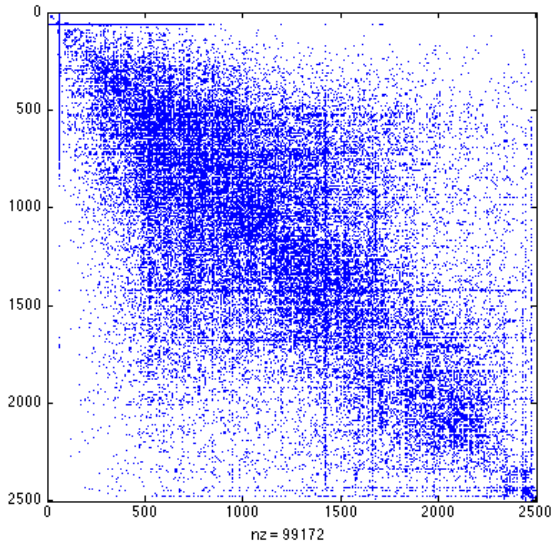

Figure 5: Spectral Bipartition for Subgraph 5

4 Louvain-Twitter algorithm

We used the Louvain algorithm MATLAB implementation by MIT Strategic Engineering. We ran the algorithm on the 5 subgraphs. The results are as follows:

Subgraph	Number of Modules	Modularity
1	1134	0.0133
2	971	0.0287
3	1059	0.0179
4	1231	0.0057
5	1256	0.0204