Darren Leong

DS 210

Prof Leonidas Kontothanassis

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For this 210 final project, I looked to analyze deeper in six degrees of separation using this facebook dataset (https://snap.stanford.edu/data/ego-Facebook.html). This facebook data consists of social circles containing 4039 accounts connected with 88234 edges. Six degrees of separation is a fascinating theory claiming any two people are, on average, six or fewer social connections apart from each other.

This theory is extremely interesting to me, so I created a project that visualizes the theory in a social media context. My rust program utilizes algorithms to discover the average distance between nodes (that represent individuals). I implemented breadth-first search (BFS) in my program to understand the structure of the graph. Since my network had multiple disconnected components, BFS identified them by only visiting nodes that are reachable from the starting node. As a result, I broke my code into four modules. In my bfs.rs module, the 'calculate_average_distance' function computed the average distance from a starting node to all other nodes in the graph using BFS. My load_edges.rs module reads the file and implements error handling. My graph.rs module creates a directed graph with a specific number of vertices and edges, while main.rs is the main module that prints the statistics and tests to ensure the functionality of directed edge creation and degree counting.

After running my code, this is the output.

```
     Running `target/debug/uhhh`
Total of 4039 nodes, 88234 edges
Degree distribution: [(1, 874), (2, 1202), (3, 889), (4, 357), (5, 207), (6, 103), (7, 27), (8, 4)]
Min Connections: 0
Max Connections: 1043
```

Results:

874 individuals with an average distance of 1

1202 individuals with an average distance of 2

889 individuals with an average distance of 3

357 individuals with an average distance of 4

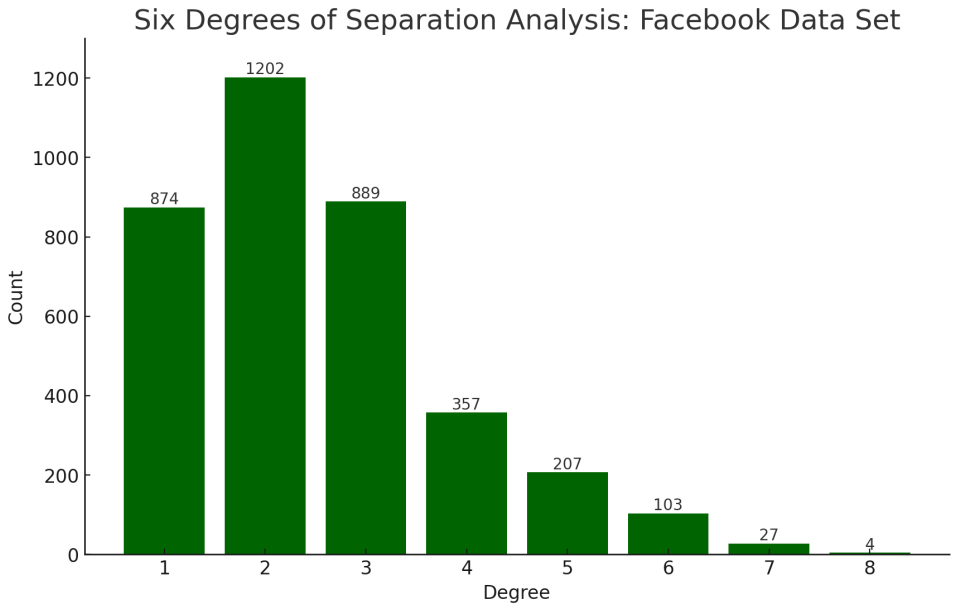
207 individuals with an average distance of 5

103 individuals with an average distance of 6

27 individuals with an average distance of 7

4 individuals with an average distance of 8

Here's a graph to better visualize the results.



The output of my code validates the six degrees of separation theory, as it suggests multiple pathways and relatively short distances between individuals in the network.