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DS210

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### DS210 Final Project

The Six Degrees of Separation Theory explains that all people are connected to every other person in the world by a chain of no more than 5 people.<sup>1</sup> I was drawn to this idea because it seemed almost impossible for every person in the world to be related to one another through a chain having at most five intermediaries. I explored the Six Degrees of Separation Theory using a social network dataset about Facebook social circles found on SNAP (<https://snap.stanford.edu/data/ego-Facebook.html>). This dataset has 4039 nodes (social profiles) and 88234 edges.

My program ultimately finds the average distance between nodes using the “`bfs::calculate_average_distance`” function and the degree distribution using the “`count_degrees`” function. More specifically, though, this is done by loading a graph from a file, then executing graph analyses like the ones mentioned before, and finally printing the results. Breaking this down further, bfs (Breadth-First Search) helps grasp the graph’s structure, which was useful in calculating the average distance between the starting node to other nodes in the graph (bfs.rs module). The graph.rs module converted the undirected data into a directed graph. The loadedges.rs module helped determine and work on errors. Finally, the main.rs module printed the findings and implemented the tests that I made.

Output:

```
Degree distribution: [(1, 874), (2, 1202), (3, 889), (4, 357), (5, 207), (6, 103), (7, 27), (8, 4)]
Min Connections: 0
Max Connections: 1043
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In other words, 874 of the FaceBook profiles had an average degree distance of 1, 1202 of the FaceBook profiles had an average degree distance of 2, ..., and 4 of the FaceBook profiles had an average degree distance of 8. Based on this dataset, I am more convinced of the theory. Although there is proof that not

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<sup>1</sup> Amanda Penn, “Six Degrees of Separation Theory: How We’re All Connected,” essay, in Shortform, 1.

*everyone* is within the chain of having at most 5 intermediaries (over 100 people had an average degree distance over 5), there are still substantially more people proving this theory. Knowing this, I can better justify this theory, as I know social media is widely used and can lead to correlations between people that I never would have expected!