Keith DeSantis

Algorithms HW4 Exploratory Analysis

Topic: Search Times and Consistency of Search Times for Breadth First Search and Depth First Search on 50 Random Starting Nodes.

Time for DFS and BFS (seconds):

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trial | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Avg |
| DFS | 0.003 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.002 | 0.005 | 0.001 | 0.003 | 0.0023 |
| BFS | 0.004 | 0.004 | 0.006 | 0.005 | 0.003 | 0.005 | 0.009 | 0.008 | 0.005 | 0.007 | 0.0056 |

Standard Deviations:

|  |  |
| --- | --- |
| DFS | 0.001418 |
| BFS | 0.001897 |

Chart, scatter chart

Description automatically generated

Figure 1. Depth First vs Breath First search times over 10 trials. Note: On trial 2 both values were 0.004 for only one point is seen.

While the two methods had a clear correlation in search time (a given set of 50 nodes made either method slower or faster than another, never one slower one faster), Depth First Search was consistently faster and proved more consistent, with an average speed of 0.0023 seconds and a standard deviation of only 0.0014118 seconds compared to Breadth First Search’s 0.0056 seconds average time and 0.001897 second standard deviation. Search times these small given better insight into the graph’s structure, specifically that it is very well connected. Having many more connections to enqueue would (and do here) make BFS take a longer time, but provide evidence of high connectivity.