Week 5 Lab Exercise 2: Study of Search Algorithms

Purpose: To compare the length of time that it takes for Binary and Sequential searches to complete their logic for 1000 searches each with smaller and larger lists of integers.

Hypothesis: The Binary search will prove to be quicker than the Sequential search on both runs of the test

Results:

Testing with arrays of 20 integers with time averages for each search:

|  |  |  |  |
| --- | --- | --- | --- |
| **Test trial** | **Sequential Search - Unsorted (Seconds)** | **Sequential Search - Sorted (Seconds)** | **Binary Search (Seconds)** |
| 1 | 0.000206552 | 0.000203353 | 0.000220095 |
| 2 | 0.00020584 | 0.000201532 | 0.000217584 |
| 3 | 0.000217825 | 0.000202959 | 0.000207469 |
| 4 | 0.000216643 | 0.000201627 | 0.000216938 |
| 5 | 0.000208703 | 0.000201315 | 0.000216392 |
| 6 | 0.00020746 | 0.0002026 | 0.000213124 |
| 7 | 0.000207759 | 0.000202142 | 0.000214711 |
| 8 | 0.000232999 | 0.0002192 | 0.000220341 |
| 9 | 0.000213099 | 0.000322216 | 0.00022614 |
| 10 | 0.000205252 | 0.000202449 | 0.000241558 |
| AVG | 0.000212213 | 0.000215939 | 0.000219435 |

Testing with arrays of 1000 integers with time averages for each search:

|  |  |  |  |
| --- | --- | --- | --- |
| **Test trial** | **Sequential Search - Unsorted (Seconds)** | **Sequential Search - Sorted (Seconds)** | **Binary Search (Seconds)** |
| 1 | 0.00094296 | 0.00414528 | 0.00031796 |
| 2 | 0.00100533 | 0.0042827 | 0.000307856 |
| 3 | 0.000924566 | 0.0042215 | 0.000308494 |
| 4 | 0.000975247 | 0.00410811 | 0.000320948 |
| 5 | 0.000952913 | 0.0423032 | 0.000320251 |
| 6 | 0.000899546 | 0.00435288 | 0.000306228 |
| 7 | 0.000941228 | 0.00422292 | 0.000307567 |
| 8 | 0.00100096 | 0.00437767 | 0.000305798 |
| 9 | 0.00111904 | 0.00430759 | 0.000309397 |
| 10 | 0.000946147 | 0.00408573 | 0.000307487 |
| AVG | 0.000970794 | 0.008040758 | 0.000311199 |

Outcome: When searching arrays of 20 integers, the unsorted Sequential Search performed faster than the sorted Sequential Search and Binary Search. In contrast, when performing the same test on arrays of 1000 integers the Binary Search found the values faster than both Sequential Searches (with the sorted Sequential Search performing the slowest).

Conclusion: Both the Sequential Search and the Binary Search can be implemented and be more efficient than the other. The Sequential Search (in my environment) performed 1000 searches more quickly than the Binary Search, but the latter completed 1000 searches more quickly than the Sequential Search.