CS2023 - Data Structures and Algorithms

In-class Lab Exercise - Week 3

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**Terminal Outputs**

1. **Insertion Sort**

Text

Description automatically generated

1. **Bubble Sort**

Text

Description automatically generated

1. **Optimized Bubble Sort**

Text

Description automatically generated

1. **Selection Sort**

Text

Description automatically generated

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Array Size** | **Insertion Sort** | **Bubble Sort** | **Optimized Bubble Sort** | **Selection Sort** |
| 500 | 0 | 1 | 1 | 0 |
| 2000 | 2 | 7 | 6 | 4 |
| 7500 | 33 | 103 | 88 | 59 |
| 12000 | 72 | 280 | 223 | 148 |
| 20000 | 198 | 861 | 736 | 432 |

**Time taken for each sorting algorithm with array length**

**Discussion**

* All 4 sorting algorithms have a similar growth pattern when array length increases. This is because the time complexity is O(n2) for all the algorithms.
* Comparatively, Bubble Sort has taken the longest amount of time.
* Optimized bubble sort has only provided a slight decrease in the run time.
* Insertion sort can be observed as the most efficient algorithm out of the 4 algorithms.