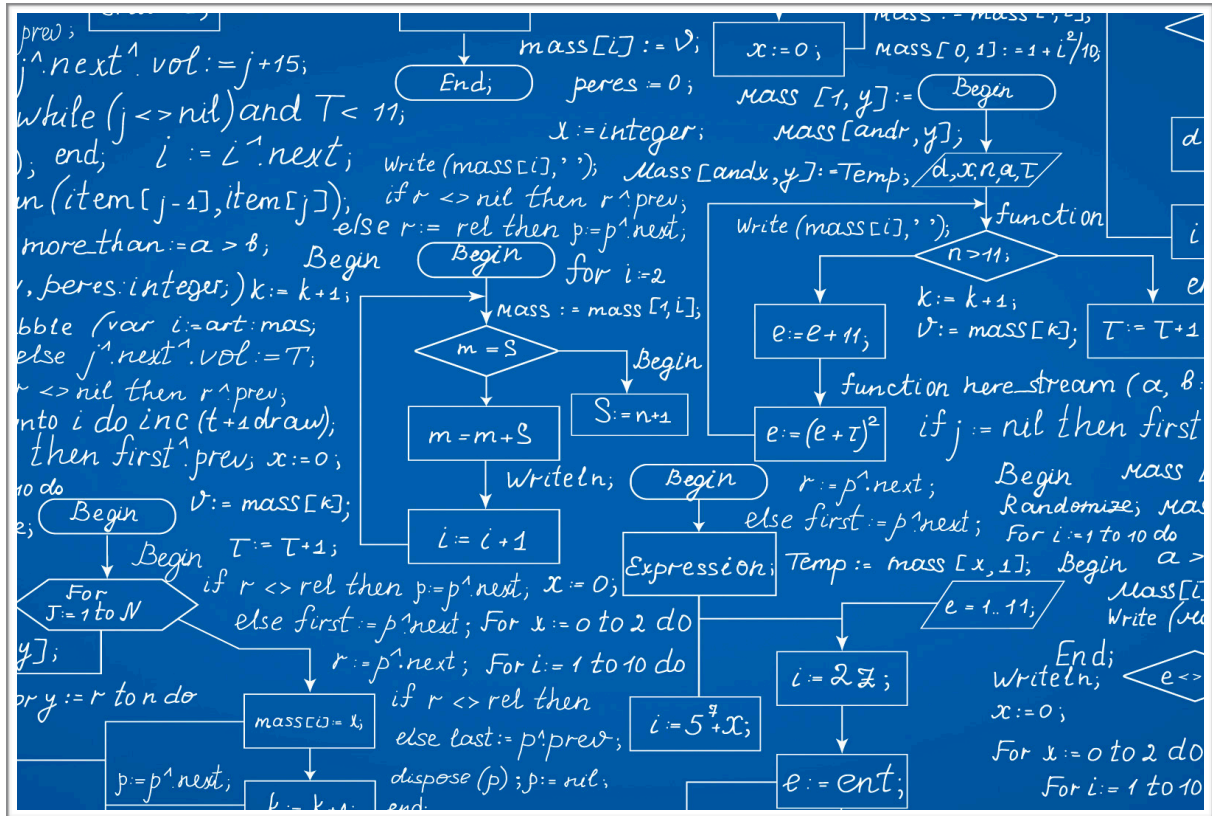


Algorithm: Project

Comparison of Sorting Algorithm



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Algorithm: Project

Comparison of Sorting Algorithm

Introduction

Sorting is any process of arranging items systematically, and has two common, yet distinct meanings:

1. Ordering: arranging items in a sequence ordered by some criterion;
2. categorizing: grouping items with similar properties.

There are many sorting algorithms in computer science. Common sorting algorithms are bubble sort, insert sort, quick sort, merge sort, radix sort and bucket sort. Each algorithm has different time complexity and calculation time. This report implements the algorithms aforementioned and measures the running time for each algorithm.

Environment

Language: C

Compiler: clang 11.0.3

OS: MacOS Catalina 10.15.4

CPU: Intel Core i5 Quad Core 8th Generation (2.4 GHz)

RAM: 16GB 2133 MHz LPDDR3

Results

```
(base) aiel@Aiel-2 algorithm-midterm-assignment % ./main
      bubble sort insertion sort   merge sort    quick sort      radix sort    bucket sort
10      1          1              23             1             12            23
100     34         12             14             9             26            38
1000    2526      820             134            99            197           224

Initai Arr: 360, 430, 415, 103, 301, 136, 195, 45, 502, 399,
bubble sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
insertion sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
merge sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
quick sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
radix sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
bucket sort: 45, 103, 136, 195, 301, 360, 399, 415, 430, 502,
```

Running Time (μ s)

	Bubble Sort	Insertion Sort	Merge Sort	Quick Sort	Radix Sort	Bucket Sort
10	1	1	23	1	12	23
100	34	12	14	9	26	38
1000	2526	820	134	99	195	224

Conclusion

The execution time of the sorting algorithm depends on the input size. Insertion sort is fastest at length 10 and fast sort is fastest at length 1000. Even if the time complexity of merge sort is less than that of insert sort, lots of function call in merge sort slows down the sort algorithm. However, if the input size is decrease, the disadvantages diminish.

Time complexity is an approximation of execution time; it is not the exact execution time. We need to understand the characteristic of the input data and select the appropriate algorithm.