Algorithms

Homework 1 Report

자유전공학부 김지원
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1. Compare the actual time usage of the two algorithms (unit : nano seconds)

Input Size	Randomized Select	Deterministic Select	Ratio of Average
10^1	14083 16042 19417 14959 15625	32583 84459 36292 32375 33208	2.73215935
10^2	38125 23542 44334 33834 33416	67708 64208 63084 83792 66666	1.99397406
10^3	118500 324000 138042 571959 205250	471291 263792 386625 480000 439375	1.50328227
10^4	1969416 1627708 991584 530916 1083583	2184917 1322333 1936833 2377667 2649792	1.68808521
10^5	9622208 7130625 3987500 5658583 5694667	23539083 14291125 11604667 17294625 12580042	2.47119625
10^6	*Each number is an average of 300 random input 10143173 10373174 10112779	*Each number is an average of 300 random input) 26473511 27898592 27700273	2.60998319 2.68949427 2.7391356 **Average of 900 input : 2.6795 (rounded)**

Result : The hidden constant difference between two algorithms' time complexity is around **2.6795** .

** Code for comparing time is included in Main.java

1. Checker program

   The checker program works by sorting the given array using java's Arrays.sort function, and then getting the i-th element by simply getting Arr[i-1] element from the sorted array (Arr).

2. Environment of the program

   Open jdk - 19