EECE 7205 HW4

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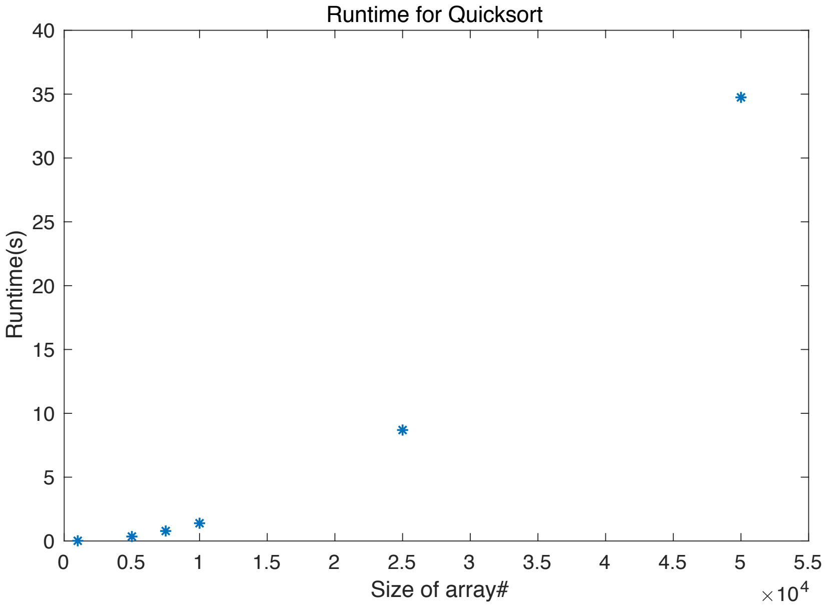

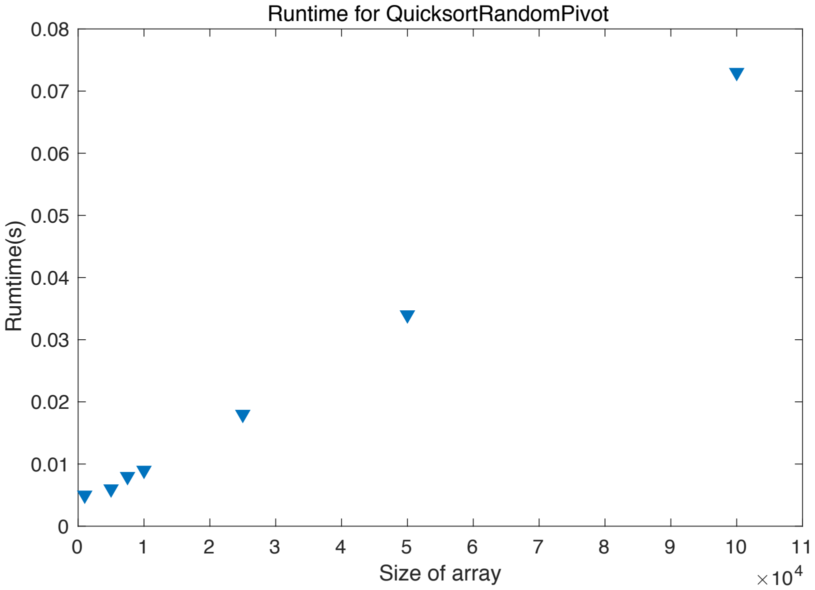

From the plot, we can find that, the runtime of Quicksort is much longer than that of QuickSortRandomPivot. Furthermore, the time complexity of the QuickSort() is O(n^2). However, when we choose the random pivot, the time complexity is nearly O(nlogn).

The reason is obvious. First, our initial array is sorted in a reverse order. And when we choose the rightmost element, and all the numbers would less than this element, so we cannot divide the whole array into two parts. In other word, we choose every number in the array as the pivot in the algorithms. For each pivot, we scan all the members other than the pivot. As a result, the time complexity is O(n^2).

When it comes to the QuickSortRandomPivot(), we could choose pivot in random. So the array could be divided into two part, and invoke the recursive algorithm. In this way, the time time complexity is O(nlogn).