***Course No :*** CSE 204

***Course Title :*** Data structure and algorithm sessional

***Offline No :*** 1

***Title* :** Timecomparison between two search algorithms

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***Objective:***

Linear search and binary search are two searching algorithms. They have different time complexities.

In case of linear searching, two comparisons are performed in each loop. The first one is for checking if i is less than or equal to n. The other one is to compare the searching element with the array element. Finally one more comparison i<=n is made outside the loop. So if x=i, 2i+1 comparisons are used. The most comparisons are 2n+2 when the element is not in the list. So a linear search requires big O of n comparisons in the worst case, because 2n+2 is O(n).

In case of binary searching, it is assumed that n=2^k elements are in the list. So k=log(n). It has a time complexity of O(logn). The list of data has to be sorted. It works by comparing the targeting element with the middle element of the sorted array. If it does not match, then based on the result the left or right half of the array is then used. And this process goes on.

***Machine configuration:***

Processor : Intel® Core™ i3-7100U CPU @ 2.40 GHz 2.40 GHz

Installed memory (RAM) : 4.00 GB (3.88 GB usable)

OS : Windows 10 Home (64 Bit)

Compiler : GNU GCC

***Dataset and Chart:***

***Here are some sample array size and their evaluation result.***

***Discussion:***

Linear search algorithm takes more time to find an element in an array. Because it compares the element with every element of the array until it matches. In worst case scenario, the compiler has to examine every single item of the array. The complexity will be O(n).

But binary search needs less time than linear searching. From the graph we can see this too. The array size varies from 10-1000. It is found that for the larger array size linear search time consistently increases and it takes a lot more time than binary search algorithm. But whatever array size is time needed for binary search does not increase too much. It gives almost a consistent line.