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Assignment Set :1

Problem No. 3

Problem Statement :

Write programs for linear search and binary search for searching integers, floating point numbers and words in arrays of respective types

Solution Approach:

Linear Search:

For linear search we run a loop starting from the first index till the last index of the array and return the index if the value in the array matches the required value given by the user ,else return -1 to denote that the element is not present in the array.

Binary Search:

The array must be sorted to perform binary search.Each time we compare the user-given value with the middle element and check if the value is equal,greater or lesser than the given value.If the value is equal we return the index if greater we recur for the left half of the array ,else for the right half.When the array size is 1 and the value then also doesn’t match , we return -1 stating that the value is not present in the array.

Note: The array must be sorted from earlier to perform binary search algorithm.

Structured Pseudocode :

Linear\_Search(Array,element)

1.for i from 1 to Array.length()

2. if(Array[i]==element)

3. return i

4.return -1

Note:We are considering the Array to be sorted in ascending order in this pseudocode

Binary\_Search(Array,value)

1.Initialise low=1,high=Array.length()

2.while(low<=high)

3. Initialise mid=low+(high-low)/2

4. if(Array[mid]==value)

5. return mid

6. else if(Array[mid]>value)

7. high=mid-1

8. else

9. low=mid+1

10. return -1

Results:

For both the algorithms we obtain result as the index of the array where the element is present and in case the element is not present we obtain the result as -1.

Discussions:

The binary search algorithm is more efficient in terms of time complexity as it takes logarithmic time to return a successful or unsuccessful search of the element whereas the linear search algorithms takes linear time in terms of input .But for binary search it should be noted that the array must be sorted in order to perform the algorithm.

Separate files containing commented source code

The file has been attached.