**Lets Upgrade - Data Structures And Algorithms**

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**Assignment 4**

Question 1

In the Binary Search algorithm, it is suggested to calculate the mid as

beg + (end - beg) / 2 instead of (beg + end) / 2. Why is it so?

Ans.

Binary Search algorithm is the most efficient algorithm for searching elements, as it does the searching randomly. It works on the principle of divide and conquer method.

Algorithm of binary search:

1. Start with the middle element.
2. If the specified element is equal to the middle element, return the position.
3. If the specified element is less than the middle element, search on its left side.
4. If the specified element is more than the middle element, search on its right side.
5. If no match is found, return -1.

Mid element is calculated as beg +(end-beg) / 2 instead of (beg+end) / 2, because the 1st expression will avoid any chances of overflow. In the 2nd expression if beg and end both are larger than the mid element, adding them means it will cause overflow. The 1st expression eliminates the risk of overflow. That’s why for calculating the mid element beg+(end-beg)/2 is used instead of (beg+end)/2.

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Question 2

Write the algorithm/function for Ternary Search.

Ans.

Ternary search is similar to binary search. It divides the array into three parts by taking two mid values, and searches where the specified element is located. It is also a divide and conquer algorithm.

Algorithm of ternary search:

1. Divide the array into three parts by taking two mid values : mid1 and mid2.
2. If the specified element matches with the mid1 value, return mid1.
3. If not mid1 and if the specified element matches with the mid2 value, return mid2.
4. If not mid2, check whether the element is lesser than mid1 value, search on the left side of mid1 i.e. array 1.
5. If not there, check whether the element is greater than mid2 value, search on the right side of mid2 i.e. array 3.
6. If not there, search on the left side of mid2 i.e. array 2.

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