1966. Binary Searchable Numbers in an Unsorted Array `Premium`

Medium | Topics | Companies | Hint

Consider a function that implements an algorithm **similar** to `Binary Search`. The function has two input parameters: `sequence` is a sequence of integers, and `target` is an integer value. The purpose of the function is to find if the `target` exists in the `sequence`.

The pseudocode of the function is as follows:

```
func(sequence, target)
   while sequence is not empty
      randomly choose an element from sequence as the pivot
      if pivot = target, return true
      else if pivot < target, remove pivot and all elements to its left from the sequence
      else, remove pivot and all elements to its right from the sequence
   end while
   return false
```

When the `sequence` is sorted, the function works correctly for **all** values. When the `sequence` is not sorted, the function does not work for all values, but may still work for **some** values.

Given an integer array `nums`, representing the `sequence`, that contains **unique** numbers and **may or may not be sorted**, return *the number of values that are **guaranteed** to be found using the function, for **every possible** pivot selection*.

Example 1:

Input: `nums = [7]`
Output: `1`
Explanation:
Searching for value 7 is guaranteed to be found.
Since the sequence has only one element, 7 will be chosen as the pivot. Because the pivot equals the target, the function will return true.

Example 2:

Input: `nums = [-1,5,2]`
Output: `1`
Explanation:
Searching for value -1 is guaranteed to be found.
If -1 was chosen as the pivot, the function would return true.
If 5 was chosen as the pivot, 5 and 2 would be removed. In the next loop, the sequence would have only -1 and the function would return true.
If 2 was chosen as the pivot, 2 would be removed. In the next loop, the sequence would have -1 and 5. No matter which number was chosen as the next pivot, the function would find -1 and return true.

Searching for value 5 is NOT guaranteed to be found.
If 2 was chosen as the pivot, -1, 5 and 2 would be removed. The sequence would be empty and the function would return false.

Searching for value 2 is NOT guaranteed to be found.
If 5 was chosen as the pivot, 5 and 2 would be removed. In the next loop, the sequence would have only -1 and the function would return false.

Because only -1 is guaranteed to be found, you should return 1.

Constraints:

- `1 <= nums.length <= 10^5`
- `-10^5 <= nums[i] <= 10^5`
- All the values of `nums` are **unique**.

Follow-up: If `nums` has **duplicates**, would you modify your algorithm? If so, how?

Topics

Array   Binary Search

Companies

0 - 6 months

Google `2`

Hint 1

The target will not be found if it is removed from the sequence. When does this occur?

Hint 2

If a pivot is to the left of and is greater than the target, then the target will be removed. The same occurs when the pivot is to the right of and is less than the target.

Hint 3

Since any element can be chosen as the pivot, for any target NOT to be removed, the condition described in the previous hint must never occur.

Discussion (2)