448. Find All Numbers Disappeared in an Array

Hint

Easy 8.8K 449

Companies

Given an array `nums` of `n` integers where `nums[i]` is in the range `[1, n]`, return *an array of all the integers in the range* `[1, n]` *that do not appear in* `nums`.

Example 1:

```
Input: nums = [4,3,2,7,8,2,3,1]
Output: [5,6]
```

Example 2:

```
Input: nums = [1,1]
Output: [2]
```

Constraints:

- `n == nums.length`
- `1 <= n <= 10^5`
- `1 <= nums[i] <= n`

Follow up: Could you do it without extra space and in `O(n)` runtime? You may assume the returned list does not count as extra space.

Approach 1: Using xtra array

As the elements are in range [1, n). Take xtra array of size nH. and scan the i/p array and while scanning make

xtra[nums(i)] = seen.

After whole array is scanned and xtra array is filled.

Run a scan on xtra array and while

scanning if
if xtra[i] != seen
add i to list.

T(n) = O(n)
S(n) = O(n)

Approach 2: Sorting and Scanning

T(n) = O(nlogn)

Approach 3: Using the fact that elements are in range [1, n] and making two scans of given array.

while scanning, at every index i see if
nums[i] is present at index nums[i]-1
if it is then just move forward
if its not perform swap and keep checking at that index.
After the scan is completed, scan again and at any index i
if (nums[i] != i+1)
add i+1 to list.

T(n) = O(n)
S(n) = O(1)

Solution 1: Using find() of vector.

As the elements are in [1,n]
Just see if i : 1 to n exists in the given array or not using find().

```
for(i:1 to n)
  if(!nums.find(i))
      add i to list
```

$T(n) = O(n^2)$
$S(n) = O(1)$

becoz find() takes O(n)

Solution 2:

Optimization of above solution.
Instead of linear search we can
Sort + Binary Search

→ Sort nums
→ for(i:1 to n)
  if(!BinarySearch(i))
    add i to list

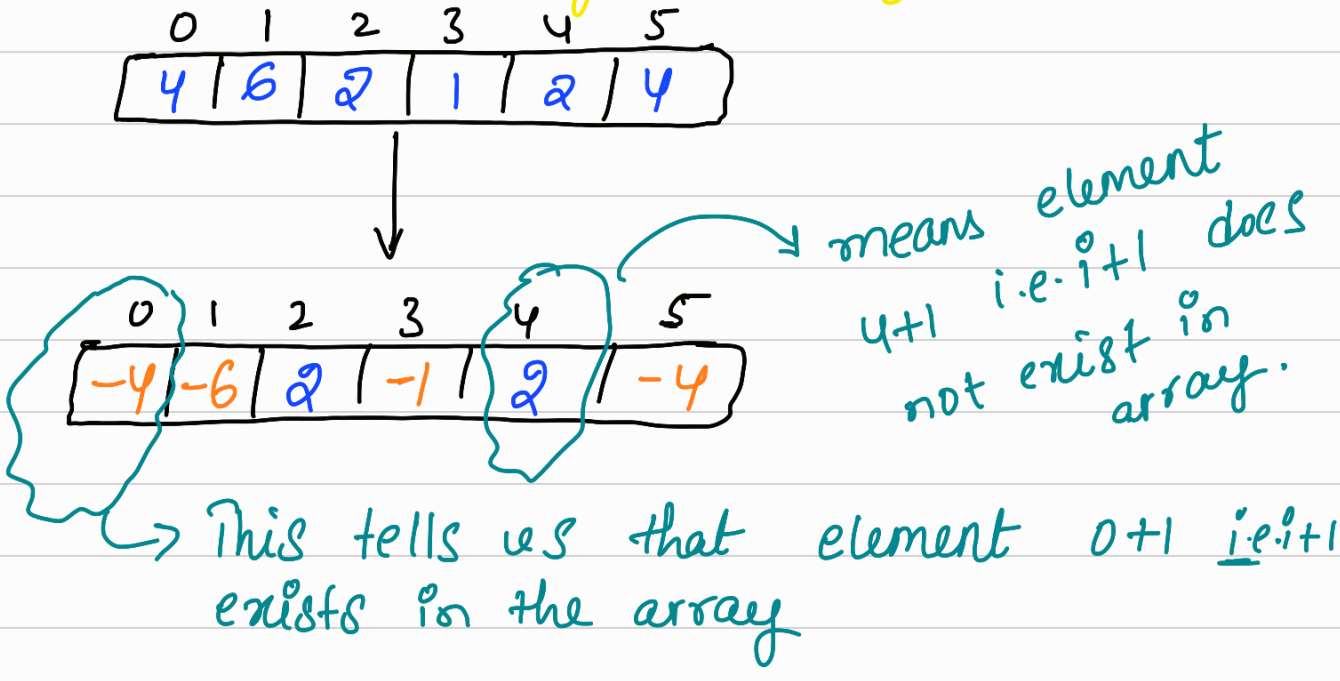
$T(n) = O(n \log n)$
$S(n) = \text{Sorting Space}$

Solution 3:

Using negative marking

As it is given that all elements are positive. we can use negative marking idea.

do a linear scan, and for every index i just make element at index nums[i]-1 as negative if its already not negative.



note: we can make use of abs() function

$T(n) = O(n)$
$S(n) = O(1)$

TAKEAWAY:

If any range kind of thing is given then we can think of using

- → negative marking
- → placing elements at crt position
- → XOR
- → Summation