Documentation for removeDuplicates Method

Overview

The removeDuplicates method is designed to remove duplicates from a sorted array in such a way that each unique element appears at most twice. The method modifies the input array in place and uses O(1) extra memory, maintaining the relative order of the elements.

Method Signature

```
from typing import List

class Solution:

    def removeDuplicates(self, nums: List[int]) -> int:
```

Parameters

nums: A list of integers sorted in non-decreasing order. This is the input array from which duplicates need to be removed.

Returns

An integer k representing the length of the array after duplicates have been removed such that each unique element appears at most twice.

Constraints

- 1 <= nums.length <= 30,000
- -10,000 <= nums[i] <= 10,000
- The input array nums is sorted in non-decreasing order.

Description

The method processes the array in place, ensuring that no element appears more than twice in the resultant array. The relative order of elements is preserved. The elements beyond the first k positions are not important and can be ignored.

Implementation Details

1. **Initial Check:**
    - If the input list nums is empty, the method returns 0.

2. **Index Initialization:**
    - An index i is initialized to 0. This index keeps track of the position where the next valid element should be placed.

3. **Iterate Through Array:**
    - The method iterates over each element in the nums list.
    - For each element, it checks if i is less than 2 or if the current element is greater than the element at position i-2.
    - If this condition is met, the current element is placed at position i in the array, and i is incremented.

4. **Return Result:**
    - After processing all elements, the method returns i, which represents the length of the array after duplicates have been removed.

Example Usage

Example 1

solution = Solution()

nums = [1, 1, 1, 2, 2, 3]

k = solution.removeDuplicates(nums)

print(k, nums[:k]) # Output: 5, nums = [1, 1, 2, 2, 3]

Explanation:

The input array is [1, 1, 1, 2, 2, 3].

After removing duplicates such that each element appears at most twice, the array becomes [1, 1, 2, 2, 3].

The method returns 5, indicating the length of the resultant array.

Example 2

solution = Solution()

nums = [0, 0, 1, 1, 1, 1, 2, 3, 3]

k = solution.removeDuplicates(nums)

print(k, nums[:k]) # Output: 7, nums = [0, 0, 1, 1, 2, 3, 3]

Explanation:

The input array is [0, 0, 1, 1, 1, 1, 2, 3, 3].

After removing duplicates such that each element appears at most twice, the array becomes [0, 0, 1, 1, 2, 3, 3].

The method returns 7, indicating the length of the resultant array.

Custom Judge

The custom judge verifies the correctness of the solution with the following steps:

- It initializes an input array nums and the expected output array expectedNums.
- It calls the removeDuplicates method.
- It asserts that the length k returned by the method matches the length of expectedNums.
- It asserts that the first k elements of nums match the elements in expectedNums.