Problem 3672: Sum of Weighted Modes in Subarrays

Problem Information

Difficulty: Medium
Acceptance Rate: 53.53%
Paid Only: Yes
Tags: Array, Hash Table, Sliding Window, Counting, Ordered Set

Problem Description

You are given an integer array `nums` and an integer `k`.

For every **subarray** of length `k`:

* The **mode** is defined as the element with the **highest frequency**. If there are multiple choices for a mode, the **smallest** such element is taken. * The **weight** is defined as `mode * frequency(mode)`.

Return the **sum** of the weights of all **subarrays** of length `k`.

Note:

* A **subarray** is a contiguous **non-empty** sequence of elements within an array. * The **frequency** of an element `x` is the number of times it occurs in the array.

Example 1:

Input: nums = [1,2,2,3], k = 3

Output: 8

Explanation:

Subarrays of length `k = 3` are:

Subarray | Frequencies | Mode | Mode Frequency | Weight ---|---|---|---|--- [1, 2, 2] | 1: 1, 2: 2 | 2 | 2 | 2 × 2 = 4 [2, 2, 3] | 2: 2, 3: 1 | 2 | 2 | 2 × 2 = 4 Thus, the sum of weights is `4 + 4 = 8`.

Example 2:

Input: nums = [1,2,1,2], k = 2

Output: 3

Explanation:

Subarrays of length `k = 2` are:

Subarray | Frequencies | Mode | Mode Frequency | Weight ---|---|---|---|--- [1, 2] | 1: 1, 2: 1 | 1 | 1 | 1 × 1 = 1 [2, 1] | 2: 1, 1: 1 | 1 | 1 | 1 × 1 = 1 [1, 2] | 1: 1, 2: 1 | 1 | 1 | 1 × 1 = 1 Thus, the sum of weights is `1 + 1 + 1 = 3`.

Example 3:

Input: nums = [4,3,4,3], k = 3

Output: 14

Explanation:

Subarrays of length `k = 3` are:

Subarray | Frequencies | Mode | Mode Frequency | Weight ---|---|---|---|--- [4, 3, 4] | 4: 2, 3: 1 | 4 | 2 | 2 × 4 = 8 [3, 4, 3] | 3: 2, 4: 1 | 3 | 2 | 2 × 3 = 6 Thus, the sum of weights is `8 + 6 = 14`.

Constraints:

* `1 <= nums.length <= 105` * `1 <= nums[i] <= 105` * `1 <= k <= nums.length`

Code Snippets

C++:

```
class Solution {
public:
long long modeWeight(vector<int>& nums, int k) {

}
};
```

Java:

```
class Solution {
public long modeWeight(int[] nums, int k) {

}
}
```

Python3:

```
class Solution:
def modeWeight(self, nums: List[int], k: int) -> int:
```