

Distinct Elements Window of Size K in C++

```
#include <iostream>
#include <vector>
#include <unordered_map>
#include <deque>

using namespace std;

vector<int> distinctElementsInWindow(const
vector<int>& arr, int k) {
    vector<int> result;
    unordered_map<int, int> frequencyMap;
    int n = arr.size();
    int i = 0;

    // Initialize the frequency map for the first window
    for (i = 0; i < k - 1; ++i) {
        frequencyMap[arr[i]]++;
    }

    for (int j = -1; i < n; ++i, ++j) {
        // Add the next element (i-th element) to the
        frequency map
        frequencyMap[arr[i]]++;

        // Record the number of distinct elements in the
        current window
        result.push_back(frequencyMap.size());

        // Remove the (j-th element) as the window slides
        if (j >= 0) {
            if (frequencyMap[arr[j]] == 1) {
                frequencyMap.erase(arr[j]);
            } else {
                frequencyMap[arr[j]]--;
            }
        }
    }

    return result;
}

int main() {
    vector<int> arr = {2, 5, 5, 6, 3, 2, 3, 2, 4, 5, 2, 2, 2, 2,
3, 6};
    int k = 4;
    vector<int> result =
distinctElementsInWindow(arr, k);

    for (int num : result) {
        cout << num << " ";
    }
    cout << endl;

    return 0;
}
```

Dry Run:

Initialize:

- **arr** = [2, 5, 5, 6, 3, 2, 3, 2, 4, 5, 2, 2, 2, 2, 3, 6]
- **k** = 4
- **frequencyMap** = {} (Empty at the start)
- **result** = [] (Empty at the start)

Step-by-Step Iteration:

i	arr[i]	frequencyMap (Updated)	Distinct Elements	result (after update)	j
0	2	{2: 1}	1	[]	-1
1	5	{2: 1, 5: 1}	2	[]	0
2	5	{2: 1, 5: 2}	2	[]	1
3	6	{2: 1, 5: 2, 6: 1}	3	[3]	2
4	3	{2: 1, 5: 1, 6: 1, 3: 1}	4	[3, 4]	3
5	2	{2: 2, 5: 1, 6: 1, 3: 1}	4	[3, 4, 4]	4
6	3	{2: 2, 5: 1, 6: 1, 3: 2}	3	[3, 4, 4, 3]	5
7	2	{2: 3, 5: 1, 6: 1, 3: 2}	3	[3, 4, 4, 3, 3]	6
8	4	{2: 3, 5: 1, 6: 1, 3: 2, 4: 1}	4	[3, 4, 4, 3, 3, 4]	7
9	5	{2: 3, 5: 2, 6: 1, 3: 2, 4: 1}	4	[3, 4, 4, 3, 3, 4, 4]	8
10	2	{2: 4, 5: 2, 6: 1, 3: 2, 4: 1}	3	[3, 4, 4, 3, 3, 4, 4, 9 3]	9
11	2	{2: 5, 5: 2, 6: 1, 3: 2, 4: 1}	2	[3, 4, 4, 3, 3, 4, 4, 10 3, 3]	10
12	2	{2: 6, 5: 2, 6: 1, 3: 2, 4: 1}	1	[3, 4, 4, 3, 3, 4, 4, 11 3, 3, 2]	11
13	2	{2: 7, 5: 2, 6: 1, 3: 2, 4: 1}	1	[3, 4, 4, 3, 3, 4, 4, 12 3, 3, 2, 2]	12
14	3	{2: 7, 5: 2, 6: 1, 3: 3, 4: 1}	2	[3, 4, 4, 3, 3, 4, 4, 3, 3, 2, 2,	13

