

Sliding Window Problem



Sliding Window

You are given an array of integers, there is a sliding window of size k which is moving from the very left of the array to the very right. You can only see the k numbers in the window. Each time the sliding window moves right by one position.

```
[5, 2, 4, 6, 3, 1]

[5, 2, 4, 6, 3, 1]

[5, 2, 4, 6, 3, 1]

[5, 2, 4, 6, 3, 1]

[5, 2, 4, 6, 3, 1]
```

Sliding Window: Challenge

Write a program in which an array is given as input along with the window size k, check the sum of the k integers of the window size and return the highest sum after checking every consecutive k items in the list.

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Write a program in which an array is given as input along with the window size k, check the sum of the k integers of the window size and return the highest sum after checking every consecutive k items in the list.

```
[5, 2, 4, 6, 3, 1] Sum = 11

[5, 2, 4, 6, 3, 1] Sum = 12

[5, 2, 4, 6, 3, 1] Sum = 13

[5, 2, 4, 6, 3, 1] Sum = 10
```

Sliding Window: Challenge

Write a program in which an array is given as input along with the window size k, check the sum of the k integers of the window size and return the highest sum after checking every consecutive k items in the list.

Let's make a function first that takes the starting and ending index and calculate the sum of elements between these indexes

```
#include <iostream>
using namespace std;
// Global Array
int arr[100];
// Function definition
int checkLargest(int start, int end)
    int sum = 0;
    for (int idx = start; idx < end; idx = idx + 1)
        sum = sum + arr[idx];
    return sum;
```

Now, Let's take the inputs from the user.

```
main()
    int arr_length, k, highestSum, sum, s = 0;
    cout << "How many numbers you want to Enter: ";</pre>
    cin >> arr_length;
    for (int idx = 0; idx < arr_length; idx = idx + 1)</pre>
        cout << "Enter " << idx + 1 << " Element: ";</pre>
        cin >> arr[idx];
    cout << "Enter Window Size: ";</pre>
    cin >> k;
```

Now, Let's check the sum for the first time.

```
main()
    int arr_length, k, highestSum, sum, s = 0;
    cout << "How many numbers you want to Enter: ";</pre>
    cin >> arr_length;
    for (int idx = 0; idx < arr_length; idx = idx + 1)</pre>
    {
        cout << "Enter " << idx + 1 << " Element: ";</pre>
        cin >> arr[idx];
    cout << "Enter Window Size: ";</pre>
    cin >> k;
    highestSum = checkLargest(s, k);
```

Now, Let's keep on iterating till the end of the array and then store the largest sum in a separate variable.

```
main()
    int arr_length, k, highestSum, sum, s = 0;
    cout << "How many numbers you want to Enter: ";</pre>
    cin >> arr length;
    for (int idx = 0; idx < arr length; idx = idx + 1)
        cout << "Enter " << idx + 1 << " Element: ";</pre>
        cin >> arr[idx];
    cout << "Enter Window Size: ";</pre>
    cin >> k;
    highestSum = checkLargest(s, k);
    while (k < arr length)</pre>
        s = s + 1;
        k = k + 1;
        int sum = checkLargest(s, k);
        if (highestSum < sum)</pre>
             highestSum = sum;
```

Now, Let's print the final sum.

```
main()
    int arr_length, k, highestSum, sum, s = 0;
    cout << "How many numbers you want to Enter: ";</pre>
    cin >> arr length;
    for (int idx = 0; idx < arr length; idx = idx + 1)
    {
        cout << "Enter " << idx + 1 << " Element: ";</pre>
        cin >> arr[idx];
    }
    cout << "Enter Window Size: ";</pre>
    cin >> k;
    highestSum = checkLargest(s, k);
    while (k < arr length)</pre>
        s = s + 1;
        k = k + 1;
        int sum = checkLargest(s, k);
         if (highestSum < sum)</pre>
             highestSum = sum;
    cout << "Highest Sum = " << highestSum;</pre>
```

Learning Objective

In this lecture, we learnt how to use arrays and loops to solve real world problems.



Self Assessment

- 1. Write a C++ program that takes two arrays and returns true if the second array is the same as the first array but shifted to the right by 1 element. Note
 - Both input arrays will be of the same length, and will have a minimum length of 2.
 - The values of the 0-indexed element in the second list and the n-1th indexed element in the first list do not matter.



Self Assessment

Test Cases

Input	Output
First Array: [1, 2] Second Array: [5, 1]	true
First Array: [1, 2] Second Array: [5, 5]	false
First Array: [1, 2, 3, 4, 5] Second Array: [5, 5, 1, 2, 3]	false
First Array: [1, 2, 3, 4, 5] Second Array: [0, 1, 2, 3, 4]	true

