Zig Zag Sequence Hackerrank Solution

Zig Zag Sequence HackerRank Solution is a popular algorithmic problem that challenges programmers to rearrange an array into a zigzag pattern. This article will dive deep into the problem, its requirements, and provide a detailed solution along with explanations. We will also discuss the importance of the problem in coding interviews and competitive programming.

Understanding the Zig Zag Sequence Problem

The Zig Zag Sequence problem requires you to transform an array into a zigzag pattern. In a zigzag sequence, the elements of the array should satisfy the following conditions:

1. For every odd index `i`, the element at `i` should be less than the element at `i-1` and `i+1`.
2. For every even index `i`, the element at `i` should be greater than the elements at `i-1` and `i+1`.

Problem Statement

You are given an array of integers. Your task is to modify this array such that it forms a zigzag sequence. The modification should be done in such a way that the new sequence follows the rules mentioned above.

Input Format

- The first line contains an integer `n`, the number of elements in the array.

- The second line contains `n` space-separated integers which represent the elements of the array.

Output Format

You are required to output the modified array in a zigzag sequence.

Example

Input

```
7
4 3 7 8 6 2 1
```

Output

```
1 3 2 4 6 7 8
```

Explanation

- At index 0 (even), `1 < 3` and `1 < 2`.

- At index 1 (odd), `3 > 1` and `3 < 2`.

- At index 2 (even), `2 < 4` and `2 < 6`.

- At index 3 (odd), `4 > 2` and `4 < 6`.

- At index 4 (even), `6 > 4` and `6 < 7`.

- At index 5 (odd), `7 > 6` and `7 < 8`.

Approach to Solve the Problem

The solution to the Zig Zag Sequence problem can be approached in several steps:

1. Sort the Array: Begin by sorting the array in ascending order. This will help in easily rearranging the elements to form a zigzag pattern.

2. Iterate and Swap: After sorting, iterate through the array and adjust the elements according to the zigzag pattern rules. Specifically, when you are at an even index, ensure that it is smaller than its adjacent elements; when at an odd index, it should be larger.

3. Output the Result: Finally, print the modified array.

Step-by-Step Implementation

Step 1: Sort the Array

Sorting the array will put the elements in the right order to create the zigzag pattern easily.

Step 2: Rearranging Elements

You will loop through the sorted array and apply the zigzag conditions.

Step 3: Print the Final Array

Output the final arrangement.

Pseudocode

Below is a simple pseudocode representation of the solution:

```
function zigzag(arr):

sort(arr)

for i from 0 to len(arr)-1:

if i % 2 == 0:

if i > 0 and arr[i] > arr[i-1]:

swap(arr[i], arr[i-1])

if i < len(arr)-1 and arr[i] > arr[i+1]:

swap(arr[i], arr[i+1])

return arr
```

Python Implementation

Now, let's convert the pseudocode into Python code:

```python
def zigzag(arr):

arr.sort()

for i in range(len(arr)):

if i % 2 == 0:

if i > 0 and arr[i] > arr[i - 1]:

arr[i], arr[i - 1] = arr[i - 1], arr[i]

if i < len(arr) - 1 and arr[i] > arr[i + 1]:

arr[i], arr[i + 1] = arr[i + 1], arr[i]

return arr
```

Example usage

n = 7

array = [4, 3, 7, 8, 6, 2, 1]

result = zigzag(array)
```

```
print(result)
```

Time Complexity

The time complexity of the zigzag sequence solution can be analyzed as follows:

- Sorting the Array: The sorting operation takes $O(n \log n)$.
- Rearranging Elements: The for loop runs $O(n)$.

Thus, the overall time complexity is $O(n \log n)$.

Space Complexity

The space complexity of this solution is $O(1)$ if we consider the sorting in place; however, if a new array is created, it will be $O(n)$.

Importance of Zig Zag Sequence Problem

The Zig Zag Sequence problem is not just an exercise in array manipulation but also teaches critical thinking and problem-solving skills. Here are some of its benefits:

- Algorithmic Thinking: It helps in understanding sorting algorithms and their application.
- Interview Preparation: Many coding interviews include similar problems to assess the candidate's programming skills and problem-solving abilities.
- Application in Real Scenarios: Understanding sequences and patterns can be crucial in various fields, including data analysis and software development.

Conclusion

In summary, the Zig Zag Sequence HackerRank solution provides a practical problem that enhances

your programming skills. By sorting the array and applying the zigzag conditions, we can achieve the desired output efficiently. Whether you are preparing for technical interviews or looking to improve your algorithmic skills, mastering this problem is a step in the right direction. With practice, you can tackle even more complex problems with confidence.

Frequently Asked Questions

What is the Zig Zag Sequence problem on HackerRank?

The Zig Zag Sequence problem requires rearranging an array such that the elements alternate between less than and greater than their neighbors, creating a zigzag pattern.

How can I approach solving the Zig Zag Sequence problem?

You can solve the Zig Zag Sequence problem by first sorting the array, then iterating through the sorted array and swapping elements to ensure they follow the zigzag pattern.

What are the common pitfalls when implementing the Zig Zag Sequence solution?

Common pitfalls include not properly handling the edge cases where the array has fewer than three elements or incorrectly swapping elements, which may violate the zigzag condition.

Is there a specific time complexity to consider for the Zig Zag Sequence solution?

Yes, the optimal solution involves sorting the array which has a time complexity of $O(n \log n)$, and the subsequent rearrangement can be done in $O(n)$, making the overall complexity $O(n \log n)$.

Can you provide a sample code snippet for the Zig Zag Sequence

solution?

Certainly! Here is a simple Python code snippet:

```python
def zigzag(arr):
arr.sort()
for i in range(1, len(arr), 2):
if i + 1 < len(arr):
arr[i], arr[i + 1] = arr[i + 1], arr[i]
return arr
```

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