Make Array Elements Unique

solved by	Senan
Platform	GeeksForGeeks
difficulty	Medium
tags	Logic
language	C++
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link	https://www.geeksforgeeks.org/problems/make-array-elements-unique--170645/1
Completion	☑

Intuition

The problem is to ensure all elements in the array are unique by incrementing duplicates to the smallest possible unique values. To achieve this, we need to iterate through the sorted array and adjust each number if it’s not greater than the previous one.

Approach

1. **Sort the Array**: First, we sort the array. Sorting helps us easily check each element against the previous one to ensure uniqueness by incrementing if necessary.
2. **Iterate and Adjust**: We initialize a variable `maxVal` to keep track of the maximum value encountered so far. For each element in the sorted array:
   - If it’s greater than `maxVal`, we set `maxVal` to this value (no increment needed).
   - If it’s not greater, increment `maxVal` by 1 and add the difference to `answer` (the total number of increments needed).
3. **Return Result**: Finally, we return `answer`, which represents the minimum increments required to make all elements unique.

Complexity

Time Complexity:

- **Sorting**: **O(n log n)**, where **n** is the number of elements in `arr`, due to sorting the array.
- **Iteration**: **O(n)**, as we loop through the array once after sorting.

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

Space Complexity:

- **Auxiliary Space**: **O(1)** because we're sorting the array in place and using only a few extra variables for calculations.

So, the space complexity is **O(1)**.

Code

```
class Solution {
  public:
    int minIncrements(vector<int> arr) {
        sort(arr.begin(), arr.end());

        int maxVal = INT_MIN;
        int answer = 0;

        for (auto num : arr) {
            if (maxVal < num) {
                maxVal = num;
            } else {
                maxVal++;
                answer += maxVal - num;
            }
        }
        return answer;
    }
};
```