



Experiment-2.1

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Branch: BE-CSE

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Subject Name: AP Lab - 2

UID: 22BCS13525

Section/Group: KPIT-901/B

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Subject Code: 22CSP-351

1. **Aim:** Sort colors

2. **Objective:**

The objective of the **Sort Colors** problem is to **sort an array of integers** representing colors (0 for Red, 1 for White, 2 for Blue) **in-place** such that all occurrences of:

- 0s (Red) come first
- Followed by 1s (White)
- Followed by 2s (Blue)

3. **Implementation/Code:**

```
void sortColors(vector<int>& nums) {  
    int low = 0, mid = 0, high = nums.size() - 1;  
  
    while (mid <= high) {  
        if (nums[mid] == 0) {  
            swap(nums[low], nums[mid]);  
            low++;  
            mid++;  
        }  
        else if (nums[mid] == 1) {  
            mid++;  
        }  
        else { // nums[mid] == 2  
            swap(nums[mid], nums[high]);  
            high--;  
        }  
    }  
}
```



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```
        high--;  
    }  
}  
}
```

4. Output:

☒ Testcase | [Test Result](#)

Accepted Runtime: 0 ms

• Case 1

• Case 2

Input

nums =
[2,0,2,1,1,0]

Output

[0,0,1,1,2,2]

Expected

[0,0,1,1,2,2]

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5. Learning Outcomes:

- Understanding the Dutch National Flag Algorithm
- Understand **swap-based sorting** techniques.
- Understand **swap-based sorting** techniques.

QUESTION 2

1. **Aim:** Top K Frequent Elements.
2. **Objective:** Given an integer array `nums` and an integer `k`, the objective of this problem is to **return the k most frequent elements** in the array. This problem tests your ability to manipulate and process data efficiently, specifically focusing on how to manage frequency counting and extract top elements in an optimized manner.

3. Implementation/Code:

```
vector<int> topKFrequent(vector<int>& nums, int k) {  
    unordered_map<int, int> freq;  
    for (int num : nums) {  
        freq[num]++;  
    }  
    priority_queue<pair<int, int>, vector<pair<int, int>>, greater<pair<int, int>>>  
    minHeap;  
  
    for (auto& pair : freq) {  
        minHeap.push({pair.second, pair.first});  
        if (minHeap.size() > k) {  
            minHeap.pop();  
        }  
    }  
    vector<int> result;  
    while (!minHeap.empty()) {  
        result.push_back(minHeap.top().second);  
        minHeap.pop();  
    }  
    return result;  
}
```

4. Output:

☒ Testcase | [Test Result](#)

Accepted Runtime: 0 ms

- Case 1
- Case 2

Input

nums =
[1,1,1,2,2,3]

k =
2

Output

[2,1]

Expected

[1,2]

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5. Learning Outcome:

- I. Learn the Basic Concept of Frequency-Based Searching
- II. Learn to Use Built-in Methods for Efficient Processing
- III. Understanding Data Structures for Efficient Retrieval