Project Development Phase

Utilization Of Algorithms, Dynamic Programming, Optimal Memory Utilization

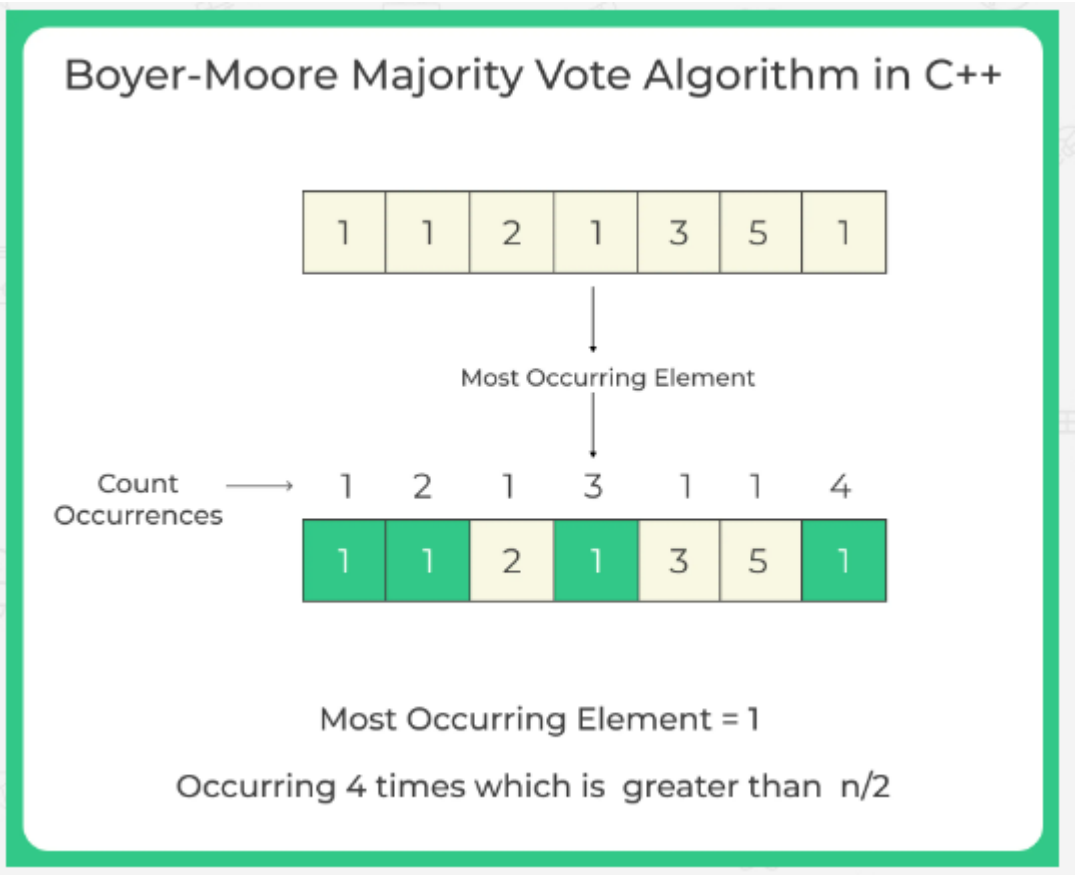
TEAM ID	NM2023TMID04400
PROJECT NAME	BIOMETRIC SECURITY SYSTEM FOR VOTING PLATFORM

Major voting algorithm

- Algorithm is an algorithm for finding the majority of a sequence of elements using linear time and a constant number of words of memory.
- It is named after Robert S. Boyer and J Strother Moore, who published it in 1981, and is a prototypical example of a streaming algorithm.

Algorithm for voting in C++

- The Boyer-Moore Majority Vote Algorithm is an efficient algorithm for finding the majority element in an array, which is an element that appears more than n/2 times, where n is the length of the array.
- The algorithm was proposed by Robert S. Boyer and J Strother Moore in 1980 and is widely used in various applications, such as data analysis, voting systems, and image processing.



Example:

```
Input: k = 6,  arr = [ 1, 2, 5, 2, 2, 2 ]

Output: Majority Element is 2
```

Algorithm :

- Iterate through the array from the beginning to the end.
- For each element in the array:
- If the count is 0, set the current element as the candidate.
- If the current element is the same as the candidate, increment the count.
- If the current element is different from the candidate, decrement the count.
- After the first pass, the candidate is the potential majority element.
- Reset the count to 0.
- Iterate through the array again.

- Count the occurrences of the candidate element.
- If the candidate occurs more than half of the time, it is the majority element.
- If the candidate occurs more than half of the time, return it as the majority element.
- If the candidate occurs less than or equal to half of the time, there is no majority element.

```
#include <iostream>
#include <vector>

using namespace std;

int majorityElement (vector < int >&nums)
{
  int candidate = 0;           // Initialize candidate as the first element
  int count = 0;        // Initialize count as 0

  // First pass: Find the potential majority element
for (int num:nums)
    {
      if (count == 0)
  {
    candidate = num;    // Set candidate as the current element
  }
      count += (num == candidate) ? 1 : -1;  // Increment or decrement count
    }

  // Second pass: Verify if the candidate is the majority element
  count = 0;                   // Reset count
for (int num:nums)
    {
      if (num == candidate)
  {
    count++;             // Count occurrences of the candidate
  }
    }

  // If the candidate occurs more than half of the time, return it
  if (count > nums.size () / 2)
    {
      return candidate;
    }
  else
    {
      return -1;        // Return -1 if there is no majority element
```

```
    }
}

int main ()
{
  // Example usage of the Boyer-Moore Majority Vote Algorithm
  vector < int >nums = { 1, 2, 2, 2, 3, 2, 4, 2, 5 };  // Example input array
int majority = majorityElement (nums);       // Call the algorithm
  if (majority != -1)
    {
      cout << "The majority element is: " << majority << endl;
    }
  else
    {
      cout << "There is no majority element." << endl;
    }

  return 0;
}
```

Output

```
The majority element is: 2
```

CHOICE OF PROGRAMMING LANGUAGES :

- JAVA was used to implement the desktop (Offline) sub-system of this application.
- JAVA has a wealth of data structures and methods in its development kit or library such as the swing package which the graphical user interface of this application leverages on; also, the language is highly portable which means that it can run on any hardware architecture and it is robust as well as being highly secured.
- PHP was used to implement the online sub-system of this application. PHP as a language is now object – oriented thus it can serve the purpose of developing this application very well.
- Also, it is cheaper to deploy online, with a vast array of technical support as well as the opensourced nature of the language.

- MySQL is deployed as the database engine for both the Offline and Online module of the University of Ibadan Online Voting System (UIBOVS) project. It is currently open-sourced and can be gotten freely online.
- MySQL has been proven with a high performance rating as well as optimal query operations.