

Design and Analysis of Algorithms Assignment - 9

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Batch : B-3

Las Vegas and Monte Carlo Algorithms

1. Las Vegas Algorithm

CODE :

```
#include<bits/stdc++.h>

using namespace std;

int main()
{
    int n;

    cout<<"\n\tEnter the total no of elements : ";

    cin>>n;

    int *a = new int[n];

    cout<<"\n\tEnter the elements : ";

    for(int i=0;i<n;i++)
        cin>>a[i];

    int cnt=0,ele;

    while(1)
    {

        int idx = rand()%n;

        ele = a[idx];

        int c=0;
```

```

    for(int i=0;i<n;i++)
    {
        if(a[i]==ele)
            c++;
    }

    if(c>n/2)
        break;
}

cout<<"\n\tMajority Element is : "<<ele;
}

```

O/P:

[illegible]

Time Complexity: $O(n \log n)$

Space Complexity: $O(1)$

2. Monte Carlo Algorithm

CODE :

```
#include<bits/stdc++.h>

using namespace std;

int main()
{
    int n;

    cout<<"\n\tEnter the total no of elements : ";

    cin>>n;

    int *a = new int[n];

    cout<<"\n\tEnter the elements : ";

    for(int i=0;i<n;i++)

        cin>>a[i];

    int cnt=0,ele;

    while(cnt<100)

    {

        int idx = rand()%n;

        ele = a[idx];

        int c=0;

        for(int i=0;i<n;i++)

        {

            if(a[i]==ele)

                c++;

        }

        if(c>n/2)

            break;

        cnt++;

    }

    if(cnt<100)

        cout<<"\n\tMajority Element is : "<<ele;

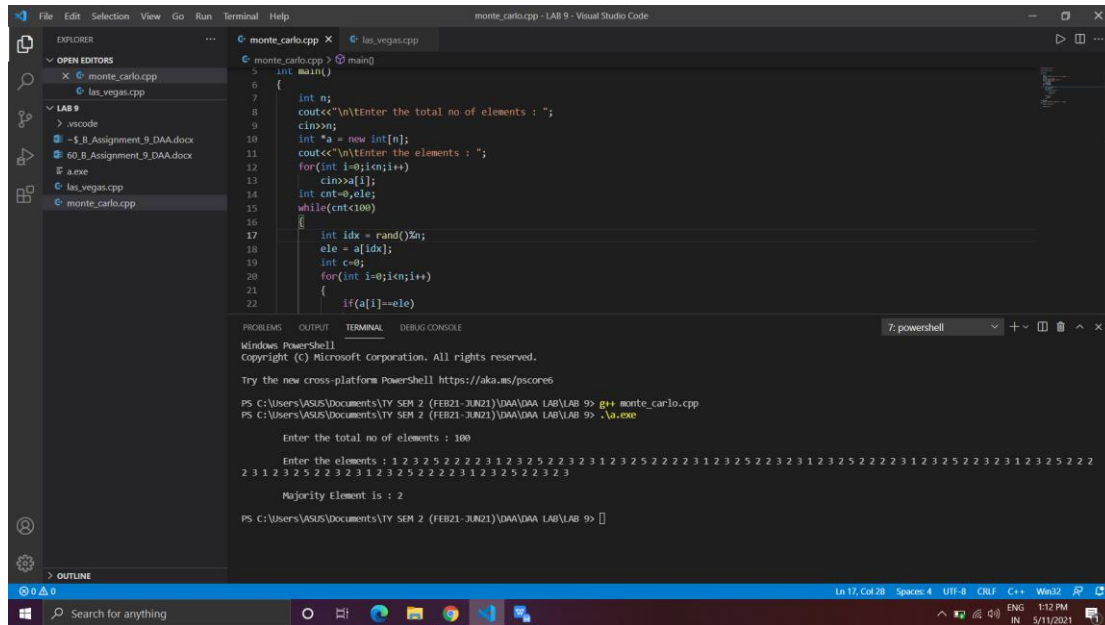
    else

        cout<<"\n\tFailure";

    cout<<"\n\n";

}
```

O/P:



```
monte_carlo.cpp - LAB 9 - Visual Studio Code
monte_carlo.cpp x las_vegas.cpp
monte_carlo.cpp > main()
5 int main()
6 {
7     int n;
8     cout<<"\n\tEnter the total no of elements : ";
9     cin>>n;
10    int *a = new int[n];
11    cout<<"\n\tEnter the elements : ";
12    for(int i=0;i<n;i++)
13        cin>>a[i];
14    int cnt=0,ele;
15    while(cnt<100)
16    {
17        int idx = rand()%n;
18        ele = a[idx];
19        int c=0;
20        for(int i=0;i<n;i++)
21        {
22            if(a[i]==ele)
```

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

Windows PowerShell
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Try the new cross-platform PowerShell <https://aka.ms/pscore6>

PS C:\Users\ASUS\Documents\TY SEM 2 (FEB21-JUN21)\DAA\LAB\LAB 9> g++ monte_carlo.cpp
PS C:\Users\ASUS\Documents\TY SEM 2 (FEB21-JUN21)\DAA\LAB\LAB 9> .\a.exe

Enter the total no of elements : 100

Enter the elements : 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 3 2 3 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 2 3 1 2 3 2 5 2 2 2 3

Majority Element is : 2

PS C:\Users\ASUS\Documents\TY SEM 2 (FEB21-JUN21)\DAA\LAB\LAB 9>

Time Complexity: $O(E)$

Space Complexity: $O(1)$