

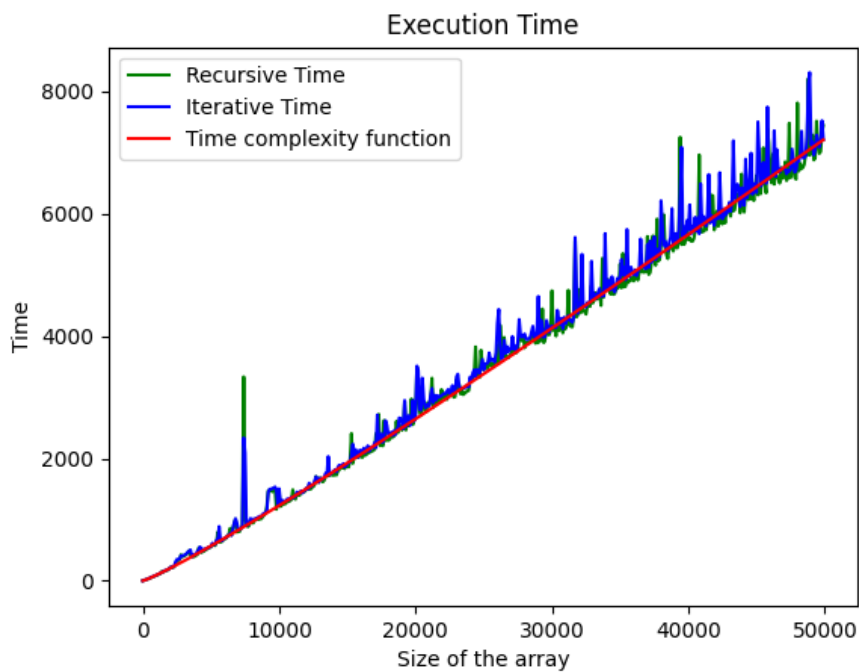
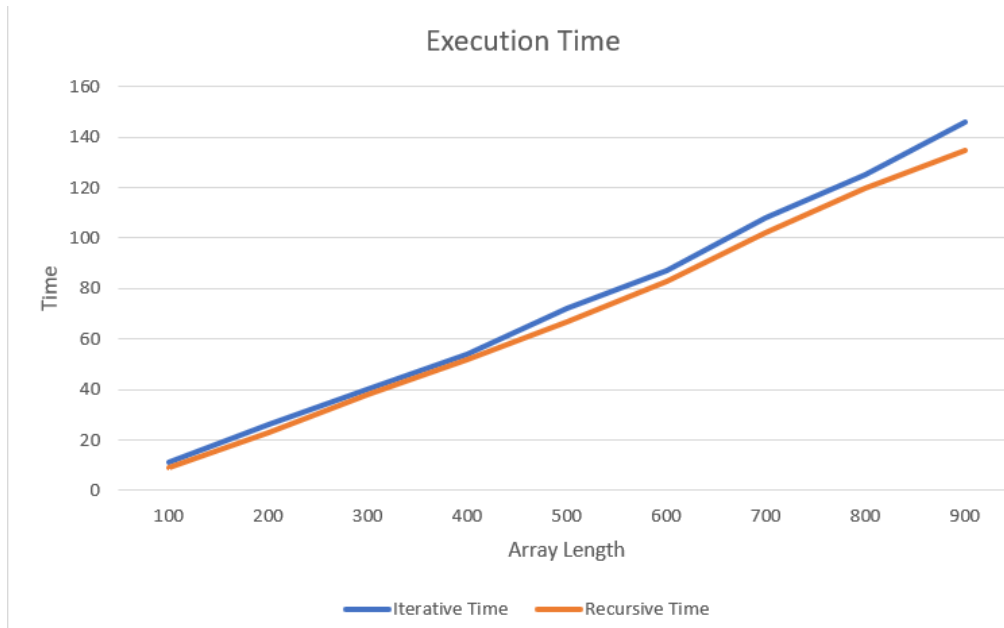
CS2023 - Data Structures and Algorithms

In Class Lab Exercise

Week 05

Index Number : 200105F

Question 01



In the second plot the size of the array increases from 1 to 50000 with a gap of 100 between two consecutive arrays. In the arrays every value is between 1 and 100000. Arrays are same for both recursive and iterative implementations but changed randomly with size. Plots are made using NumPy. All the times are measured in microseconds.

Question 02

Below is the C++ implementation of the running median.

```
#include <iostream>
#include <iomanip>
using namespace std;

void printArr(double arr[], int n)
{
    int i;
    for (i = 0; i < n; ++i)
        cout << arr[i] << ",";
    cout<<endl;
}

int main()
{
    int length;
    double median;
    cout<<"Enter the length of the list: ";
    cin>>length;
    double arr[length];

    int count = 0;
    while (count<length)
    {
        double next_val;
        cout<<"Enter the next value: ";
        cin>>next_val;

        //if the array is empty value is directly added
        if (count==0) arr[count]=next_val;
        else{
            int j=count-1;
            while (next_val < arr[j] && j >= 0) {
                arr[j + 1] = arr[j];
```

```

        j--;
    }
    arr[j + 1] = next_val;
}
count+=1;
//printArr(arr,count);

if (count%2==0)
{
    median = (arr[count/2]+arr[count/2-1])/2;
    cout<<fixed<<setprecision(1)<<median<<endl;
}
else
{
    median = arr[int(count/2)];
    cout<<fixed<<setprecision(1)<<median<<endl;
}
}
cout<<"List Full"<<endl;
return 0;
}

```

Output

```

PS D:\FoE\Fourth Semester\Data Structures and Algo\Labs\Lab 5> cd "d:\FoE\Fourth Semester\Data Structures and Algo\Labs\Lab 5\" ; if ($?) { g++ running_median.cpp -o
running_median } ; if ($?) { .\running_median }
Enter the length of the list: 4
Enter the next value: 7
7.0
Enter the next value: 3
5.0
Enter the next value: 5
5.0
Enter the next value: 2
4.0
List Full
PS D:\FoE\Fourth Semester\Data Structures and Algo\Labs\Lab 5>

```