Heaven's Light is Our Guide

Rajshahi University of Engineering and Technology

Department of Computer Science and Engineering

Course No: CSE.2202

Course Title: Sessional based on CSE.2201 (Computer Algorithms)

Report On: Lab Final Problem 4

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Problem 4:

Algorithm:

① Counting Sort (data n[]){

for i = 0 1to n do{

element := data[i];

F[element] += 1;

}

for i = 1 to n do{

P[i] = F[i] + F[i-1];

}

for i = 1 to n {

Element = data[i];

S_A[P[Element]] = Element;

}

}

(ii) BubbleSort (data n[]){

for i = 0 to n do{

for j = i to n do{

if (data[i] > data[j]){

swap (data[i], data[j]);

}

}

}

}

Code:

```
#include <bits/stdc++.h>
using namespace std;
using namespace std::chrono;
typedef long long ll;
#define M 10001
```

```
void menu(){
    cout<<"\nEnter N (0 to exit): ";
}

int main(){
    ll n,i,j;
    vector<ll> cn,cb,cc;
    while(1){
        ll a;
        menu();
        cin>>a;
        if(a<0){ cout<<" Invalid input "<<endl; continue;}
        if(a==0){ break;}
        else{
        ll mx, mn, x;
        vector<ll> bsort_array, pos_sort, csort_array;
        map<ll,ll>mp;
        ofstream f1;
        ifstream f2;
```

```
f1.open("input.txt");

n= a;
en.push_back(n);
srand(time(0));
n = rand()%M;
mx=x; mn=x;
f1 << x;
esort_array.push_back(-1);
for(i=1; i<n; i++){
    x = rand()%M;
    f1<<" "; f1<<x;
    mx = max(mx,x);
    mn = min(mn,x);
    esorta_array.push_back(-1);
}
f1.close();

auto s = high_resolution_clock::now();
f2.open("input.txt");
while(!f2.eof()){ f2>>x;
    bsort_array.push_back(x);
}
```

```
f2.close();

for(i=0;i<n-1;i++){

    for(j=i+1;j<n;j++){

        if(bsort_arr[i]>bsort_arr[j]){

            swap(bsort_arr[i],bsort_arr[j]);

        }

    }

}

auto st = high_resolution_clock::now();

auto dur = duration_cast<milliseconds>(st-s);

cout<<"Time Bubble Sort :"<<dur<<endl;

cb.push_back(dur.count());

s = high_resolution_clock::now();

f2.open("input.txt");

while(!f2.eof()){

    f2>>x;

    mp[x]+=1;

}
```

```
f2.close();

for (i=min; i<=max; i++){
    if (i==mn){
        pos_csort.push_back(mp[i]);
        continue;
    }
    pos_csort.push_back(mp[i]+pos_csort[i-mn-1]);
}

f2.open("input.txt");
while(!f2.eof()){
    f2>>n;
    csort_array[pos_csort[n-mn]-1]=n;
    pos_csort[n-mn]--1;
}
    f2.close();
    st = high_resolution_clock::now();
    dur = duration_cast<milliseconds>(st-s);
    cout<<"\n Counting sort:"<<dur.count()<<endl;
    return 0;
}
```

"F:\4th Semester\CSE\CSE.2202\Lab 7\1803046.exe"

```
Enter N (Press 0 to Exit): 100
Bubble Sort: 8 Milliseconds
Counting Sort: 16 Milliseconds

Enter N (Press 0 to Exit): 400
Bubble Sort: 13 Milliseconds
Counting Sort: 19 Milliseconds

Enter N (Press 0 to Exit): 700
Bubble Sort: 22 Milliseconds
Counting Sort: 21 Milliseconds

Enter N (Press 0 to Exit): 1000
Bubble Sort: 27 Milliseconds
Counting Sort: 16 Milliseconds

Enter N (Press 0 to Exit): 1300
Bubble Sort: 33 Milliseconds
Counting Sort: 14 Milliseconds

Enter N (Press 0 to Exit): 1600
Bubble Sort: 42 Milliseconds
Counting Sort: 15 Milliseconds

Enter N (Press 0 to Exit): 1900
Bubble Sort: 40 Milliseconds
Counting Sort: 15 Milliseconds

Enter N (Press 0 to Exit): 2200
Bubble Sort: 59 Milliseconds
Counting Sort: 15 Milliseconds

Enter N (Press 0 to Exit): 2500
Bubble Sort: 68 Milliseconds
Counting Sort: 16 Milliseconds

Enter N (Press 0 to Exit): 0

Exiting...
```

N	B_S	C_S
100	8	16
400	13	19
700	22	21
1000	27	16
1300	33	14
1600	42	15
1900	40	15
2200	59	15
2500	68	16