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CSE 330

Winter 2018

Hw 1 - Selection Problem

* **Status**

100% complete

* **Complexity Analysis**

O(n²) where n is the size of input

* **Source Code**

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\* hw1.cpp

\* 01/29/2018

\* This program finds the kth largest number from a group of numbers in

\* inFile.txt. Initial k numbers are read into a vector, while remaining numbers

\* are read one by one. If numbers are greater the k, they are inserted into

\* correct location, removing smallest number. Numbers less than k are ignored

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#include <iostream>

#include <fstream>

#include <vector>

using namespace std;

void selectSort(vector<int>&);

void print(vector<int>&);

//Main function that opens a file and inputs its data into a vector. Data is sorted and the kth number is //printed to console

int main()

{

vector<int> v;

int next;

int k;

ifstream inFile;

inFile.open("inFile.txt");

if(!inFile)

{

cerr << "inFile.txt failed to open";

exit(1);

}

cout << "Enter k: ";

cin >> k;

while(!inFile.eof() && v.size() !=k)

{

inFile >> next;

v.push\_back(next);

}

print(v);

if(k>1)

{

selectSort(v);

print(v);

}

while(!inFile.eof())

{

inFile >> next;

if(next > v[k-1])

{

for(int i = 0; i < v.size(); i++)

{

if(next >= v[i])

{

v.insert(v.begin()+i,next); //put in correct spot

v.pop\_back(); //removed lowest number

break; //no need to continue loop

}

}

}

print(v);

}

inFile.close();

cout << "The " << k << " largest number is " << "'" << v[k-1] << "'" << endl;

}

//This function sorts a vector in decending order

void selectSort(vector<int>& v)

{

for(int i = 0; i < v.size(); i++)

{

for(int j = i+1; j < v.size(); j++)

{

if(v[i] < v[j])

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

}

}

}

//This function prints contents of vector

void print(vector<int>& v)

{

for(auto& x: v)

cout << x << " ";

cout << endl;

}

* **Files used**

inFile.txt (k=1,N=1)

89

inFile.txt (k=1,N=4)

76 49 1002 1

inFile.txt (k=4,N=10)

11 8 99 32 1 57 82 3 100 7

* **Sample Runs**

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ exit^M

Script started on 2018-01-29 08:13:24-0800

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ g++ -c hw1.cpp^M

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ g++ hw1.cpp^M

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ a/^H^[[K/.^H^[[K^H^[[K.^H^[[K^H^[[K./a.out^M

Enter k: 1^M

89 ^M

89 ^M

The 1 largest number is '89'^M

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ exit^M

Script started on 2018-01-29 08:18:20-0800

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ a.^H^[[K^H^[[K.a/^H^[[K^H^[[K/a.uo^H^[[K^H^[[Kout^M

Enter k: 1^M

76 ^M

76 ^M

1002 ^M

1002 ^M

1002 ^M

The 1 largest number is '1002'^M

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ exit^M

Script started on 2018-01-29 08:20:18-0800

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ ./a.out^M

Enter k: 4^M

11 8 99 32 ^M

99 32 11 8 ^M

99 32 11 8 ^M

99 57 32 11 ^M

99 82 57 32 ^M

99 82 57 32 ^M

100 99 82 57 ^M

100 99 82 57 ^M

100 99 82 57 ^M

The 4 largest number is '57'^M

^[]0;005670557@csusb.edu@jb358-1:~/cse330/hw1^G[005670557@csusb.edu@jb358-1 hw1]$ exit^M