Mark Eatough

CSIS 2430 9:00 Class

Programming Project 2

Sorting Program

Assignment objective:

Implement (3) sorting algorithms - quicksort, bubblesort and "roll-your-own". You will generate 50 random numbers between 1 and 1000, place them in a data structure of your own choosing, implement all 3 sorting algorithms, and then you MUST time/compare them. Bonus points if your "own" algorithm does better than the other two.

For you to get FULL points on this assignment, you will need to hand in ALL as follows:

- Cover page displaying your answers, the reason for these results written up in a paragraph.
- Code
- Screen CAP of your output.

Remember, NO ZIP files!!

What Worked?:

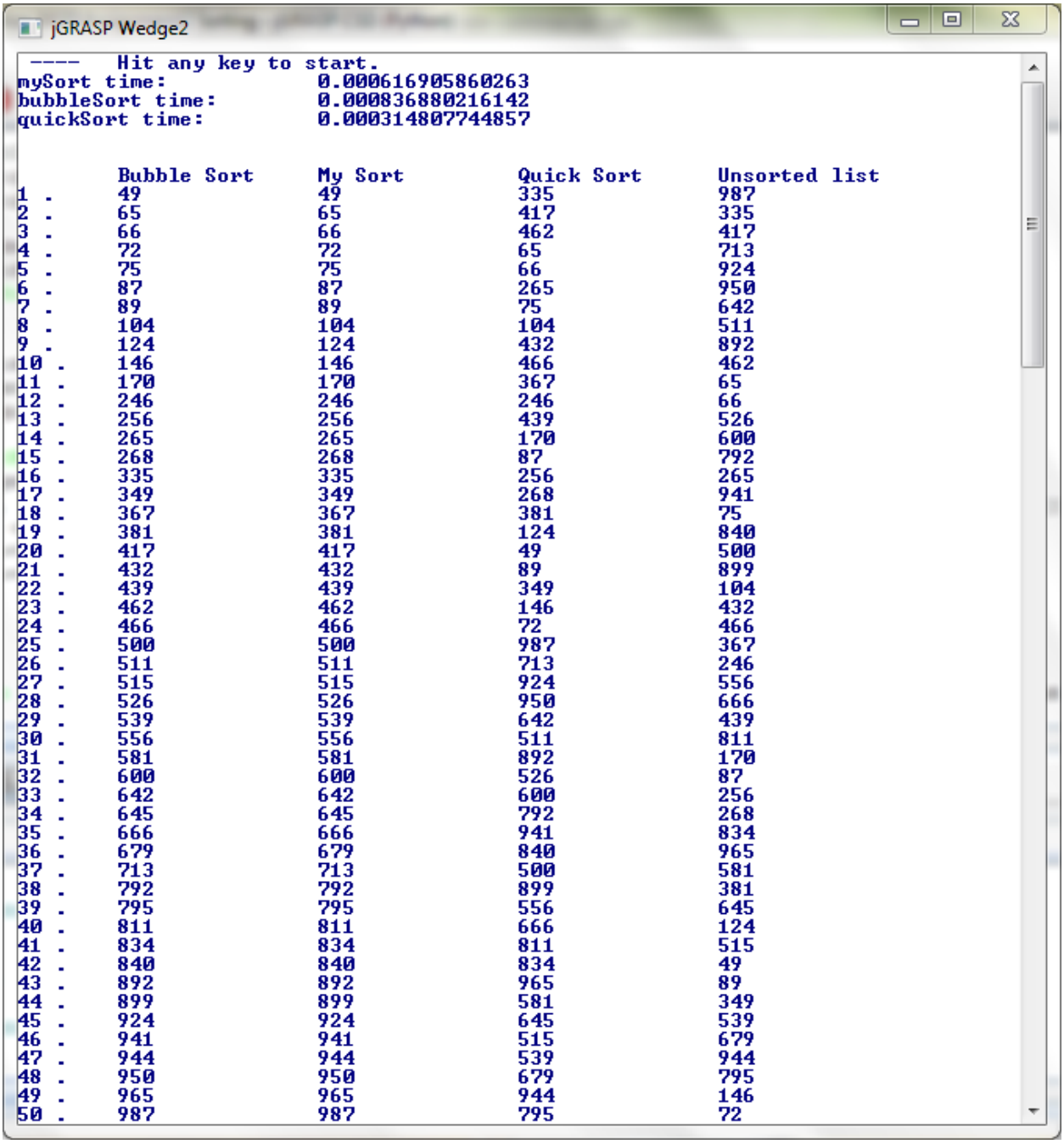
The bubble sort was pretty easy to implement. My sort started at both ends of the list, searching for the highest and lowest numbers respectively. After the highest and lowest numbers were found my markers both moved in one position from the ends of the list. Once they met at the middle the list was sorted.

What did not work?:

When it came to the quick sort I epically failed. My plan was to pick the pivot point similarly to how we did in class for the guess the number between one and a million exercise. I picked 500 at first, sorting that into two lists, one of elements more than 500 the other of elements that are less. Then use recursion to pass 250 and 750 as the pivot points for those two lists respectively and so on. I could only get the method to do the first split, so the quicksort method only sorts the numbers to below and above 500.

Comments:

I used the build in time.clock() method to time my sorting algorithms. The quicksort time was by far the fastest, but my sort was faster than the bubble sort. However my sort was more difficult to implement than the quicksort, and not as fast so it is probably not a practical sort. The bubble sort was by far the easiest to implement, but had the worst time complexity.



	Bubble Sort	My Sort	Quick Sort	Unsorted list
1 .	49	49	335	987
2 .	65	65	417	335
3 .	66	66	462	417
4 .	72	72	65	713
5 .	75	75	66	924
6 .	87	87	265	950
7 .	89	89	75	642
8 .	104	104	104	511
9 .	124	124	432	892
10 .	146	146	466	462
11 .	170	170	367	65
12 .	246	246	246	66
13 .	256	256	439	526
14 .	265	265	170	600
15 .	268	268	87	792
16 .	335	335	256	265
17 .	349	349	268	941
18 .	367	367	381	75
19 .	381	381	124	840
20 .	417	417	49	500
21 .	432	432	89	899
22 .	439	439	349	104
23 .	462	462	146	432
24 .	466	466	72	466
25 .	500	500	987	367
26 .	511	511	713	246
27 .	515	515	924	556
28 .	526	526	950	666
29 .	539	539	642	439
30 .	556	556	511	811
31 .	581	581	892	170
32 .	600	600	526	87
33 .	642	642	600	256
34 .	645	645	792	268
35 .	666	666	941	834
36 .	679	679	840	965
37 .	713	713	500	581
38 .	792	792	899	381
39 .	795	795	556	645
40 .	811	811	666	124
41 .	834	834	811	515
42 .	840	840	834	49
43 .	892	892	965	89
44 .	899	899	581	349
45 .	924	924	645	539
46 .	941	941	515	679
47 .	944	944	539	944
48 .	950	950	679	795
49 .	965	965	944	146
50 .	987	987	795	72

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'''
************************************************************
 * Discrete Structures
 * Sorting Program
 * Programmer: Mark Eatough
 * Course: CSIS 2430
 * Created September 1, 2013

 *This program takes a list of 50 unsorted integers that
 *were randomly selected between 1 and 1000.  The program
 *sorts the list using a bubble sort, a quick sort, and a
 *sort that I came up with and them times how long the sorts
 *took
 ************************************************************
 '''

import time
from random import randint
#create a list to store my data
randList = []
pivot = 500

#populate my list with 50 random integers between 1 and 1000
for i in range(0, 50):
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    randList.extend([randint(1, 1000)])

randList2 = randList[:]
randList3 = randList[:]
randList4 = randList[:]

firstSum = 0
secondSum = 0
thirdSum = 0

# quicksort method
def quickSort(r, pivot):
    quickStart = time.clock()
    greater = []
    less = []
    for i in range(len(r)):
        if(r[i] < pivot):
            less.append(r[i])
        if(r[i] >= pivot):
            greater.append(r[i])

    r = less[:] + greater[:]
    print "quickSort time: \t", (time.clock() - quickStart)
    return r
```

```
#bubble sort method
def bubbleSort(r):
    start = time.clock()
    k = 0
    l = 0
    for k in range(len(r)-1):
        for l in range(len(r)-1):
            if r[l] > r[l+1]:
                temp = r[l]
                r[l] = r[l+1]
                r[l+1] = temp
    print "bubbleSort time: \t", (time.clock() - start)

#my sort method
def mySort(r):
  myStart = time.clock()
    leftSide = 0
    rightSide = len(r)-1

    #nested while loop to sort list
    while(leftSide < len(r)/2):
        lCounter = leftSide
        rCounter = rightSide
```

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 lowTemp = r[leftSide]
 highTemp = r[rightSide]
 lowIndex = leftSide
highIndex = rightSide
 swap = 0;
 #inner while loop
 while(lCounter < len(r)/2):
    if(lCounter < rCounter):
       if(r[lCounter] < lowTemp):
          lowTemp = r[lCounter]
          lowIndex = lCounter
          swap+=1
       if(r[rCounter] < lowTemp):
          lowTemp = r[rCounter]
       if(r[lCounter] > highTemp):
          highTemp = r[lCounter]
       if(r[rCounter] > highTemp):
          highTemp = r[rCounter]
       lCounter+=1
       rCounter-=1
 if(leftSide >= rightSide-1):
   if(r[leftSide] > r[rightSide]):
       lowTemp = r[rightSide]
       r[rightSide] = r[leftSide]
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            r[leftSide] = lowTemp
        else:
            lowIndex = r.index(lowTemp)
            r[lowIndex] = r[leftSide]
           r[leftSide] = lowTemp
            highIndex =  r.index(highTemp)
            r[highIndex] = r[rightSide]
            r[rightSide] = highTemp

        leftSide+=1
        rightSide-=1
    print "mySort time: \t\t", (time.clock() - myStart)



mySort(randList2)
bubbleSort(randList)
randList3 = quickSort(randList3, pivot)

print "\n\n\tBubble Sort\tMy Sort\t\tQuick Sort\tUnsorted list"
for j in range(len(randList2)):
    print j+1, ".\t", randList[j], "\t\t", randList2[j], "\t\t",
randList3[j], "\t\t", randList4[j]
   secondSum += randList2[j]
    firstSum += randList[j]
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    thirdSum += randList3[j]
print "\n\n\n first sum = ", firstSum, "\n second sum = ",
secondSum, "\n third sum = ", thirdSum
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