Sort Test Draft

Shukry Zablah

2019-02-18 Thu

Contents

1 Sort Test (Performance Evaluation Project 1)

1.1 Sample Use

We provide a command line utility to run a variety of sorting algorithms with a variety of options.

To compile we use the following command:

```
gcc sorttest.c -o sorttest -lrt
```

Note that we need to link the `librt.a` library when we compile a program that uses the `clock_gettime` function.

Suppose we want to time the `merge_sort` algorithm on an array of 1000 random values for values under ten thousand, and we want to repeat this 10 times.

We can run the compiled executable in the command line as follows:

```
./sorttest merge 1000 10000 10 TRUE

merge,1000,10000,10,628059
merge,1000,10000,10,478565
merge,1000,10000,10,462982
```

```
merge,1000,10000,10,459839
merge,1000,10000,10,460290
merge,1000,10000,10,462772
merge,1000,10000,10,459828
merge,1000,10000,10,460089
merge,1000,10000,10,481532
merge,1000,10000,10,458632
Correctly Sorted: 10/10
```

The program prints the algorithm, the length of the input, the range of the values, the number of repetitions, and the elapsed time in nanoseconds in that order. The output is in a csv format.

We used the option TRUE in our command in order to run a function that verifies the array is sorted. Normally you would use the FALSE option to omit this step.

In order to automate our data collection we create a small bash script called `driver.sh` that contains the commands we will run. (Remember to use `chmod +x <file>` to be able to execute scripts).

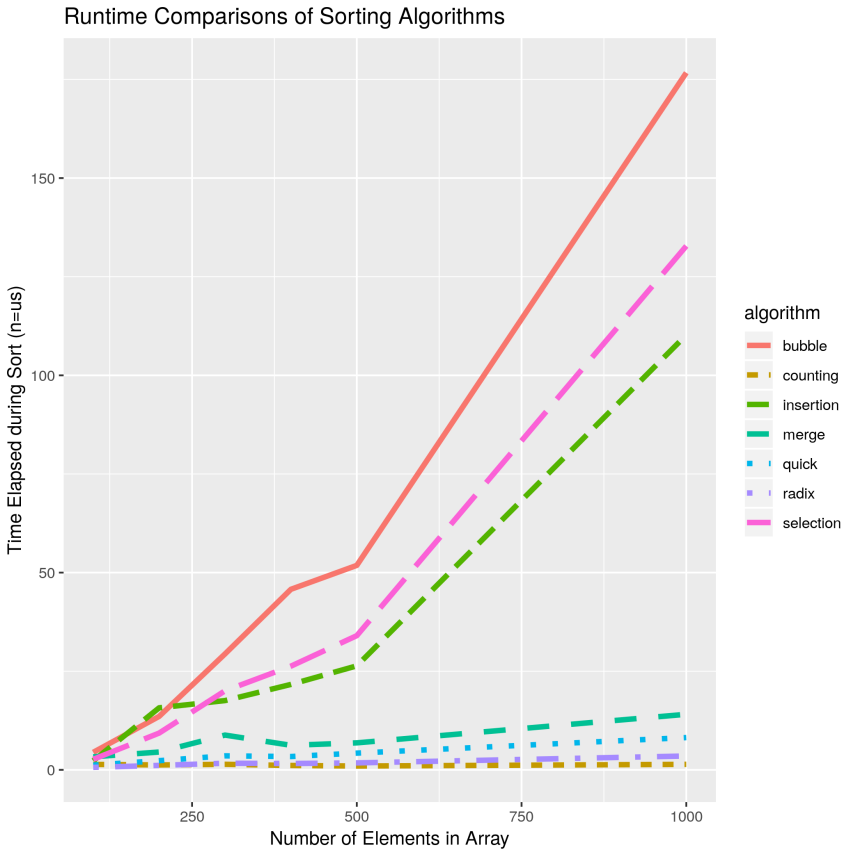
In order to create a csv file that contains all of our collected data we redirect the output of the program into the `test.csv` file.

```
./driver.sh > test.csv
```

After collecting our data we use an R script in order to generate a plot of the elapsed times. Again, we allow the script to be executable for convenience.

```
./analyze.R
```

Now we can check the current directory in order to retrive the image of our plot.



Remember that we can change:

- the sorttest.c file to change the behavior of the timing programs and the way data is created
- the driver.sh file to specify sorttest input to decide what data to collect
- the analyze.R to create different plots and manipulate data

1.2 Supported Algorithms

- bubble
- counting
- insertion
- merge

- quick
- radix
- selection

1.3 Todos [6/8]

- ☒ add initial support for choosing algo, num values, and range
- ☒ support for repetitions (right now the reps arg doesn't matter)
- ☒ support for verification of sorting (as an additional arg)
- ☒ use high precision methods ($\text{clock}_{\text{gettime}}$)
- ☒ update readme for sample workflow with bash and R
- ☒ fix counting sort not working
- ☐ add more clever timing scheme
- ☐ brainstorm possible timing setups

1.4 Helpful Links

`https://www.cs.rutgers.edu/~pxk/416/notes/c-tutorials/gettime.html`