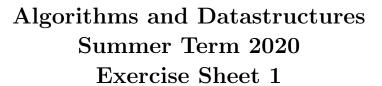
University of Freiburg Dept. of Computer Science Prof. Dr. F. Kuhn P. Bamberger P. Schneider



Due: Wednesday, 20th of May, 4 pm.

Exercise 1: Registration

Register for the online course system Daphne. You can also find the according link on the Website of this course. Make sure that your data is correct, specifically that you can be reached under the given email address. Then execute the *checkout* command on your SVN-repository.¹

Exercise 2: Quicksort

Implement the algorithm *QuickSort* from the lecture. A template QuickSort.py is provided on the website. Write a unit test both for the quicksort_divide and the quicksort_recursive method. The unit tests should check at least one non-trivial example. If there are critical cases that are easy to check (e.g., an empty input), you should make a unit test for these cases, too.

Exercise 3: Time Measurement

Measure the runtime T(n) of the algorithms SelectionSort, MergeSort² and of your QuickSort implementation for different input sizes n. You should test QuickSort for two different variants of choosing the pivot: Choosing the first element as pivot and choosing a random element as pivot. Repeat the experiment for two different input types: Arrays with random integers and arrays with pairwise distinct integers in descending order.

Plot the runtimes of the *four* algorithms algorithms each with the *two* different input types with input sizes $n \in \{100, 200, \ldots, 5000\}$.³ Use your plots to compare the runtimes and write a short evaluation into the file experience.txt (c.f., Task 4).

Exercise 4: Submission

Commit your code including the tests and the 8 plots into the SVN, into a subfolder uebungsblatt-01 (German for exercise sheet 01). Make sure that there are no errors when you run your code (including style check and unit tests) on Jenkins. Commit a file experience.txt in which you describe your experiences with this exercise sheet and any problems that may have appeared.

(5 Points)

(5 Points)

(5 Points)

(5 Points)



¹Your SVN-repository will be created automatically after your registration to Daphne. The URL is https://daphne.informatik.uni-freiburg.de/ss2020/AlgoDat/svn/your-rz-account-name

²You can find the code for these algorithms in the public repository https://daphne.informatik.uni-freiburg.de/ ss2020/AlgoDat/svn/public

³The differences in runtimes will be most distinct if they are plotted in a single chart with n on the x-axis and the runtime T(n) on a logarithmic y-axis.