Institut for Matematik og Datalogi
Syddansk Universitet

September 10, 2003
JFB

DM19 – Algorithms and Complexity – E03 – Lecture 3

Announcement

There will be a second discussion section for DM19. It will take place on Fridays from 10:15 to 12, starting September 19. It will be in U68, except on October 10, November 7, and November 14, when it will be in U82E.

Lecture, September 8

We covered counting sort from section 8.2 of the textbook, and information theoretic lower bounds from section 2.4 of the first set of notes. We began on adversary arguments from sections 3.1 and 3.2 of the same set of notes.

Lecture, September 15

Paul Medvedev will lecture on string matching from chapter 32. (Note that I will be out-of-town all week and will be unable to hold office hours.)

Lecture, September 22

We will cover section 3.3 and 3.5 of the first set of notes, plus median finding from chapter 9 (sections 9.2 and 9.3) in the textbook.

Problems to be discussed in week 39

Do the following problems from chapter 32 of the textbook:

- 32.1-2

- 32.2-1, 32.2-3

- 32.3-1, 32.3-3, (32.3-5 if there is time)

- 32.4-1, 32.4-3, 32.4-5

Problems to be discussed in week 40

- From Baase's textbook: How many comparisons are done by the tournament method to find the second largest item on average if n is a power of 2?

- From Baase's textbook: Suppose $L1$ and $L2$ are arrays, each with n keys sorted in ascending order.

  - Devise an $O((\lg n)^2)$ algorithm to find the nth smallest of the $2n$ keys. (For simplicity, you may assume the keys are distinct.)
  - Give a lower bound for this problem.

- Design an algorithm for finding the second largest item in array, which is similar to the standard algorithm for finding the largest. Keep track of the largest and second largest at each step. How many comparisons does your algorithm do in the worst case?

- Design an efficient algorithm to find the third largest item in an array.

- Do the following problems from the textbook: 9.3-3, 9.3-7, and 9.3-9.