Institut for Matematik og Datalogi
Syddansk Universitet

April 2, 2019
JFB

On-Line Algorithms – F19 – Lecture 12

Lecture, April 1

(On March 27, we reviewed the answers to the problems on the first assignment and did a midway course evaluation.) Continuing with the paper on the relative worst order ratio, we covered Section 3.

Lecture, April 3

We will cover the definitions for relatedness and weakly comparable in Section 2 and Theorem 7 of Section 5. We will begin on the k-server problem from sections 10.1, 10.2, and 10.4 of Chapter 10, in the textbook. We may begin on Chapter 12 in the textbook.

Lecture, April 9

We will finish Section 10.4 and begin on Chapter 12, in the textbook.

Problems for April 8

1. The problems not finished on April 2.
2. What is the complexity of the dynamic programming procedure used for computing the cost of an optimal offline algorithm for the k-server problem when the request sequence is of length n. For the special case of a uniform metric space a faster algorithm exists. What is its complexity?
3. Define and analyze a lazy version of DC for paging.
4. Exercise 10.1.

5. Define a lazy version of DC on the line.

   (a) Using relative worst order analysis, show that your algorithm, Lazy Double Coverage, is at least as good as Double Coverage (DC) for three points on the line.

   (b) Show that the greedy algorithm, Greedy, is optimal for three points on the line, according to bijective analysis. To do this, for every algorithm, Alg, you need to find a bijection, f, from sequences of length n to sequences of length n, such that for large enough n, for any sequence I of length n, $\text{Greedy}(I) \leq \text{Alg}(f(I))$.

6. (Easy if you know enough about NP-Completeness) Show that the makespan pro blem for identical machines is NP-hard.