Institut for Matematik og Datalogi
Syddansk Universitet

April 21, 2017
JFB

On-Line Algorithms – F17 – Lecture 16

Lecture, April 21

We continued with chapter 12 in the textbook, finishing up through Theorem 12.4. We may begin on the article "Online Bin Packing with Advice", Joan Boyar, Shahin Kamali, Kim S. Larsen, Alejandro López-Ortiz. *Algorithmica*, 74(1): 507-527, 2016. The publication is available through the course's homepage.

Lecture, April 26

We will finish section 12.2.3 in the textbook and begin on the article "Online Bin Packing with Advice", Joan Boyar, Shahin Kamali, Kim S. Larsen, Alejandro López-Ortiz. *Algorithmica*, 74(1): 507-527, 2016. The publication is available through the course's homepage.

Lecture, May 2

We will finish the article "Online Bin Packing with Advice", and begin on the article "The Advice Complexity of a Class of Hard Online Problems", Joan Boyar, Lene M. Favrholdt, Christian Kudahl, Jesper W. Mikkelsen. *Theory of Computing Systems*, First Online 2016. The publication is also available through the course's homepage.

Problems for May 3

1. For makespan in the related machines case, where would advice be useful?

2. Suppose you have a randomized algorithm for a problem, X, which chooses using a uniform distribution between 8 deterministic algorithms

for X, and achieves a competitive ratio of 2. Can you define a good deterministic algorithm with advice for X? Can you say something in general about the relationship between mixed algorithms and advice complexity.

3. For the ski rental problem (see the slides), what is the competitive ratio of the randomized algorithm that on a request (whenever it hasn't yet bought the equipment) decides to buy with probability p and to rent with probability $1-p$? (It will be a function of p and the cost of buying, d.)

4. Work out the advice string for optimality for paging, with $k = 5$, for the following request sequences: $\langle 1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6\rangle$, $\langle 1, 2, 3, 4, 5, 6, 5, 4, 3, 2, 1, 2, 3, 4, 5, 6\rangle$. When $N = k + 1$, less advice is sufficient. What?