DM538 – Weekly Note 12

Lecture, week 49

Monday, December 3

Kleinberg and Tardos: Algorithm Design (photocopies)

- We will finish Section 13.4 about MAX-3-SAT.
- Section 13.5: Median Finding and Quicksort
- Section 13.6: Hashing: A Randomized Implementation of Dictionaries

Exercises, week 49

Thursday, December 6

1. Recall that the contraction algorithm of Section 13.2 has a probability of at least $1/\binom{n}{2}$ for finding a *global minimum cut*. Suppose that, at each step of the algorithm, instead of choosing a random edge for contraction we choose two vertices at random and coalesce them into a single vertex (as if we were contracting an edge between them).

    Show that there are inputs on which the probability that this modified algorithm finds a minimum cut is exponentially small.

2. This exercise is about finding a *global minimum cut in a weighted graph*. In a weighted graph, the weight of a cut (A, B) is the total weight of the edges between A and B, and a minimum cut is a cut of minimum weight.

    How would you adapt the contraction algorithm to this problem?

3. Argue that, in principle, you can always convert a Las Vegas algorithm to a Monte Carlo algorithm, but you cannot necessarily convert a Monte Carlo algorithm to a Las Vegas algorithm.

4. Exam January 2012 Problem 2 b)-d)

5. This exercise is about *coloring the vertices of a graph*. There are 3 colors available, and the aim is to maximize the number of edges that have endpoints with different colors.

    Give a randomized algorithm that colors the vertices such that, in expectation, $2/3$ of the edges will have endpoints with different colors.

6. Consider a very simple *online auction system*:
    There are n bidding agents, and each agent has a bid. Assume that all bids are distinct from one another.
    The bidding agents appear in an order chosen uniformly at random, and at all times, the system maintains a variable b^* equal to the highest bid so far.
    What is the expected number of times that b^* is updated?

Lecture, week 50

Monday, December 10

Kleinberg and Tardos: Algorithm Design (photocopies)

- Section 13.9: Chernoff Bounds
- Section 13.10: Load Balancing

Instruktorater

Hjælp dine medstuderende, dygtiggør dig selv og få penge for det. Søg i dag!

Der er ofte gode muligheder for at få et instruktorat, selvom man ikke er langt henne i studiet. Se nærmere information på

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http://www.jobs.sdu.dk/vis_stilling.php?id=7749&lang=da
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Instruktorer, der ifølge deres seneste ansættelseskontrakt allerede er ansat for foråret 2013, skal naturligvis ikke søge på stillingsopslaget. I stedet indleverer de ønsker om undervisning i foråret 2013, liste over tidligere undervisningserfaring, samt udskrift af eksamensprotokol til IMADA's sekretariat.

Der ydes hjælp til nye instruktorer i form af møder og diskussion i et mindre omfang.

Hvis du har spørgsmål, så henvend dig gerne på IMADA.

ANSØGNINGSFRIST: **12. december 2012 kl. 12.00**