Institut for Matematik og Datalogi
Syddansk Universitet

November 29, 2006
JBJ

DM19 – Fall06 – Weekly note 12

Stuff covered November 29, 2006

We finished Chapter 35 on Approximation algorithms and also covered Section 5.2 by Motwani and Raghavan in DM19 notes on randomized approximation algorithms for Max SAT. We also introduced the notion of heuristics and discussed various construction heuristics. Material Chapter 10 in DM19 notes.

Exercises December 5, 2006

- 35.5-4 page 1049.
- 35.4 page 1051
- 35.5 page 1051
- Consider the following problem called **E1-2AUG**: The input is a graph $G = (V, E)$ a spanning tree $T = (V, F)$ of G and a weight function ω on $E' = E \setminus F$. Find a minimum weight subset $A \subseteq E'$ so that adding these edges to T results in a 2-edge-connected spanning subgraph of G. Recall that $H = (V, E)$ is 2-edge-connected if and only if for every partition of V into sets $U, V \setminus U$ at least two edges of E have an endpoint in both U and $V \setminus U$. Let us say that an edge $uv \in E'$ **covers** the edge st of T if st is on the unique path from u to v in T.

  1. Show that adding $A \subseteq E'$ to T will give a 2-edge-connected graph if and only if every edge in T is covered by at least one edge in A.
  2. Formulate **E1-2AUG** as a set covering problem. Hint consider for each $e \in E'$ the set S_e consisting of those edges of T that are covered by e.
  3. Suppose A is the set of edges of a minimum spanning forrest (that is, a minimum spanning tree in each connected component) of the graph $H = (V, E')$ obtained by deleting all edges of T from G. Prove that if G is 2-edge connected then A covers each edge of T at least once.
  4. Describe various construction heuristics for **E1-2AUG** based on the observations above. Try to find as many heuristics as you can and be ready to argue that they work (result in 2-edge-connected graphs).

Lecture December 6, 2006

We will finish Chapter 10 from DM19 notes on heuristics and also cover part of the notes on Branch and Bound in DM19 notes.

Test exam

We discussed the possibility of having a test exam in week 51 where 2-3 of you volunteer to present 2-3 of the exam questions (they will be available next week and a almost identical to the one from last year). We will conduct it as a normal exam except that the two persons would be given the question in advance (no draw and preparation as at the exam). Also there will not be questions in other areas of the pensum as there normally will in the last 10 min (other than posibly in areas very close to the given question).

If I get 2-3 volunteers by next week, then I will select one of the two slot for exercises in week 51 and us that for the "exam".

I strongly encourage you to volunteer for this event. You will help yourself and your fellow students. Of course, no matter how you perform at this exam it will have no influence on the evaluation of your real exam.