Institut for Matematik & Datalogi
Syddansk Universitet

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JBJ

DM63 Meta-heuristics — Ugeseddel 6

Lecture on October 13, 2005

I introduce the noising method and the guided local search method. Notes pages 109-126 and 176-189.

There are no lectures in week 42.

Plan for the rest of the semester

We will meet on October 27 where I will give hints on how to tune the various metaheuristics and explain how to make a good project in DM63. After that there will be no more lectures. From now on you should work on the implementation of the various methods we have covered and experimenting with these so that you are well prepared when the exam project is handed out. This will happen on November 1st where I will make the project text available on the www page for the course. From then on you will have about 6 weeks until you must hand in your report. **Remember that it is strictly forbidden to collaborate on the project!**

Exercises on the noising method:

1. Implement a raw noising algorithm for the graph partitioning problem
2. Experiment on various input graphs in order to investigate the following
   (a) What are good choices for $RATE_{min}$ and $RATE_{max}$
   (b) Should all edges be added the same noise, or should one noise each edge independently?
   (c) How many cycles and how many iterations per cycle should be made?
   (d) Is the modified noising method (as described in the paper Sudhakar et al, see weekly note 4) better than the original method by Charon and Hudry?
   (e) is it better to alternate between moves and swaps of 2 elements than always using the same one of those for selecting the next neighbour?
   (f) What are good values to the counter *stopcount* in Sudhakar page 106?
   (g) Experiment with the test data you have found to see if the conclusions in Table 4 of Sudhakar holds when you compare the three variants of the noising method (the standard one, the modified making only moves and the modified where we alternate between moves and exchange).

Exercises on the guided local search algorithm:

1. Implement a scheme for applying guided local search on the graph partitioning problem. That is,
   (a) Identify/choose which properties of local minima to penalise.
   (b) Decide what the cost c_i of posessing property i should be.
   (c) Implement a function for calculating the utility of properties and finding those which have the maximum utility.
   (d) Decide on a starting value of the parameter λ.
   (e) Implement a function for calculating the new objective function as described in (1) on page 181 in the notes.

2. Eksperiment with different values of λ and also the c_i's to see which choices give the best solutions.

3. Try with various defintions of properties to see whether it makes a difference.

4. Implement a variant of fast local search (FLS) and apply that together with your GLS algorithm. Do you get better results that way?