TRANSP-OR

Introduction
à l'optimisation
Fall 2014 - 2015

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Heuristiques

Question 1:

(À résoudre sur le tableau par le chargé de cours)

Suppose we have a set of courses that must take place in a lecture hall. The lecture hall can be used only by one course at a time. Each course i has a start time s_i and a finish time f_i, where $s_i \leq f_i$. If selected, course j takes place during the half-open time interval $[s_j, f_j)$. Courses i and j are compatible if the intervals $[s_j, f_j), [s_i, f_i)$ do not overlap (i.e., i and j are compatible if $s_i \geq f_j$ or $s_j \geq f_i$).

a) Propose a greedy algorithm to find maximum-size of mutually compatible courses. Use course duration as a selection criterion.

b) For the same problem sort courses based on the start time and find the maximum-size of mutually compatible course.

c) Repeat the above step, this time use the ending time as selection criterion.

d) Extend the above algorithm to minimize the number of required lecture-hall.

Course (i)	Start time (s_i)	End time (f_i)
1	1	4
2	8	12
3	0	6
4	2	13
5	5	7
6	5	9
7	6	10
8	3	5
9	8	11
10	12	14
11	3	8

Heuristiques

Question 2:

(À résoudre par les étudiants en classe)

Assume that you are applying simulated annealing to the traveling salesman problem.

a) What is the main difference between 2-opt and simmulated annealing search strategy?

b) Considering the pseudo-code of simulated annealing algorithm (presented in the course). Indicate how you could change it so that the algorithm only accepts better solutions?

c) Fill out the following table:

$f(x_c)$	$f(y)$	T	Random r	$e^{-\delta/T}$	Decision
15	16	20	0.34		
13	25	25	0.67		
75	76	276	0.91		
1378	1256	100	0.82		

Question 3:

(À résoudre par les étudiants en classe s'il y a le temps, sinon à résoudre à la maison)

Mr. Jones drives an automobile from Lausanne to Amsterdam. His car gas tank, when full, holds enough gas to travel n kilometers, and his map gives the distances between gas stations on his route. He wishes to make as few gas stops as possible along the way.

a) Give a lower bound on the minimum number of stops.

b) Give an efficient method by which he can determine at which gas stations he should stop.