

Problem Solving and Search in Artificial Intelligence

Final Exam, 22.06.2018

Student: _____

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I. (Closed book part of the exam) - 14 points

1. Which are important issues in automated algorithm selection? (7p)
2. Suppose that your algorithm includes several parameters. Would you use the offline or online parameter tuning (argue your answer)? (7p)

II (Open book part of the exam) - 46 points

Consider the traveling tournament problem defined below (definition taken from master thesis of Bong Min Kim, TU Wien, 2012):

Given n teams with n even and an $n \times n$ symmetric distance matrix D , where $D(i, j)$ represents the distance between the cities of team T_i and T_j , the goal in solving the traveling tournament problem is to find a valid double round robin schedule, such that the total traveling distance of all teams is minimized. A schedule is valid for the traveling tournament problem, if it satisfies the following constraints:

- Double Round-Robin constraint: Each team plays with each other team exactly two times, once in its own city and once in its opponent's city
- AtMost constraint: Each team must play no more than U and no less than L consecutive games in or away from the home city
- NoRepeat constraint: It is not allowed that two teams are playing each other in two consecutive rounds

1. Find an appropriate problem representation for this problem and define two moves for generation of neighborhood solutions. (10p)
2. Define an objective function that could be used by local search for this problem. (5p)
3. How could you apply tabu list for this problem. Present few steps of tabu search algorithm. (8 p)
4. Suppose that you have to only find a valid double round robin schedule. Formulate this problem as a CSP problem (define variables, domains of variables, and formulate formally the constraints) (18 p)
 - a. Illustrate how you could solve this problem by using forward checking (only few steps)
 - b. Draw a part of constraint graph for this problem. Do you think that this graph will have small tree width (explain your answer)
5. Explain shortly how you could apply min-conflicts heuristic for this problem. (5 p)