

Methods and Models for Combinatorial Optimization

Lab exercise - Part II

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For the combinatorial optimization problem described in Part I, it is required to: Per il problema di ottimizzazione combinatoria descritto nella Parte I, si richiede di:

- design and implement an ad-hoc optimization algorithm, as an alternative to solving the implemented model with Cplex. Any meta-heuristic can be developed, as well as any of the approaches presented for the Travelling Salesman Problem (e.g., a Branch-and-cut approach based on separating sub-tour elimination constraints). You can also keep inspiration from any method you can find in literature for related problems, if it is related to the content of the course: if you decide to start from literature, you should ask to the teacher.
- test the performance of the implemented method, present the computational results and compare the results to the ones obtained with the model solved by Cplex in Part I (use the same instance generated for Part I). Typical questions to be addressed during the performance test are: what are the running times? what is the gap with respect to the optimal solution? It is better to use the proposed heuristic or the Cplex model? etc. Notice that, you should have more than one instance per size, so that average results should be provided. Moreover, in case the implemented algorithm has randomized components, you should rerun several (e.g. 10) times the algorithm on the same instances and collect statistics (average times or performance, standard deviations, min, max etc.).
- write a final report (10-20 pages) where you describe how you implemented the model of Part I in Cplex (some implementation details, for example, about the maps used to access variables, or how you created variables and constraints), some design issue concerning the algorithm of Part II (not the general heuristic or branch-and-bound that one can find in the notes or in a book, but how the method was customized), and the computational results (summarizing tables and some comments) of both Part I and Part II, and their comparison.