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Impact of Specialized Valid Inequalities for the Driver Rostering Problem for Mass Transit Systems

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Abstract

This work presents the improvements found with the implementation of specialized valid inequalities created specifically to solve the rostering problem for mass transit systems, specific for small and medium size problems. The addition of new equations to the base mathematical model allows the analysis of a specific type of characteristics, time frames, driver specifications per driver and rest times. The difficulty found by solving the problem by adding the rostering analysis in the representation process by adding traditional equations can obstruct the automatized solution process, hence by adding valid inequalities generated by an extended breakdown of the computational behavior found in traditional solutions and new mathematical representation, were the specific analysis of certain situations and limitations included in actualized mathematical models for the crew scheduling problem, assures a more profound revision of the performance and problematic characteristics that affects the solution process. The results shown interesting results, regarding mathematical representation and model actualization, related with the topology and the size of each test system solved in this work, resulting in a new approach to find a base structure of attributes that represents each problem. This work uses the language C++ with the commercial solver Cplex, to ensure the optimal solution for small and medium size systems, searching a better computational performance, and reducing computational effort. The model and proposed valid inequalities are proved using test systems available in the specialized literature.

Keywords
Driver scheduling, driver rostering, exact optimization, specialized cuts, mathematical optimization

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