

Combining Metaheuristics and Integer Programming on School Timetabling problems

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Abstract

Fischetti and Lodi (2003) proposed the use of general MIP solvers to explore large neighborhoods around reference solutions. In the original article, this appeared as a branching strategy aimed at improving the practical behavior of exact methods, producing better solutions earlier. As predicted in this work, the potential of similar techniques in a heuristic context was worthy of further investigation. A number of papers on that subject, MIP based heuristics, already appeared. In particular, Hansen and others borrowed VNS concepts to improve such heuristics. In this work we explore the use of MIP search to improve a Tabu Search for a Class x Teacher Timetabling Problem. Besides exploring neighborhoods around reference solutions we consider exploring “ellipsoidal” neighborhoods, which uses information from pairs of solutions from an Elite Pool. Proposals for automatic neighborhood size selection are also discussed. Computational experiments demonstrate that significant improvements can be achieved with the proposed method.