Decomposition methods for sports scheduling problems

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Abstract

Generating a sports league schedule is a challenging task due to the variety of different requirements which have to be addressed. The basic problem is to find a schedule for a single/double round robin tournament in which every team plays against each other team exactly once/twice, and every team plays one game per round. Additionally, several side constraints have to be respected, e.g., the avoidance of breaks (consecutive home/away games of a team), fairness issues (like opponent strengths, carry-over effects), the consideration of regions or wishes of teams and media.

This variety of specific problem settings has led to a multitude of alternative approaches (cf., e.g. [1] [2], [3], [4]). Due to its complexity, the problem is often solved by decomposition techniques, i.e., it is divided into different subproblems which are solved consecutively. In this talk, the following three approaches are discussed:

In a "first-schedule, then-break" approach, in the first stage it is decided which teams play against each other in which round. Afterwards, in the second stage home-away patterns (with a minimum number of breaks) corresponding to the pairings from the first stage are determined. In a "first-break, then-schedule" approach, at first home-away patterns are generated for the teams. Then, the subproblem of the second stage consists in finding a corresponding feasible schedule. In a "first assign modes, then schedule" approach, at first for each game a home team is fixed. In the second stage, all games are scheduled in these fixed modes taking into account additional constraints.

References

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