Analyzing Constraints Influence in the Design of Rotating Crew Schedules

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Abstract

The rotating crew scheduling problem can be modelled as an optimization problem in which there are several constraints regarding the shifts of the workers and one commonly used objective function is to balance the number of hours per week for every worker. Often, managers prefer to be presented with an array of solutions from which they can make a selection, and there are constraints which reduce the feasibility space more than others. Our aim is to provide the set of all solutions rather than a unique optimal solution as well as to analyze the effect of the constraints in this solution set. For that aim, we follow an algebraic computational approach that solves both days off and shift assignment problems related to the design of rotating schedules ([1]). Specifically, we determine a set of Boolean polynomials whose zeros can be uniquely identified with the set of rotating schedules related to a given workload matrix and with the constraints imposed to them.

References

1. R. Falcón and E. Barrena and D. Canca and G. Laporte. Counting and enumerating feasible rotating schedules by means of Gröbner bases. Mathematics and Computers in Simulation. DOI:10.1016/j.matcom.2014.12.002.