

**Fages, Jean-Guillaume; Lapègue, Tanguy****Filtering AtMostNValue with difference constraints: application to the shift minimisation personnel task scheduling problem.** (English) Zbl 1407.90150

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Summary: The problem of minimising the number of distinct values among a set of variables subject to difference constraints occurs in many real-life contexts. This is the case of the Shift Minimisation Personnel Task Scheduling Problem, introduced by Krishnamoorthy et al., which is used as a case study all along this paper. Constraint-Programming enables to formulate this problem easily, through several `AllDifferent` constraints and a single `AtMostNValue` constraint. However, the independence of these constraints results in a poor lower bounding, hence a difficulty to prove optimality. This paper introduces a formalism to describe a family of propagators for `AtMostNValue`. In particular, we provide simple but significant improvement of the state-of-the-art `AtMostNValue` propagator of Bessière et al., to filter the conjunction of an `AtMostNValue` constraint and disequalities. In addition, we provide an original search strategy which relies on constraint reification. Extensive experiments show that our contribution significantly improves a straightforward model, so that it competes with the best known approaches from Operational Research.

**MSC:****90B35** Deterministic scheduling theory in operations research**68T20** Problem solving in the context of artificial intelligence (heuristics, search strategies, etc.)**90C10** Integer programmingCited in 2 Documents**Keywords:**constraint-programming; global constraints; `AtMostNValue`; shift minimisation personnel task scheduling problem**Software:**Algorithm 457; `AllDifferent`; `AtMostNValue`; Choco; CSDP; ptsplib; SDPLR**Full Text:** [DOI](#)**References:**

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