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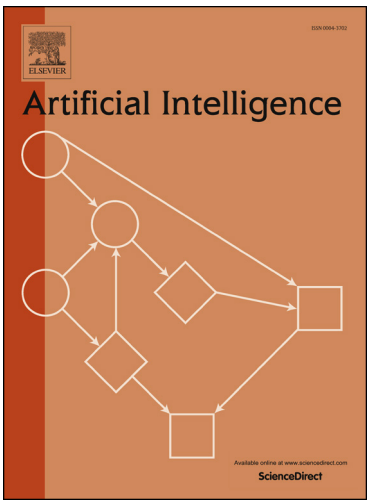

WPM3: An (in)complete algorithm for weighted partial MaxSAT

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PII: S0004-3702(17)30069-3
DOI: http://dx.doi.org/10.1016/j.artint.2017.05.003
Reference: ARTINT 3016

To appear in: *Artificial Intelligence*

Received date: 22 June 2016
Revised date: 14 May 2017
Accepted date: 29 May 2017

Please cite this article in press as: C. Ansótegui, J. Gabàs, WPM3: An (in)complete algorithm for weighted partial MaxSAT, *Artif. Intell.* (2017), http://dx.doi.org/10.1016/j.artint.2017.05.003

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WPM3: an (in)complete algorithm for Weighted Partial MaxSAT

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Abstract

Maximum Satisfiability (MaxSAT) has been used to solve efficiently many combinatorial optimization problems. At recent editions of international MaxSAT Evaluation (MSE), the best performing solvers for real world (industrial) problems were those implementing SAT-based algorithms. These algorithms reformulate the MaxSAT optimization problem into a sequence of SAT decision problems where Pseudo-Boolean (PB) constraints may be introduced. In order to identify the most suitable PB constraints, some algorithms (core-guided) analyze the unsatisfiable cores retrieved from the previous SAT problems in the sequence while refining the lower bound. In this paper, we first conduct a comprehensive study on the complete core-guided algorithms Eva and OLL, that inspired the best performing solvers on industrial instances at MSE-2014. Despite of its apparently different foundations, we show how they are intimately related and identify how to improve them. In this sense, we present our complete core-guided algorithm WPM3. We show how to further exploit the analysis of unsatisfiable cores by being aware of their global structure, i.e., how the cores are interrelated. This is used to encode more efficient PB constraints and enables the algorithm to obtain assignments and refine also the upper bound. Therefore, WPM3 can also work as an incomplete algorithm. At MSE-2015, it showed a competitive performance on industrial instances. It got one out of three gold medals at the complete track and dominated at the incomplete track.

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Research partially supported by the Ministerio de Economía y Competividad research project TASSAT2: TIN2013-48031-C4-4-P and Google Faculty Research Award program.

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