

WMaxCDCL-SCIP in Pseudo-Boolean Competition

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I. INTRODUCTION

WMaxCDCL-SCIP is a complete pseudo-Boolean optimization (PBO) solver for both linear and non-linear constraints. WMaxCDCL-SCIP consists of two solvers: (1) the WMaxCDCL [5] branch-and-bound MaxSAT solver for weighted partial MaxSAT problems, and (2) the SCIP [2] constraint programming solver for pseudo-Boolean optimization. This paper presents our portfolio strategy and describes the encoding method for transforming a pseudo-Boolean instance into a MaxSAT instance.

II. PORTFOLIO STRATEGY

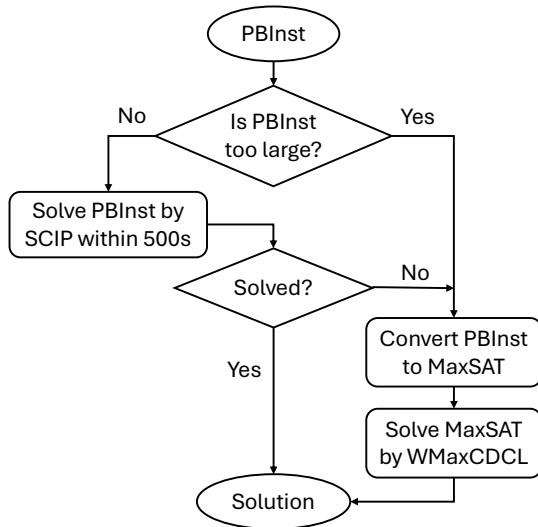


Fig. 1. The portfolio strategy of WMaxCDCL-SCIP

Figure 1 shows how WMaxCDCL-SCIP solves a pseudo-Boolean instance (PBIInst). The portfolio solver begins by executing SCIP for 500 seconds to solve the PBIInst. If SCIP fails to find the optimal solution, our approach proceeds to encode the PBIInst into a MaxSAT instance and solves it using WMaxCDCL. We restrict SCIP's application to instances that

contain coefficients larger than 2^{16} , as its internal floating-point representation cannot accurately handle too large integer values.

III. MAXSAT ENCODINGS

For non-linear constraints, we use the parser ¹ provided by the organizer to convert it into linear constraints. Then, we employ PBLib [4] to encode pseudo-Boolean constraints, utilizing its default settings which automatically select optimal encodings (e.g., Binary Decision Diagrams (BDD) [1], Adder Networks [3]) based on the properties of the given pseudo-Boolean constraint. The objective $\text{Min} \sum_{i \in n} w_i \cdot x_i$ is encoded into soft clauses using the following method: if a coefficient w_i of a decision variable x_i is positive, then $\neg x_i$ is added as a soft clause with weight w_i , otherwise, x_i is added with weight $-w_i$.

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¹<https://www.cril.univ-artois.fr/PB25/coding.html>