CCAglucose2015 in SAT Race 2015

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Abstract—This document describes the SAT solver "CCAglucose2015", which first empoys a preprocessor CP3, and then calls a hybrid solver combining a local search solver CCAnr and a complete solver glucose.

I. Introduction

Recently, we proposed a diversification strategy for local search algorithms, which is called configuration checking (CC). The CC strategy is first applied to improving the performance of local search solvers for the minimum vertex cover (MVC) problem [1], [2]. Thanks to its simplicity and effectiveness, the CC strategy has been successfully used to improve stochastic local search (SLS) algorithms for satisfiability (SAT) [3], [4], [5], [6]. Especially, by enhancing CC with an aspiration mechanism, the heuristic of configuration checking with aspiration (CCA) [3] has led to two well-performing local search solvers, namely CCASat [4] and CCAnr [7]. While CCASat won the random SAT track in SAT Challenge 2012, CCAnr shows competitive or better performance on structured instances than other local search solvers. As the performance of CCAnr is complementary to the performance of complete solvers on solving hard-combinatorial instances, we combine CCAnr with a complete solver glucose [8], and developed the hybrid solver CCAnr+glucose. This hybrid solver won the second place in the "Hard-combinatorial SAT track" of SAT Competition 2014, and placed fourth in the "Application SAT track".

After SAT Competition 2014, we discovered that the performance of CCAnr can be further improved by a preprocessor CP3 [9]. Therefore, we combine CP3 into our hybrid solver CCAnr+glucose, and we call this new solver CCAglucose2015. The implementation details of CCAnr can be found in the literature [7].

II. Main Techniques

The CCAglucose2015 solver is a combination of the preprocessor CP3, the SLS solver CCAnr and the complete solver glucose.

The main procedures of CCAglucose2015 can be described as follows. For solving an SAT instance, the CCAglucose2015 solver first uses CP3 to preprocess the instance and try to solve it. If CP3 cannot solve the instance, CCAglucose2015 utilizes the SLS solver CCAnr to solve the instance with a cutoff time of t CPU seconds. If the instance is solved by CCAnr with t CPU seconds, then CCAglucose2015 reports the solution which is found by CCAnr. Otherwise, CCAglucose2015 activates the complete solve glucose to solving the instance, and reports the solution if the instance is solved by glucose within the remaining time.

III. Main Parameters

The parameter t is set to 500 CPU seconds for SAT Race 2015.

The parameters used in the current version of the CCAnr solver in CCAglucose2015 are the same as the ones in the version which is submitted to SAT Competition 2014 [10].

The parameters used in the current version of the glucose solver in CCAglucose2015 are the same as the ones in the version which is submitted to SAT Competition 2013 [8].

IV. Implementation details

CCAglucose2015 is implemented in programming language C/C++, and is developed on the basis of CP3, CCAnr and glucose.

V. SAT Race 2015 Specifics

The CCAglucose2015 solver is submitted to the Main track, SAT Race 2015. According to the rules of SAT Race 2015, there is a run script named starexec_run_default, and the the command line for running CCAglucose2015 is

./starexec_run_default.sh <instance>

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