MaxHS in the 2021 MaxSat Evaluation

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I. MAXHS

MaxHS originated in the work of Davies [1] who developed the first MaxSat solver based on the Implicit Hitting Set approach (IHS). The core components of MaxHS are described in [1]–[4]. The PhD thesis of Saikko [5] also provides an excellent overview of the IHS approach along with a number of additional insights. In addition to various algorithmic and code improvements over the years, MaxHS also employs the techniques of reduced cost fixing [6] and abstract cores [7]. Both of these techniques go beyond the basic IHS approach.

II. 2021

As with the 2020 MaxHS entry to the 2021 entry detects and utilizes abstract cores when these are useful. In 2021 some more tuning of when to trigger the construction of abstract cores was done. These changes added to the solver's robustness but did not do much to enhance its performance. It was noticed however, that extracting abstract cores is more difficult for the SAT solver than extracting ordinary cores. It was also noted that the size of the new MaxSat instances submitted to the competition was growing, again increasing the burden on the SAT solver. In the 2020 version of MaxHS utilized MiniSat v2.2 as its SAT solver. This version had been modified in minor ways to improve its effectiveness on the problems MaxHS required it to solve. But it was clear that it was time to move on to a more effective SAT solver.

Interesting, in previous years we had tested replacing MiniSat with Glucose in MaxHS, but MaxHS with Glucose had always performed slightly worse. So a decision was made to move to the non-MiniSat based solver Cadical [8]. This change yielded better performance for MaxHS (albeit on somewhat limited testing).

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