NBC_MINISAT_ALL: A Non-blocking AllSAT Solver

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1. Description

An AllSAT solver without blocking clause mechanism (a non-blocking solver for short), implemented on top of MiniSat-C v1.14.1, is presented.

2. DOWNLOAD

- Latest version: nbc_minisat_all version 1.0.0, released on 30th Sep., 2015.

3. FILE FORMAT

Input boolean formula should be in DIMACS CNF format. For details of DIMACS CNF format and benchmark problems, see SATLIB.

4. HOW TO COMPILE

If no option is given, standard mode is selected.

```
$ tar zxvf nbc_minisat_all-1.0.0.tar.gz
$ cd nbc_minisat_all-1.0.0
$ make [options]
list of options
s    standard: debug information used by debugger is generated
 at compilation time, and detailed solver status is reported at
 runtime.
p    profile:  in addition to standard setting, profile information
 used by gprof is generated at compilation time and several tests
 are performed at runtime.
d    debug:    in addition to standard setting, several tests are
 performed at runtime and no optimization is applied.
r    release:  release version, compiled with dynamic link
rs   static:   release version, compiled with static link
clean    executable files, object files, etc are removed.
```

5. MACRO

Program behavior can be controlled by defining or not defining the following macros in `Makefile`. Select at most one of the following backtrack methods in conflict resolution stage: if none of them is selected, the combination of BJ and CBJ is selected.

- BT: Chronological backtracking

- BJ: Non-chronological backtracking with backtrack level limit (this technique is imported from clasp, see Gebser et al. 2007)

- CBJ: Conflict-directed Back Jumping

Select one of the two 1UIP schemes, decision level-based scheme and sublevel-based scheme. If DLEVEL is not defined, sublevel-based scheme is selected.

- DLEVEL: Decision level-based scheme is selected. If this is not defined, sublevel-based analysis is selected.

Other functionalyties are as follows.

- FIXEDORDER: Variable selection heuristic is disabled and variables are selected in increasing order of variable indices. If this is not defined, variable selection heuristic is used. This functionality is added to evaluate efficiency of variable selection heuristics.

- GMP: GNU MP bignum library is used to count solutions.

6. USAGE

If an output file is specified, all satisfying assignments to a CNF are generated in DIMACS CNF format without problem line. *Notice: there may be as many number of assignments as can not be stored in a disk space.* If you want to use timelimit or status report functionality, define TIMELIMIT in `Makefile`.

```
Usage:  ./nbc_minisat_all [options] input-file [output-file]
```

7. LICENSE

nbc_minisat_all is implemented by modifying MiniSat-C_v1.14.1. Please confirm the license file included in this software.

8. REFERENCES

- N. Eén, N. Sörensson : MiniSat Page: MiniSat-C_v1.14.1, accessed on 15 Dec. 2014.

- N. Eén, N. Sörensson : An Extensible SAT-solver, In Proceedings of the 6th international conference of Theory and Applications of Satisfiability Testing, pages 502--518, 2004.

- Grumberg, Orna and Schuster, Assaf and Yadgar, Avi: Memory Efficient All-Solutions SAT Solver and Its Application for Reachability Analysis, Formal Methods in Computer-Aided Design, LNCS Vol.3312, pp.275-289, 2004.

- Gebser, Martin and Kaufmann, Benjamin and Neumann, Andr{\'e} and Schaub, Torsten: Conflict-driven Answer Set Enumeration, in Proceedings of the 9th International Conference on Logic Programming and Nonmonotonic Reasoning, pp.136--148, 2007.