

ToolBar: a state-of-the-art platform for WCSP

S. Bouveret¹, F. Heras², S. de Givry¹, J. Larrosa², M. Sanchez³, and T. Schiex¹

¹ INRA, Toulouse, France

² Dep. LSI, UPC, Barcelona, Spain

³ CSIC-III A, Barcelona, Spain

`toolbar AT ossau.toulouse.inra.fr`

`http://carlit.toulouse.inra.fr/cgi-bin/awki.cgi/SoftCSP`

A lot of work has been done recently around soft constraints. Following the work on algebraic structures (valued, semiring CSP), the class of weighted networks is now identified as one of the most important class: it is among the most difficult one and many practical problems (satellite scheduling, frequency assignment, computer aided musical composition, pedigree analysis, Max-SAT – useful in electronic design – or maximum probability explanation in Bayesian nets for examples) are actually instances or can easily reduce to weighted CSP.

Several algorithms have been proposed for WCSP resolution, making the comparison of all these algorithms difficult to establish. We have started the collaborative CVS based development of ToolBar, a C experimental platform that integrates WCSP algorithms and benchmarks in an efficient implementation. ToolBar includes several recently published algorithms maintaining some form of local consistency for solving WCSP and Max-SAT [2, 1]. Currently node, arc, directional arc and full directional arc consistencies are available. Algorithms such as tree decomposition, bucket elimination, dominance testing, singleton arc consistency are currently being integrated.

ToolBar also offers two languages to describe problems: one is a very basic language (called `wcsp`), in the spirit of MPS for linear programming, and the other is a higher macro language that makes problem description much easier and which expands in the first language. On the Max-SAT side, ToolBar is also able to read classical propositional CNF files. Bayesian net (ERGO) and weighted CNF files are being developed.

The `wcsp` format is also readable by other solvers for WCSP including INCOP (a local search engine for WCSP), LVCSP (a lisp library of soft constraint algorithms) and VCSP (a C++ library for VCSP with simplification techniques).

Several benchmarks and random problem generators in these formats are available on the SoftCSP collaborative WIKI based web site. The benchmarks, for a current total of 1606 instances, are either locally generated problems or instances of known problems (DIMACS, JNH, CELAR, SPOT5) in the community. For most problems, a known upper bound is also provided.

[1] DE GIVRY, S., LARROSA, J., MESEGUER, P., AND SCHIEX, T. Solving Max-Sat as weighted CSP. In *Proc. of CP-03* (Kinsale, Ireland, 2003), pp. 363–376.

[2] LARROSA, J., AND SCHIEX, T. In the quest of the best form of local consistency for weighted CSP. In *Proc. of the 18th IJCAI* (Acapulco, Mexico, 2003), pp. 239–244.