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Refereed Article

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Solving Constraint Satisfaction Problems with NB-Resolution

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Abstract: *Though resolution and constraint satisfaction problems are two of the most developed areas in artificial intelligence, little has been done to explore the relationship between the two. This paper explores the relationship using the key observation that semantic trees, used in the study of resolution, and backtrack search spaces, used in the study of constraint satisfaction, are the same objects. The exploration results in the development of the NB-resolution rule of inference, a generalisation of ordinary resolution that can be used to solve constraint satisfaction problems. This paper proves that a clausal-form constraint satisfaction problem is backtrack-free if its constraints are closed under NB-resolution. This generalises the usual completeness result for resolution by telling us not only what happens when an unsatisfiable set of clauses is closed under resolution but also what happens when a satisfiable set of clauses is closed under resolution. The paper also presents a refinement of NB-resolution based on the order in which variables are considered in the search procedure.*

Publication and review history

1. This work is originally presented at the Machine Intelligence 16 Workshop, 1-3 December, 1998, and the abstract is presented to the participants.

2. The present article is *advertised* to the MI peer community on December 1, 1999.

3. The present article is *published* by Linköping University Electronic Press on December 30, 1999, and is permanently available at
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4. The article is refereed during January - May, 2000 by the Organizing Committee of the Machine Intelligence workshops, and is accepted for inclusion in the ETAI.

5. The article appears in Electronic Transactions on Artificial Intellligence, Volume 3 (1999), Section B, pages 105–120. The issue and the annual volume are made permanently available at
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6. Paper editions of the ETAI issue and the ETAI volume containing this artice are *republished* by the Royal Swedish Academy of Sciences.

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