Implementation and Performance of Transaction Logic in Prolog

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by

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Abstract

Transaction Logic is a recently proposed logic which accounts for state changes in logic programs and databases. With this increase in functionality, it can be used in a wide class of applications such as in logic programming, graph theory, and AI.

The contributions of this thesis are twofold. First, we present a Prolog implementation of the serial-Horn fragment of Transaction Logic. We developed four prototypes, which range from simple but slow, to fast but complex. The functionality of the implementation includes queries, backtrackable updates, serial execution of transactions, bulk updates, and procedural constructs, such as iterative loops. Second, we exercise and test our implementations on various graph problems. We test several different Transaction Logic prototypes implemented on top of several different Prologs. The results effectively compare the query and update performance of different Prologs. They also show that with some Prologs, Transaction Logic programs achieve efficiency comparable to programs with destructive updates in procedural programming languages.