Title	[課題研究報告書] An Investigation of the Steven Eker's Approach to Associative-Commutative Matching
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Abstract

This master's project report focuses on the associative-commutative matching via bipartite graph matching including not only the basic approach but also the detailed algorithm to help other researchers get a better understanding about the algorithm created by S. M. Eker.

The problem we want to solve is the one consists of multiple terms where the subsets of functions symbols are associative-commutative. Eker's approach to solving this complex problem is that we first change the form of both pattern term and subject term into ordered normal form because of the easier in representative and checking equality. Then making use of the recursive attribute of bipartite graph, we construct a hierarchy of bipartite graph matching problems containing AC subproblem and variable bindings. We try to find the variable bindings as soon as possible and concentrate on finding the variable clashes to backtrack rather than finding all possible solutions and then test them for consistency. From these graphs it can be found out the sets of solutions and build the semi-pure AC systems. When we solve the semi-pure AC system, we divide the variable into two type: the shared variable and owned variable with the different way of solving. Then, we try to find all the potential term in the subject terms to make the assignment to a variable. Afterwards, putting all the variable bindings and the solution from solving semi-pure AC system step to get the matching substitutions. This algorithm has implemented in Maude and showed the highest performance rewrite engine modulo AC. So we investigate in Eker's approach to find the efficiency of his algorithm which can apply when we want to implement the independent software component.

Keywords: AC Matching Problem, Bipartite Graph Matching, Associativity, Commutativity, Ordered Normal Form, .