

Title:

Unification and matching in unranked term algebras with regular expression sorts

Abstract:

Unranked terms (or trees) are a natural way to model XML documents, multithreaded recursive program configurations with an unbounded number of parallel processes, information in knowledge-based systems, data types and transformation patterns in programming languages, etc. Their study in sorted algebras is motivated, among others, by the desire to support typed computations, to work with more concise and natural representations of AI problems, and to speed up certain theorem proving methods.

A fundamental problem in applications pertaining to such representations is solving systems of equations. We analyse unification (REOSU) and matching (REOSM) in the general setting of order-sorted algebras where we permit regular expression sorts for variables and the domains of function symbols. We indicate how the problems studied by us generalise some known problems (e.g., order-sorted unification for ranked terms, sequence unification, and word unification with regular constraints), and present our main recent results: REOSU is infinitary and decidable; a procedure to construct a minimal set of REOS unifiers; finitary fragments of REOSU, including the corresponding matching problem (REOSM); NP-completeness of REOSM, and #P-completeness of the corresponding counting problem. Finally, we outline some promising directions of future work.