

Decision Procedures for Proving Inductive Theorems without Induction

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Automated inductive reasoning for term rewriting has been extensively studied in the literature. Classes of equations and term rewriting systems (TRSs) with decidable inductive validity have been identified and used to automatize the inductive reasoning. In this talk, a new approach for deciding inductive theorems of TRSs is described. In particular, we give procedures for deciding the inductive validity of equations in some standard TRSs on natural numbers and lists. Our essential idea is to use the validity in the *initial algebras* of TRSs, instead of validity guaranteed by existence of inductive proofs. Contrary to previous decidability results, our procedures can automatically decide *without* involving induction reasoning the inductive validity of *arbitrary* equations for these TRSs, that is, without imposing any syntactical restrictions on the form of equations.