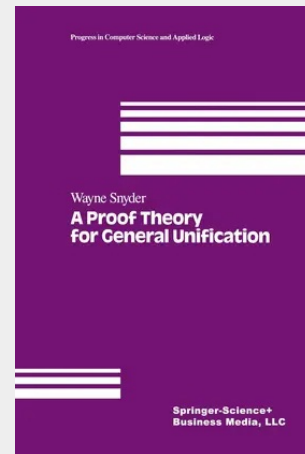


A Proof Theory for General Unification

In this monograph we study two generalizations of standard unification, E-unification and higher-order unification, using an abstract approach originated by Herbrand and developed in the case of standard first-order unification by Martelli and Montanari. The formalism presents the unification computation as a set of non-deterministic transformation rules for converting a set of equations to be unified into an explicit representation of a unifier (if such exists). This provides an abstract and mathematically elegant means of analysing the properties of unification in various settings by providing a clean separation of the logical issues from the specification of procedural information, and amounts to a set of 'inference rules' for unification, hence the title of this book. We derive the set of transformations for general E-unification and higher order unification from an analysis of the sense in which terms are 'the same' after application of a unifying substitution. In both cases, this results in a simple extension of the set of basic transformations given by Herbrand Martelli-Montanari for standard unification, and shows clearly the basic relationships of the fundamental operations necessary in each case, and thus the underlying structure of the most important classes of term unification problems.

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