



SYMBOLIC BOOLEAN MANIPULATION WITH ORDERED BINARY DECISION DIAGRAMS

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Abstract

Ordered Binary Decision Diagrams (OBDDs) represent Boolean functions as directed acyclic graphs. They form a canonical representation, making testing of functional properties such as satisfiability and equivalence straightforward. A number of operations on Boolean functions can be implemented as graph algorithms on OBDD data structures. Using OBDDs, a wide variety of problems can be solved through symbolic analysis. First, the possible variations in system parameters and operating conditions are encoded with Boolean variables. Then the system is evaluated for all variations by a sequence of OBDD operations. Researchers have thus solved a number of problems in digital system design, finite state system analysis, artificial intelligence, and mathematical logic. This paper describes the OBDD data structure, and surveys a number of applications that have been solved by OBDD-based symbolic analysis.

Keywords and phrases: binary decision diagrams, branching programs, symbolic manipulation, symbolic analysis, Boolean functions, Boolean algebra.

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