

## Abstract

This tutorial paper discusses the known representations based on Binary Decision Diagrams (BDDs) for various types of discrete objects: incompletely specified functions, sets, finite state machines, binary and multi-valued relations, etc. While presenting the known material, the emphasis is on those aspects of implicit representations that are important to achieve speed-up in computation.

The new material includes implicit representations for dichotomies, partitions, set systems, and information measures. The last type of objects, information measures, constitute a promising approach to problem solving in a number of areas, including decomposition of discrete functions and finite state machines.

Multi-valued relations (MVRs) are presented as the most general representation for all the considered classes on discrete objects. Two complementary ways of representing MVRs are proposed: binary-encoded multi-valued decision diagrams (BEMDDs) and labeled rough partitions (LRPs). The sizes of BEMDDs and LRPs are compared using a set of multi-valued benchmarks.