Title: Implication Graphs and Logic Testing

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Abstract:

An implication graph represents logical implications between a set of Boolean variables. When a variable *A* implies another variable *B*, the implication graph contains a directed edge *A*→*B*, where *A* and *B* are nodes that can assume true or false values. For three variables, *A*, *B* and *C*, if *A* implies *B*, and *B* implies *C*, then the transitive relation "*A* implies *C"* is represented in the transitive closure of the implication graph by an edge *A*→*C*. We present a new "update algorithm" to compute the transitive closure of an implication graph. Implication graphs have applications in the design and testing of logic circuits. We show how a traditional implication graph representation of a logic circuit is enhanced by adding partial implications. Two types of partial implications, namely, *AND* type and *OR* type, are considered. An *AND* implication means that several variables together imply another variable. An *OR* implication refers to a single variable implying one or more variables in a set of variables. Benefits of these enhancements are illustrated by solving the problem of logic redundancy identification.