

Random Walk Based Heuristic Algorithms for Distributed Memory Model Checking

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Abstract

Model checking techniques suffer from the state space explosion problem: as the size of the system being verified increases, the total state space of the system increases exponentially. Some of the methods that have been devised to tackle this problem are partial order reduction, symmetry reduction, hash compaction, selective state caching, etc. One approach to the problem that has gained interest in recent years is the parallelization of model checking algorithms.

A random walk on the state space has some nice properties, the most important of which is the fact that it lends itself to being parallelized in a natural way. Random walk is a low overhead and a partial search method. Breadth first search, on the other hand, is a high overhead and a full search technique. In this article, we propose various heuristic algorithms that combine random walks on the state space with bounded breadth first search in a parallel context. These algorithms are in the process of being incorporated into a distributed memory model checker.