© 2013 FIZ Karlsruhe

io-port 05897415

Kupferschmid, Sebastian; Wehrle, Martin

Abstractions and pattern databases: The quest for succinctness and accuracy.

Abdulla, Parosh Aziz (ed.) et al., Tools and algorithms for the construction and analysis of systems. 17th international conference, TACAS 2011, held as part of the joint European conferences on theory and practice of software, ETAPS 2011, Saarbrücken, Germany, March 26 – April 3, 2011. Proceedings. Berlin: Springer (ISBN 978-3-642-19834-2/pbk). Lecture Notes in Computer Science 6605, 276-290 (2011).

Summary: Directed model checking is a well-established technique for detecting error states in concurrent systems efficiently. As error traces are important for debugging purposes, it is preferable to find as short error traces as possible. A wide spread method to find provably shortest error traces is to apply the A* search algorithm with distance heuristics that never overestimate the real error distance. An important class of such distance estimators is the class of pattern database heuristics, which are built on abstractions of the system under consideration. In this paper, we propose a systematic approach for the construction of pattern database heuristics. We formally define a concept to measure the accuracy of abstractions. Based on this technique, we address the challenge of finding abstractions that are succinct on the one hand, and accurate to produce informed pattern databases on the other hand. We evaluate our approach on large and complex industrial problems. The experiments show that the resulting distance heuristic impressively advances the state of the art.

doi:10.1007/978-3-642-19835-9_26