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Reachability for Finite-state Process Algebras Using Horn Clauses - DTU Orbit (09/11/2017)

Reachability for Finite-state Process Algebras Using Horn Clauses

In this work we present an algorithm for solving the reachability problem in finite systems that are modelled with process algebras. Our method is based on Static Analysis, in particular, Data Flow Analysis, of the syntax of a process algebraic system with multi-way synchronisation. The results of the Data Flow Analysis are used in order to build a set of Horn clauses whose least model corresponds to an overapproximation of the reachable states. The computed model can be refined after each transition, and the algorithm runs until either a state whose reachability should be checked is encountered or it is not in the least model for all constructed states and thus is definitely unreachable. The advantages of the algorithm are that in many cases only a part of the Labelled Transition System will be built which leads to lower time and memory consumption. Also, it is not necessary to save all the encountered states which leads to further reduction of the memory requirements of the algorithm.

General information

State: Published
Organisations: Department of Applied Mathematics and Computer Science , Language-Based Technology
Authors: Skrypnyuk, N. (Intern), Nielson, F. (Intern)
Pages: 283-302
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information

Journal: International Journal of Foundations of Computer Science
Volume: 24
Issue number: 2
ISSN (Print): 0129-0541
Ratings:
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 0.31 SNIP 0.52 CiteScore 0.45
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.32 SNIP 0.662 CiteScore 0.57
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.365 SNIP 0.715 CiteScore 0.6
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.463 SNIP 0.762 CiteScore 0.67
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.616 SNIP 1.076 CiteScore 0.84
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.407 SNIP 0.942 CiteScore 0.64
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.383 SNIP 0.715
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.574 SNIP 0.882
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.701 SNIP 0.893
Scopus rating (2007): SJR 0.549 SNIP 0.894
Scopus rating (2006): SJR 0.533 SNIP 0.967
Scopus rating (2005): SJR 0.565 SNIP 1.03
Scopus rating (2004): SJR 0.555 SNIP 0.923
Scopus rating (2003): SJR 0.458 SNIP 1.036
Scopus rating (2002): SJR 0.53 SNIP 1.354
Scopus rating (2001): SJR 0.164 SNIP 0.753

Original language: English
DOIs:
10.1142/S0129054113400121
Source: dtu
Source-ID: n::oai:DTIC-ART:inspec/391915201::32278
Publication: Research - peer-review › Journal article – Annual report year: 2013