Interactive Visualization Tools to Improve Learning and Teaching in Online Learning Environments

This paper presents two interactive visualization tools for learning management systems (LMS) in order to improve learning and teaching in online courses. The first tool was developed at the Intelligent Information Systems Laboratory (IISLab) at the Tampere University of Technology (TUT). The tool is used to analyse students' activity from automatically recorded user log data and to build interactive visualizations. They provide valuable insights into the learning process and participation of students in a course offered to teachers and students. The second tool was developed at the Unitelma Sapienza University. It extends navigation and search functionalities in the discussion forum of an LMS with a topic-driven paradigm. The tool analyses forum content and automatically identifies discussion topics. It then enhances the original forum with a topic-driven navigation structure and an interactive search graph. Both tools have been developed as plug-ins for the Moodle LMS, but their analysis processes and techniques can be adopted into any LMS.

General information

State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Financial Services, Department of Mathematics, Research group: MAT Intelligent Information Systems Laboratory, Unitelma Sapienza University, University of Sannio, National University of La Plata
Authors: Kuosa, K., Distante, D., Tervakari, A., Cerulo, L., Fernández, A., Koro, J., Kailanto, M.
Number of pages: 21
Pages: 1-21
Publication date: Jan 2016
Peer-reviewed: Yes

Publication information

Journal: International Journal of Distance Education Technologies
Volume: 14
Issue number: 1
Article number: 1
ISSN (Print): 1539-3100
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 0.157 0.328
Publication Forum (2016): 1
Scopus rating (2015): 0.141 0.302
Publication Forum (2015): 1
Scopus rating (2014): 0.165 0.279
Publication Forum (2014): 1
Scopus rating (2013): 0.214 0.428
Publication Forum (2013): 1
Scopus rating (2012): 0.168 0.36
Publication Forum (2012): 1
Scopus rating (2011): 0.244 0.467
Scopus rating (2010): 0.376 0.475
Scopus rating (2009): 0.195 0.379
Scopus rating (2008): 0.16 0.235
Scopus rating (2007): 0.162 0.25
Scopus rating (2006): 0.133 0.055
Scopus rating (2005): 0.1 0.0
Scopus rating (2004): 0.101 0.0
Original language: English
DOIs:
10.4018/IJDET.2016010101

Bibliographical note

INT=mat,"Koro, Juho"
Research output: Scientific - peer-review › Article

A State Space Tool for Concurrent System Models Expressed In C++

This publication introduces a state space exploration tool that is based on representing the model under verification as a piece of C++ code that obeys certain conventions. This approach facilitates experimenting with many kinds of modelling ideas. On the other hand, the use of stubborn sets and symmetries requires that either the modeller or a preprocessor tool analyses the model at a syntactic level and expresses stubborn set obligation rules and the symmetry mapping as suitable C++ functions. The tool supports the detection of illegal deadlocks, safety errors, and may progress errors. It also partially
Stop It, and Be Stubborn!

A system is always may-terminating, if and only if from every reachable state, a terminal state is reachable. This publication argues that it is beneficial for both catching non-progress errors and stubborn, ample, and persistent set state space reduction to try to make verification models always may-terminating. An incorrect mutual exclusion algorithm is used as an example. The error does not manifest itself, unless the first action of the customers is modelled differently from other actions. An appropriate method is to add an alternative first action that models the customer stopping for good. This method typically makes the model always may-terminating. If the model is always may-terminating, then the basic strong stubborn set method preserves safety and some progress properties without any additional condition for solving the ignoring problem. Furthermore, whether the model is always may-terminating can be checked efficiently from the reduced state space.
Perfect Pavelka Logic

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Research group: MAT Computer Science and Applied Logics
Authors: Turunen, E., Navara, M.
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Fuzzy Sets and Systems
ISSN (Print): 0165-0114
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 1.506 1.977
Publication Forum (2016): 1
Scopus rating (2015): 1.43 1.816
Web of Science (2015): 2.098 2.376 >10.0 0.729 0.00772 0.555
Publication Forum (2015): 1
Scopus rating (2014): 1.461 2.278
Web of Science (2014): 1.986 2.496 >10.0 0.423 0.00874 0.582
Publication Forum (2014): 1
Scopus rating (2013): 1.439 2.189
Publication Forum (2013): 1
Scopus rating (2012): 1.617 2.468
Publication Forum (2012): 1
Scopus rating (2011): 1.518 2.017
Scopus rating (2010): 1.381 2.189
Scopus rating (2008): 1.635 2.139
Scopus rating (2007): 1.554 2.23
Scopus rating (2006): 1.166 2.306
Scopus rating (2005): 0.846 1.898
Scopus rating (2004): 0.943 1.773
Scopus rating (2003): 0.789 1.399
Scopus rating (2002): 1.012 1.127
Scopus rating (2001): 0.944 1.134
Scopus rating (2000): 0.457 1.275
Scopus rating (1999): 0.458 1.346
Original language: English
DOIs:
10.1016/j.fss.2014.06.011

Bibliographical note
In Press.Siirretään Portfolio15<br/>Contribution: organisation=mat,FACT1=1<br/>Portfolio EDEND: 2015-01-08<br/>Publisher name: Elsevier BV
Source: researchoutputwizard
Source-ID: 35
Research output: Scientific - peer-review Article

Using context overlays to analyse the role of a priori information with Process Mining
Notwithstanding the significant advances in context-aware computing in pervasive computing and self-adaptive systems, there is still much more to be desired in providing better context services. The number of sensors deployed world-wide increases very rapidly. The Internet of Things, amongst others, generates vast amounts of data of many different data types. How data are used is essential to improve user experience and efficiencies of the systems in which they occur. We explain how familiar concepts of Process Mining strengthen generalised sensor context services. We present a laboratory
case to explain the approach. By way of a real-world example, we confirm the viability of using Process Mining to strengthen context-aware computing.

**General information**

State: Published  
Ministry of Education publication type: A4 Article in a conference publication  
Organisations: Department of Mathematics, Research group: MAT Intelligent Information Systems Laboratory  
Authors: Pileggi, P., Rivero Rodriguez, A., Nykänen, O.  
Keywords: (Context-aware computing, Process mining, Self-adaptive systems, Pervasive computing)  
Number of pages: 6  
Pages: 639-644  
Publication date: 2015  

**Host publication information**

Title of host publication: 2015 IEEE International Systems Conference (SysCon 2015) Proceedings  
Place of publication: Vancouver, BC, Canada  
Publisher: IEEE  
ISBN (Print): 978-1-4799-5927-3  
DoIs: 10.1109/SYSCON.2015.7116823  
Links: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7116823  
Research output: Scientific - peer-review › Conference contribution

**An algebraic study of Peterson’s Intermediate Syllogisms**

**General information**

State: Published  
Ministry of Education publication type: A1 Journal article-refereed  
Organisations: Department of Mathematics, Research Community on Data-to-Decision (D2D)  
Authors: Turunen, E.  
Number of pages: 14  
Pages: 1-14  
Publication date: 2014  
Peer-reviewed: Yes

**Publication information**

Journal: Soft Computing  
ISSN (Print): 1432-7643  
Ratings:  
Publication Forum (2017): 1  
Scopus rating (2016): 0.75 1.204  
Publication Forum (2016): 1  
Scopus rating (2015): 0.724 1.179  
Web of Science (2015): 1.63 1.732 5.0 0.352 0.00643 0.52  
Publication Forum (2015): 1  
Scopus rating (2014): 0.793 1.518  
Web of Science (2014): 1.271 1.635 4.8 0.285 0.00478 0.413  
Publication Forum (2014): 1  
Scopus rating (2013): 0.857 1.454  
Publication Forum (2013): 1  
Scopus rating (2012): 0.805 1.232  
Publication Forum (2012): 1  
Scopus rating (2011): 0.892 1.817  
Scopus rating (2010): 0.736 1.303  
Scopus rating (2009): 0.744 1.417  
Scopus rating (2008): 0.776 1.228  
Scopus rating (2007): 0.459 0.742  
Scopus rating (2006): 0.466 0.968  
Scopus rating (2005): 0.382 0.876
Another paraconsistent algebraic semantics for Lukasiewicz-Pavelka logic

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Research Community on Data-to-Decision (D2D)
Authors: Rodríguez, J. T., Turunen, E., Ruan, D., Montero, J.
Number of pages: 16
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Fuzzy Sets and Systems
Volume: 242
ISSN (Print): 0165-0114
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 1.506 1.977
Publication Forum (2016): 1
Scopus rating (2015): 1.43 1.816
Web of Science (2015): 2.098 2.376 >10.0 0.729 0.00772 0.555
Publication Forum (2015): 1
Scopus rating (2014): 1.461 2.278
Web of Science (2014): 1.986 2.496 >10.0 0.423 0.00874 0.582
Publication Forum (2014): 1
Scopus rating (2013): 1.439 2.189
Publication Forum (2013): 1
Scopus rating (2012): 1.617 2.468
Publication Forum (2012): 1
Scopus rating (2011): 1.518 2.017
Scopus rating (2010): 1.381 2.189
Scopus rating (2008): 1.635 2.139
Scopus rating (2007): 1.554 2.23
Scopus rating (2006): 1.166 2.306
Scopus rating (2005): 0.846 1.898
Scopus rating (2004): 0.943 1.773
Scopus rating (2003): 0.789 1.399
Scopus rating (2002): 1.012 1.127
Scopus rating (2001): 0.944 1.134
Scopus rating (2000): 0.457 1.275
Scopus rating (1999): 0.458 1.346
A Simple Character String Proof of the "True but Unprovable" Version of Gödel's First Incompleteness Theorem

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Valmari, A.
Number of pages: 15
Pages: 355-369
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Electronic Proceedings in Theoretical Computer Science
Volume: 151
Article number: 25
ISSN (Print): 2075-2180
Ratings:
Publication Forum (2017): 0
Publication Forum (2016): 0
Publication Forum (2015): 0
Original language: English
DOI:
10.4204/EPTCS.151.25

Bibliographical note
Paper presented also in the Proceedings of the 14th International Conference Automata and Formal Languages (AFL 2014).

Asymptotic Proportion of Hard Instances of the Halting Problem

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Valmari, A.
Number of pages: 24
Pages: 307-330
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Acta Cybernetica
Volume: 21
Issue number: 3
ISSN (Print): 0324-721X
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 0.177 0.275
Publication Forum (2016): 1
Scopus rating (2015): 0.171 0.911
Publication Forum (2015): 1
Scopus rating (2014): 0.158 0.597
Publication Forum (2014): 1
Scopus rating (2013): 0.139 0.264
Publication Forum (2013): 1
Scopus rating (2012): 0.197 0.438
Publication Forum (2012): 1
Scopus rating (2011): 0.202 0.686
Scopus rating (2010): 0.176 0.228
Scopus rating (2009): 0.184 0.496
Scopus rating (2008): 0.197 0.092
Scopus rating (2007): 0.149 0.275
Scopus rating (2006): 0.239 0.501
Scopus rating (2005): 0.225 0.34
Scopus rating (2004): 0.186 0.292
Scopus rating (2003): 0.205 0.74
Scopus rating (2002): 0.425 0.79
Scopus rating (2001): 0.227 0.471
Scopus rating (2000): 0.165 0.279
Scopus rating (1999): 0.209 0.412
Original language: English
Links:
http://osl.sed.hu/actacybernetica/edb/vol21n3/Valmari_2014_ActaCybernetica.xml

Bibliographical note
Contribution: organisation=mat,FACT1=1<br/>Portfolio EDEND: 2014-11-17<br/>Publisher name: Szegedi Tudomanyegyetem
Source: researchoutputwizard
Source-ID: 1693
Research output: Scientific - peer-review › Article

Diamonds Are a Girl's Best Friend: Partial Order Reduction for Timed Automata with Abstractions

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics
Authors: Hansen, H., Lin, S., Liu, Y., Nguyen, T. K., Sun, J.
Number of pages: 16
Pages: 391-406
Publication date: 2014

Host publication information
Publisher: Springer International Publishing
Editors: Biere, A., Bloem, R.
ISBN (Print): 978-3-319-08866-2
ISBN (Electronic): 978-3-319-08867-9

Publication series
Name: Lecture Notes in Computer Science
Volume: 8559
ISSN (Print): 0302-9743
DOIs:
10.1007/978-3-319-08867-9_26
Minimal Solutions of Fuzzy Relation Equations with General Operators on the Unit Interval

General information
State: Published
Ministry of Education publication type: A4 Article in a conference publication
Organisations: Department of Mathematics, Research Community on Data-to-Decision (D2D)
Authors: Medina, J., Turunen, E., Bartl, E., Diaz-Moreno, J. C.
Number of pages: 10
Pages: 81-90
Publication date: 2014

Host publication information
Publisher: Springer International Publishing
ISBN (Print): 978-3-319-08851-8
ISBN (Electronic): 978-3-319-08852-5

Publication series
Name: Communications in Computer and Information Science
Volume: 444
ISSN (Print): 1865-0929
DOIs:
10.1007/978-3-319-08852-5_9

Bibliographical note
Contribution: organisation=mat,FACT1=1<br/>Portfolio EDEND: 2014-12-30<br/>Publisher name: Springer International Publishing
Source: researchoutputwizard
Source-ID: 411
Research output: Scientific - peer-review › Conference contribution

Old and New Algorithms for Minimal Coverability Sets

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Valmari, A., Hansen, H.
Number of pages: 25
Pages: 1-25
Publication date: 2014
Peer-reviewed: Yes

Publication information
Journal: Fundamenta Informaticae
Volume: 131
Issue number: 1
ISSN (Print): 0169-2968
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 0.396 0.77
Publication Forum (2016): 1

Bibliographical note
Contribution: organisation=mat,FACT1=1<br/>Portfolio EDEND: 2014-10-03<br/>Publisher name: Springer International Publishing
Source: researchoutputwizard
Source-ID: 1062
Research output: Scientific - peer-review › Conference contribution

Links:
http://link.springer.com/chapter/10.1007%2F978-3-319-08867-9_26
Does the Shannon bound really apply to all data structures

General information
State: Published
Ministry of Education publication type: A1 Journal article-refereed
Organisations: Department of Mathematics, Regulation of learning and active learning methods (REALMEE)
Authors: Valmari, A.
Number of pages: 12
Pages: 47-58
Publication date: 2013
Peer-reviewed: Yes

Publication information
Journal: Proceedings of the Estonian Academy of Sciences
Volume: 62
Issue number: 1
ISSN (Print): 1736-6046
Ratings:
Publication Forum (2017): 1
Scopus rating (2016): 0.238 0.45
Publication Forum (2016): 1