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.

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Authors: Kuosa, K., Distante, D., Tervakari, A., Cerulo, L., Fernández, A., Koro, J., Kailanto, M.
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INT=mat,"Koro, Juho"
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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 supports the detection of must progress errors.

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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.
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.
A Simple Character String Proof of the "True but Unprovable" Version of Gödel's First Incompleteness Theorem

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Asymptotic Proportion of Hard Instances of the Halting Problem

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

General information
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Does the Shannon bound really apply to all data structures

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