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**Asynchronous Unfold/Fold Transformation for Fixpoint Logic**

16th International Symposium on Functional and Logic Programming, Kyoto, Japan · May 10, 2022 [Show publication](#)

Various program verification problems for functional programs can be reduced to the validity checking problem for formulas of a fixpoint logic. Recently, Kobayashi et al. have shown that the unfold/fold transformation originally developed for logic programming can be extended and applied to prove the validity of fixpoint logic formulas. In the present paper, we refine their unfold/fold transformation, so that each predicate can be unfolded a different number of times in an asynchronous manner. Inspired by the work of Lee et al. on size change termination, we use a variant of size change graphs to find an appropriate number of unfoldings of each predicate. We have implemented an unfold/fold transformation tool based on the proposed method, and evaluated its effectiveness.

Other authors**Biabduction for Separation Logic with Arrays and Lists**

Workshop on Programming and Programming Language (PPL2022), Japan · Mar 16, 2022 This paper gives an algorithm that solves the biabduction problem in symbolic heap separation logic with arrays and lists. The logic is an assertion language of Hoare-style logic for program verification of pointer manipulating programs. The biabduction problem asks to find an additional assumption and an additional conclusion from a given assumption and a given conclusion such that the entailment becomes true. Biabduction is indispensable for modular analysis and automatic verification with separation logic, since it guarantees to match the condition at a call site that calls a function and the precondition of the called function. This paper proves the correctness of the biabduction algorithm. A biabduction solver based on the algorithm has been implemented as a part of the authors' automatic program verifier, and experimental results of the biabduction solver with small inputs are also shown, which show the algorithm is usable.

Other authors**Function Pointer Eliminator for C Programs**

19th Asian Symposium on Programming Languages and Systems, Chicago, IL, USA · Oct 12, 2021 [Show publication](#)

Verification of memory safety such as absence of null pointer dereferences and memory leaks in system software is important in practice. O'Hearn's group proposed a new method of memory safety analysis/verification by modular abstract interpretation with separation logic and biabduction. To realize this method, one has to construct a call graph before the modular abstract interpretation. This paper aims to analyze/verify memory safety of system software written in C programming language by this method, and as the first step this paper provides a function pointer eliminator tool to eliminate function pointer calls in order to construct a call graph. The tool uses SVF for pointer analysis. First C programs are translated into LLVM programs by Clang and then SVF analyses the LLVM programs. The tool given in this paper finds correspondence between function pointer calls in C programs and those in LLVM programs, and transforms the C programs into C programs with the same functionality and without any function pointer calls. The experimental results for gzip, git, and OpenSSL using this function pointer eliminator are presented and they show that this tool is sufficiently efficient and precise for the purpose.

Other authors**Completeness and expressiveness of pointer program verification by separation logic**

Information and Computation · Aug 1, 2019 [Show publication](#)

Reynolds' separation logical system for pointer program verification is

investigated. This paper proves its completeness theorem that states that every true asserted program is provable in the logical system. In order to prove the completeness, this paper shows the expressiveness theorem that states the weakest precondition of every program and every assertion can be expressed by some assertion. This paper also introduces an extension of the assertion language with inductive definitions and proves the soundness theorem, the expressiveness theorem, and the completeness theorem.

Other authors

A Logical System for Modular Information Flow Verification

International Conference on Verification, Model Checking, and Abstract Interpretation (VAMC), Los Angeles, USA · May 3, 2017
[Show publication](#) 

Information Flow Control (IFC) is important to ensure secure programs where secret data does not influence any public data. The pervasive standard that IFC aims to is non-interference. Current IFC systems are separated into dynamic IFC, static IFC, and hybrids between static and dynamic. With dynamic IFC suffering from high overhead and limited ability to prevent implicit flows due to the paths not taken, we propose a novel modular static IFC system. To the best of our knowledge, this is the first modular static IFC system. Unlike type-based static IFC systems, ours is logic-based. The limitation of type-based IFC systems is in the inviolability of static security label declarations for fields. As such, they suffer from transient leaks on fields. Our proposed system uses a Hoare-like logic. It verifies each function independently with the help of separation logic. Furthermore, we provide the proof of correctness for our novel IFC system with respect to termination- and timing-insensitive non-interference.

Other authors

Completeness for recursive procedures in separation logic

Theoretical Computer Science · Jun 6, 2016
[Show publication](#) 

This paper proves the completeness of an extension of Hoare's logic and separation logic for pointer programs with mutual recursive procedures. This paper shows the expressiveness of the assertion language as well. This paper achieves a new system by introducing two new inference rules, and removes an axiom that is unsound in separation logic and other redundant inference rules for showing completeness. It introduces a novel expression that is used to describe complete information of a given state in a precondition. This work also uses the necessary and sufficient precondition of a program for the abort-free execution, which enables us to utilize strongest postconditions.

Other authors

New complete system of Hoare's logic with recursive procedures

JAIST Logic Workshop Series, 2015 · Mar 1, 2015
We introduce a complete system of Hoare's logic with recursive procedures. Apt gave a system for the same purpose and showed its completeness. Our system is obtained from Apt's system by replacing the invariance axiom, the substitution rule I, the substitution rule II, and the conjunction rule by the rules (inv-conj) and (exists). Apt suggested without proofs that one could replace them by his substitution rule I, (inv-conj), and (exists) to get another complete system. We prove that the substitution rule I can actually be derived in our system. We also give a detailed proof of the completeness of our system.

Other authors

Visualization and Queuing Analysis of Spatio-Temporal Traffic Data

17th International Conference on Computer and Information Technology – 2014 (ICCI-2014) · Oct 1, 2014
[Other authors](#) 

Completeness of Pointer Program Verification by Separation Logic

Seventh IEEE International Conference on Software Engineering and Formal Methods · Jan 1, 2009
[Show publication ↗](#)

Reynolds' separation logical system for pointer program verification is investigated. This paper proves its completeness theorem as well as the expressiveness theorem that states the weakest precondition of every program and every assertion can be expressed by some assertion. This paper also introduces the predicate that represents the next new cell, and proves the completeness and the soundness of the extended system under deterministic semantics.

Other authors

Algorithms for synthesis and average distribution of variable sized MOS components for efficient Analog VLSI devices

International Conference on Computer and Information Technology · Dec 1, 2007
[Show publication ↗](#)

In the field of Analog VLSI layout design, large variation of MOS component sizes causes mismatches and reduces the performance and splitting is necessary to reduce the variation. On the other hand, intensity of imposing always varies during fabrication. In this ongoing research, the solutions of above problems are introduced with some algorithm implementations. Two different sizes of components can be split into optimized number of pieces and an algorithm distributes them in an average and symmetrical (better) arrangement such that it can ensure average imposing and the efficiency increases. The computer generated solutions are compared with other possible solutions and proved better.

Other authors



An Educational Toolkit for Artificial Neural Network

Journal of Electronics and Computer Science (ISSN: 1680-6743) 9(1) · Jun 1, 2001
[Other authors ↗](#)



An Improved Memory Management Based Flexible Human Health Monitoring System

Journal of Electronics and Computer Science, Jahangirnagar University, Savar, Dhaka, Bangladesh · Jun 1, 2007
[Other authors ↗](#)



Introducing Vector Segmented Bangla Font (FZVSBF) for Small Hand Held Devices

International Conference on Electrical and Computer Engineering · Dec 1, 2006
[Show publication ↗](#)

This paper introduces vector segmented font system for Bangla numerals and characters for software implementation. In development of small hand held devices software, the font system can be used. This font system saves significant amount of memory. 51 segments are used to design the segmented font system, FZVSBF. This font system is capable of replacing the conventional bit-mapped font system with 93.35% efficiency.

Other authors

Partial Matching of Bangla Words

International Conference on Electrical and Computer Engineering · Dec 1

International Conference on Electrical and Computer Engineering, Dec 1, 2008
[Show publication](#)

In this research the concept of traditional Bangla word matching is replaced by partial matching based on pronunciation error. The authors have used some specially designed databases and some rules to analyze Bangla words. The rules are taken based on Bangla pronunciation rules given by Bangla Academy. As the outcome of this research it is possible to search a Bangla word through a text by using differently spelled word or misspelled word. Bangla vowels are analyzed successfully.

An Efficient Technique for Inter/Intra Network Handover Process

ULAB Journal of Science and Engineering - vol 5
In a telecommunication system, run of prepaid mobile balance and degraded signal strength are two important reasons for the disruption of mobile conversation besides other reasons. Presence of multiple Subscriber Identification Module (SIM) cards in the mobile handset can facilitate us to avoid disruption partially that improve the overall call quality. In our work, we proposed a novel handover technique that uses multiple SIM to avoid such disruptions. Our work shows a guideline of necessary network operations that should be performed at the telecommunication switching centers to establish an inter/intra network handover.

Other authors



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