

EDITORIAL PREFACE

Preface to Special Issue: LSFA 2019 and 2020

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This special issue collects selected articles from the 14th and 15th editions of the Workshop on Logical and Semantic Frameworks, with Applications (LSFA 2019 and 2020). LSFA 2019 was held on 25–26 August 2019 in Natal as a satellite event of the 27th International Conference on Automated Deduction (CADE 2019). LSFA 2020 was held on 27–28 August as an online workshop, with organizers from Salvador.

Logical and semantic frameworks are formal languages used to represent logics, languages, and systems. These frameworks provide foundations for formal specification of systems and programming languages, supporting tool development and reasoning. LSFA aims to be a forum for presenting and discussing work in progress and therefore to provide feedback to authors on their preliminary research.

Topics of interest to this forum include, but are not limited to, specification languages and meta-languages, formal semantics of languages and logical systems, logical frameworks, semantic frameworks, type theory, proof theory, automated deduction, implementation of logical or semantic frameworks, applications of logical or semantic frameworks, computational and logical properties of semantic frameworks, logical aspects of computational complexity, lambda and combinatory calculi, and process calculi.

Out of the total of 21 papers that were presented at LSFA 2019 and 2020, 13 were invited to submit an extended version to this special issue. The invited speakers were also invited to submit. Ten manuscripts were submitted, of which six were selected for inclusion in the issue. All the submitted manuscripts were subjected to rigorous review, with some going through multiple stages of revision.

The first article by Sandro Preto and Marcelo Finger, entitled “Efficient Representation of Piecewise Linear Functions into Łukasiewicz Logic Modulo Satisfiability” considers rational McNaughton functions and their representation in Łukasiewicz Infinitely-Valued Logic, with a goal of providing a setting for stating and reasoning about properties of such functions. Working toward this goal, the authors focus on two different efficient representations. The paper presents a polynomial algorithm for representing such functions, discusses an implementation, and presents some experimental results.

The article by Uwe Wolter, Alfio Martini, and Edward Haeusler, entitled “Indexed and Fibred Structures for Partial and Total Correctness Assertions” studies partial and total correctness assertions in Hoare logic in the context of category theory. The authors show how indexed and fibred structures can be used to model and reason about logical systems. In particular, the syntactic features of Hoare assertions are presented in the setting of indexed categories, while Hoare triples and the Hoare deduction calculus are characterized in the fibred setting.

The third article, by Bruno Xavier, Carlos Olarte, and Elaine Pimentel on “A Linear Logic Framework for Multi-Modal Logics” proves cut-admissibility of LNS_{FMLL} and formalizes the proof in Coq. LNS_{FMLL} is a focused, linear, nested system for FMLL, which is a multi-modal linear logic.

The paper illustrates how FMLL can serve as a logical framework for expressing multi-modal logics as object logics. Furthermore, the authors establish criteria for cut-elimination for object logics expressed in this logical framework and show that such criteria can be easily checked.

The article by Favio Ezequiel Miranda-Perea, Lourdes del Carmen González Huesca, and Pilar Selene Linares Arévalo, entitled “A dual-context sequent calculus for the constructive modal logic S4,” contributes to the theory of modal logics by proposing a dual-context sequent calculus for constructive S4, and proving important meta-properties, such as admissibility of structural rules, invertibility, and cut-elimination. The paper includes a formalization in Coq of the equivalence between the axiomatic system, different natural deduction calculi, and the proposed sequent calculus.

The article by Leandro Gomes, Alexandre Madeira, and Luis Soares Barbosa, entitled “Weighted synchronous automata,” proposes a new class of automata to handle the notions of *vagueness* and *simultaneity* in programs. Such programs are used in situations where multiple branches could be executed in parallel, with possibly different weights associated with each execution. The two notions have been accounted for separately in previous works, but they come together as first-class citizens in the automata defined in this paper.

The sixth and last article in this volume, by Vivek Nigam, Minyoung Kim, Ian Mason and Carolyn Talcott, entitled “Detection and Diagnosis of Deviations in Distributed Systems of Autonomous Agents,” treats the issue of faults in cyber-physical systems. The paper proposes a formal framework based on rewriting logic to identify potential faults at design time. The authors define how to formalize fault models and required behavior as well as propose a workflow to determine the cause of failure.

We would like to thank all involved in this special issue. First, we would like to thank all authors for submitting their contributions and for the care and attention they took in subsequent revisions. We thank all the anonymous referees for their thorough and careful reviews and all the members of MSCS involved in processing this issue. Last but not least, we would like to express our gratitude to the MSCS editor, Pierre-Louis Curien, for his support in making this issue possible.

Guest Editors

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