

## Special Issue on the 31Th Italian Conference on Computational Logic: CILC 2016

### Preface

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This special issue of *Fundamenta Informaticae* contains the revised, extended versions of selected papers presented at the Italian Conference on Computational Logic (Convegno Italiano di Logica Computazionale, CILC 2016) that was hosted by the Università degli Studi di Milano-Bicocca, Italy, from June 20th to June 22th, 2016.

The event was the thirty-first edition of the annual meeting of the Italian Association for Logic Programming (GULP, Gruppo Ricercatori e Utenti di Logic Programming). Since its first edition, the annual conference organized by GULP is the main occasion of meeting and exchanging ideas and experiences among Italian researchers who work in the field of Computational Logic. During the years, this meeting has extended its horizons from the area of Logic Programming to the area of Computational Logic in general, including aspects of Artificial Intelligence and Deductive Databases.

The program of CILC 2016 included 21 technical papers accepted for presentation and a few demos. Paper selection was made by peer reviewing.

The conference program included also two invited talks.

- (i) The first talk was given by Elena Bellodi, winner of GULP 2014 best dissertation award, who reported on her thesis *Integration of Logic and Probability in Inductive and Terminological Reasoning* and, in particular, on Statistical Relational Learning, and
- (ii) The second talk was by Eugenio Omodeo and Alberto Policriti who presented the Springer book *Martin Davis on Computability, Computational Logic, and Mathematical Foundations* that they edited. The book reviews Davis' contributions to logic, computability, and unsolvability.

In addition, to celebrate the seventieth birthday of Professor Mario Ornaghi there was a special session featuring the following speakers and talks.

- (i) Kung-Kiu Lau (University of Manchester, UK): *From Super Mario to X-MEN*. He presented an overview of his research in Component-based Software Development, which started in logic programming, went through component-based development, and ended up with model-driven software development.
- (ii) Michael Mendler (Otto-Friedrich Universität, Bamberg, Germany): *Synchronous Programming in Intermediate Constructive Logic*. He showed how Intermediate Logics can be used to give a

logical meaning to computations for cyclic and concurrent logical programs, such as those arising in asynchronous circuits or in the declarative semantics of synchronous programming languages.

(iii) Helmut Schwichtenberg (Ludwig-Maximilians-Universität, Munich, Germany): *Logic for real number computation*. He presented a logical and constructive approach to study real number computation based on Gray-code and to extract real number algorithms from proofs in an appropriate formal theory involving inductive and coinductive definitions.

Some of the papers presented at the conference were selected for this special issue and their authors were invited to submit an improved, extended version for publication. The papers that have been accepted went through a two-round careful review by qualified international referees, to whom we express our deep gratitude for their comments and criticism.

Here is a brief overview of the topics of the accepted papers.

Mauro Ferrari et al. give a brief survey of Mario Ornaghi's contribution to the field of computational logic.

Federico Bergenti et al. introduce an instantiation of the constraint logic programming scheme called *CLP(PolyFD)* in which variables take values from finite subsets of the integers and constraints are expressed as equalities, inequalities, and disequalities of polynomials with integer coefficients. Such constraints can be treated effectively by means of a specific solver under the assumption that initial approximations of the domains of variables are available. The proposed solver uses the modified Bernstein form of polynomials to detect the satisfiability of constraints.

Loris Bozzato introduces an information terms semantics for the minimal description logic  $\mathcal{EL}$ , discussing the relationship between this constructive semantics and answer set semantics. He also presents a prototype dealing with one aspect of such semantics (the generation of information terms of a knowledge base) using OWL-EL ontologies and "off the shelf" tools.

Roberta Calegari et al. explore the expressive power of labelled systems. To this end, they define a new notion of truth for logic programs extended with labelled variables interpreted in non-Herbrand domains. They also present a meta-interpreter implementing the operational semantics and some case studies.

Federico Chesani et al. introduce the notion of Structured Processes with Observability and Time (SPOT models), able to support incompleteness (of traces and logs), and temporal constraints on the activity duration and between activities. They exploit the power of abduction to provide a flexible, yet computationally effective framework able to reinterpret key reasoning services in terms of incompleteness and observability in a uniform way.

Giorgio Delzanno presents a logic-based framework for the specification and validation of distributed protocols. The specification language is a logic-based presentation of update rules for arbitrary graphs. The protocol is defined for asynchronous processes distributed over a graph with arbitrary topology. He proposes then validation methods based on source to source transformations and deductive reasoning.

Laura Giordano and Daniele Theseider Dupré study a rational extension of the low complexity description logic  $SR\mathcal{OEL}(\sqcap, \times)$ , which underlies the OWL  $\mathcal{EL}$  ontology language. The extension involves a typicality operator, whose semantics is based on Lehmann and Magidor's ranked models and allows for the definition of defeasible inclusions. They provide a Datalog calculus for instance checking under rational entailment and exploit it for computing the rational closure of simple KBs in polynomial time.

Roberto Micalizio and Gian Luca Pozzato present a methodology to revise a Description Logic knowledge base when exceptions are detected. They make use of a non-monotonic extension of the

Description Logic ALC based on the combination of a typicality operator and the well-established non-monotonic mechanism of rational closure, which allows one to deal with prototypical properties and defeasible inheritance.

Martin Sticht presents a multi-agent version of dialogical logic that corresponds more to multi-conclusion sequent calculi for propositional intuitionistic logic rather than single-conclusion ones, which are related to two-player dialogues.

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