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Computing with Foresight and Industry

15th Conference on Computability in Europe, CiE 2019
Durham, UK, July 15–19, 2019
Proceedings

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Preface

Computability in Europe 2019: Computing with Foresight and Industry Durham, UK, July 15–19, 2019



The conference Computability in Europe (CiE) is the annual flagship conference of the Association CiE, a European association of mathematicians, logicians, computer scientists, philosophers, physicists, biologists, historians, and others interested in new developments in computability and their underlying significance for the real world. The Association CiE promotes the development of computability-related science, covering mathematics, computer science, and applications in various natural and engineering sciences, such as physics and biology, as well as related fields, such as philosophy and history of computing.

CiE 2019 had as its motto “Computing with Foresight and Industry” and was the 15th conference in the series. The conference was organized by Algorithms and Complexity in Durham (ACiD), a research group in the Department of Computer Science of Durham University. The 14 previous CiE conferences were held in Amsterdam (The Netherlands) in 2005, Swansea (Wales) in 2006, Siena (Italy) in 2007, Athens (Greece) in 2008, Heidelberg (Germany) in 2009, Ponta Delgada (Portugal) in 2010, Sofia (Bulgaria) in 2011, Cambridge (UK) in 2012, Milan (Italy) in 2013, Budapest (Hungary) in 2014, Bucharest (Romania) in 2015, Paris (France) in 2016, Turku (Finland) in 2017, and Kiel (Germany) in 2018. CiE 2020 will be held in Salerno (Italy).

The CiE conference is the largest annual international meeting focused on computability-theoretic issues. Its proceedings are published in the Springer series *Lecture Notes in Computer Science* and contain the best submitted papers, as well as extended abstracts of invited, tutorial, and special session speakers.

The CiE conference series is coordinated by the CiE Conference Series Steering Committee consisting of Alessandra Carbone (Paris), Gianluca Della Vedova (executive officer), Liesbeth De Mol (Lille), Mathieu Hoyrup (Nancy), Natasha Jonoska (Tampa FL), Benedikt Löwe (Amsterdam), Florin Manea (Kiel, chair), Klaus Meer (Cottbus), Mariya Soskova (Sofia), and ex-officio members Paola Bonizzoni (Milan, President of the Association CiE) and Dag Normann (Oslo).

The Program Committee of CiE 2019 was chaired by Daniël Paulusma (Durham University, UK) and Giuseppe Primiero (University of Milan, Italy) and consisted of 30 members. The committee selected the invited and tutorial speakers and the special session organizers, and reviewed the submitted papers.

The Program Committee invited four speakers to give plenary lectures at CiE 2019: Felipe Cucker (City University of Hong Kong, SAR China), Ursula Martin (University of Oxford, UK), Sonja Smets (University of Amsterdam, The Netherlands), and Linda Brown Westrick (Penn State, USA). The conference also had two plenary tutorials, presented by Markus Holzer (JLU Giessen) and Assia Mahboubi (University of Nantes).

In addition, the conference had six special sessions: Computational Neuroscience, History and Philosophy of Computing, Lowness Notions in Computability, Probabilistic Programming and Higher-Order Computation, Smoothed and Probabilistic Analysis of Algorithms, and Transfinite Computations. Speakers in these special sessions were selected by the respective special session organizers and were invited to contribute a paper to this volume.

Computational Neuroscience.

Organizers: Noura Al Moubayed and Jason Connolly

Speakers:

Ulrik Beierholm (Durham University)

Netta Cohen (Leeds University)

Evelyne Sernagor (Newcastle University)

V Anne Smith (University of St. Andrews)

History and Philosophy of Computing.

Organizers: Council of the HaPoC Commission

Speakers:

Tony Hoare (University of Oxford)

Michael Jackson (Open University)

Raymond Turner (University of Essex)

Lowness Notions in Computability.

Organizers: Johanna Franklin and Joseph S. Miller

Speakers:

Kenshi Miyabe (Meiji University)

Benoît Monin (LACL, Créteil University)

Keng Meng Selwyn Ng (Nanyang Technological University)

Don Stull (LORIA)

Probabilistic Programming and Higher-Order Computation

Organizer: Christine Tasson

Speakers:

Thomas Ehrhard (IRIF, Paris Diderot University)

Cameron Freer (MIT)

Joost-Pieter Katoen (RWTH Aachen)

Sam Staton (University of Oxford)

Smoothed and Probabilistic Analysis of Algorithms

Organizer: Bodo Manthey

Speakers:

Sophie Huiberts (CWI, Amsterdam)

Stefan Klotz (University of Twente)

Clemens Rösner (University of Bonn)

Sebastian Wild (University of Waterloo)

Transfinite Computations

Organizer: Sabrina Ouazzani

Speakers:

Merlin Carl (University of Konstanz)

Lorenzo Galeotti (University of Hamburg)

Benjamin Rin (Utrecht University)

Philip Welch (University of Bristol)

The members of the Program Committee of CiE 2019 selected for publication in this volume and for presentation at the conference 20 of the 35 non-invited submitted papers. Each paper received at least three reviews by the Program Committee and their subreviewers. In addition to the accepted contributed papers, this volume contains seven invited papers. The production of the volume would have been impossible without the diligent work of our expert referees, Program Committee members and additional reviewers alike. We would like to thank all of them for their excellent work.

All authors who contributed to this conference were encouraged to submit significantly extended versions of their papers, with additional unpublished research content, to *Computability. The Journal of the Association CiE*.

The Steering Committee of the conference series CiE is concerned about the representation of female researchers in the field of computability. In order to increase female participation, the series started the Women in Computability (WiC) program in 2007. In 2016, after the new constitution of the Association CiE allowed for the possibility of creating special interest groups, a Special Interest Group named Women in Computability was established. Since 2016, the WiC program has been sponsored by ACM's Women in Computing. This program includes a workshop, the annual WiC dinner, the mentorship program and a grant program for young female researchers. The Women in Computability workshop continued in 2019, coordinated by Liesbeth De Mol. In 2019, additional funding for the workshop was received from the L'Oréal foundation.

The organizers of CiE 2019 would like to thank the following entities for their financial support (in alphabetical order): the Association for Symbolic Logic (ASL), the Division of History of Science and Technology (DHST), the Division of Logic, Methodology and Philosophy of Science and Technology (DLMPST), Durham University, the European Association for Theoretical Computer Science (EATCS), the Commission for the History and Philosophy of Computing (HaPoC), the London Mathematical Society (LMS), and Springer. We would also like to acknowledge the support of our non-financial sponsor, the Association Computability in Europe.

We gratefully thank Matthew Johnson for his work in the Organizing Committee toward making the conference a successful event, and Eelkje Eppenga for designing the poster of CiE 2019.

We thank Andrej Voronkov for his EasyChair system, which facilitated the work of the Program Committee and the editors considerably.

May 2019

Florin Manea
Barnaby Martin
Daniël Paulusma
Giuseppe Primiero

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