Report on ICALP 2018

The 45th International Colloquium on Automata, Languages and Programming

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ICALP 2018 took place in Prague from the 9th till the 13th of July 2018. The conference, which brought ICALP to CZech Republic for the second time, was well organized by Jiří Sgall, Andreas Emil Feldmann, Tomáš Masařík, Michal Opler, Jiří Fiala and Jan Musílek from the Computer Science Institute of Charles University with the support of Anna Kotěšovcová from CONFORG. EATCS would like to thank all of them for all the effort they put into making ICALP 2018 a memorable event.

According to the data presented by Jiří on behalf of the local organizers during the General Assembly of the EATCS held on Wednesday, 11 July, ICALP 2018 had 296 registered participants, 72 of whom were students. Let me note that this is the third year in a row with increasing number of participants, surpasing the attendance of ICALP 2011 at Zürich.

ICALP 2018 featured four invited talks, which were delivered by Jaroslav Nešetřil, Alexander Schwarzmann, Sam Staton and Ryan Williams, as well presentations by the recipients of the Presburger Award, the Gödel Prize and the EATCS Award.

Ryan Williams started the conference on Tuesday, 10th of July, by delivering a talk on *Lower Bounds by Algorithm Design: A Progress Report*. In his talk, Ryan revisited a program that he proposed in 2010 for proving lower bounds in circuit complexity, via faster algorithms for circuit satisfiability and related problems. The talk gave an overview of how the program works, report on the successes of this program so far, and outline open frontiers that have yet to be resolved.

Jaroslav Nešetřil gave the second invited talk on Wednesday, 11th of July, entitled *Sparsity - an Algorithmic Perspective* which was a joint work with Patrice Ossona de Mendez (EHESS Paris and Charles University Prague). The talk point of departure was the use of sparse structures to find fast algorithms for some problems which seem to be otherwise complex and how this is formalized by the recently developed theory of sparse classes of graphs (and structures). The talk discussed arguments on the dichotomy Nowhere vs Somewhere Dense that presents a very robust tool to study and design algorithms and algorithmic metatheorems. This dichotomy can be characterized in many different ways leading to broad applications.

Sam Staton's talk took place on Thursday, 12th of July, and was entitled *Probability Theory from a Programming Perspective*. The talk elaborated on the leading idea of applying techniques from verification and programming theory to machine learning and statistics, to deal with things like compositionality and various notions of correctness and complexity. The talk looked into Probabilistic programming, an example of this idea, that can lead to new foundational methods in probability theory. This is particularly true in the "non-parametric" aspects, for example in higher-order functions and infinite random graph models.

The last invited talk was delivered on Friday, 13th of July, by *Alexander Schwarzmann*, which was a joint work with Theophanis Hadjistasi. The talk dealt with the storage of shared readable and writable data in distributed systems that are subject to perturbations in the underlying distributed platforms composed of computers and networks that interconnect them. The perturbations may include permanent failures (or crashes) of individual computers, transient failures, and delays in the communication medium. An interesting presentation of the overall setting, models of computation, definition of atomic consistency, and measures of efficiency was provided. This was followed by a presentation of algorithms for the single-writer and multi-writer settings in the static models, discussing design issues, correctness, efficiency, and trade-offs. Lastly, the dynamic setting was also examined by presenting the most important approaches and also providing examples.

The core of the scientific program consisted of the papers that were selected for presentation by the three PCs and their chairs (Dániel Marx, Donald Sannella and Christos Kaklamanis.) All tracks received many submission of very high quality contributing to an excellent program. In total, ICALP 2018 received a very large number of submissions (502). Out of these, the committee decided to accept 147 papers for inclusion in the scientific program: 98 papers for Track A, 30 for Track B, and 19 for Track C. This year the program of ICALP also included brief announcements of work in progress with substantial interest for the community. In total 14 brief announcements were accepted for publication: 10 for Track A and 4 for Track C. The complete program can be viewed in detail on the corresponding web site[1]. The proceedings of the conference were published by Leibniz International Proceedings in Informatics Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany. The complete volume is available online under an open-source licence.

The award ceremony was held on Thursday, 12th of July, including the presentations of the EATCS Award 2018, the Gödel Prize 2018, the Presburger Award 2018.

The EATCS Award 2018 was given to *Noam Nisan* for his decisive influence

[1] `https://iuuk.mff.cuni.cz/~icalp2018/programme`

on a range of areas in computational complexity theory and for algorithmic mechanism design, an elegant and rigorous computational theory that aptly informs economics. Noam Nisan has been a dominant intellectual force in theoretical computer science for nearly three decades. He has had pervasive, deep influence in computational complexity theory and is one of the creators and leaders of algorithmic mechanism design. His work has also had immense impact outside of the theoretical computer science community, e.g., in the economics, artificial intelligence, and data networking research communities, in the Google Ad Exchange and online ad auctions more generally, and in education on both the undergraduate and graduate levels. For all these reasons, EATCS celebrated Noam Nisan and his influential work, and is honored to award him with its most prestigious prize[2].

The Gödel Prize 2018 was awarded to *Oded Regev* for his paper *On lattices, learning with errors, random linear codes, and cryptography* that appeared in the Journal of the ACM, volume 56, issue 6, 2009 (preliminary version in the 37th annual Symposium on Theory of Computing, STOC 2005). The award was presented jointly by ACM SIGACT and the EATCS[3].

The Presburger Award 2018 for young scientists was awarded to *Aleksander Mądry* that has made several groundbreaking contributions to the theory of algorithms which have firmly established him as a leader in his field. Some of his most notable work is on the maximum flow problem in graphs and digraphs. EATCS awarded Aleksander Mądry for his work is of exceptional standard and visibility, establishing him as a leading researcher in his field[4].

During the award ceremony, the EATCS Distinguished Dissertation Awards for 2017 were announced that were given to:

- *"Asynchronous Adventures: Formal Approaches to Querying Big Data in Shared-Nothing Systems"*, by Bas Ketsman.
- *"High-Dimensional Similarity Search and Sketching: Algorithms and Hardness"*, by Ilya Razenshteyn.
- *"Hardness of Approximation Between P and NP"*, by Aviad Rubinstein.

The annual General Assembly of the EATCS took place on Wednesday, 11th of July. The general assembly started by providing a second two-year term to Paul Spirakis to continue his work as the president of EATCS and the vice-presidents

[2]The full citation for the award is available at `https://http://eatcs.org/images/awards/eatcsaward/2018.pdf`

[3]The full citation for the award is available at `https://eatcs.org/index.php/component/content/article/1-news/2670-2018-godel-prize`

[4]The full citation for the award is available at `https://eatcs.org/images/awards/Presburger_Laudatio18.pdf`

Leslie Ann Goldberg, Antonin Kucera and Giuseppe Persiano. The next point of discussion was related to the financial viability of the association and how to guarantee the sustainability of EATCS. Jean-Francois Raskin, the treasurer of EATCS, presented a series of changes that were approved by the council of EATCS, including an increase to the annual membership to €40 (from €30). One more very important announcement was made in terms of the organization of future ICALPs and the formation of a Steering Committee. Paul presented the long-term goal of the council to transform EATCS by allocating several ICALP related tasks and responsibilities to the Steering Committee, so that EATCS can support a larger number of conferences. Details on the Steering Committee are available on the EATCS website[5].

ICALP 2018 also included two schools and six workshops organized on a different location. The workshops were held on 9th of July, 2018: Modern Online Algorithms (MOLI); Game Solving: Theory and Practice; Parameterized Approximation Algorithms Workshop (PAAW); Infinity; Algorithmic Aspects of Temporal Graphs; and Constrained Recognition Problems. Additionally two summer schools were organized. The Summer School on Algorithms and Lower Bounds organized immediately before ICALP during 6-9 July, 2018, with a follow-up workshop on Monday afternoon. The Summer School on Discrete Mathematics was organized after the conference during 16-20 July, 2018. The school was be organized by the Institute of Mathematics of the Czech Academy of Sciences and the Computer Science Institute of Charles University.

ICALP 2018 was a successful conference, of high level and excellently organized, in a relaxed atmosphere. We are grateful for generous support from AVAST and RSJ companies which included both travel grants for young women researchers and students and a direct support of the conference. We thank the School of Computer Science (Charles University, Faculty of Mathematics and Physics) and Center of Excellence - Institute for Theoretical Computer Science (project P202/12/G061 of Czech Science Foundation) for their support.

Next ICALP will be held at Patras, Greece. from July 8-12, 2019. The call for papers is included in this volume of the bulletin.

[5]http://eatcs.org/index.php/icalp-sc