

REPORT ON ICALP 2013

The 40th International Colloquium on Automata, Languages and Programming

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The 40th International Colloquium on Automata, Languages and Programming (ICALP), the main conference and annual meeting of the European Association for Theoretical Computer Science (EATCS), took place from the 8th to the 12th of July 2013 in Riga, Latvia. The main conference was preceded by a series of workshops, which took place on Sunday, 7 July. This year, the following five workshops were co-located with ICALP:

- Workshop on Automata, Logic, Formal languages, and Algebra (ALFA'13);
- International Workshop on Approximation, Parameterized and EXact algorithms (APEX 2013);
- Foundations of Network Science (FONES);
- Learning Theory and Complexity; and
- Workshop on Quantum and Classical Complexity.

ICALP 2013 marked two milestones in the history of the ICALP conference series: it was the first ICALP conference that has been organized in a country of the former Soviet Union and it was the 40th ICALP conference.

First of all, let me express my heartfelt thanks to the local organizers, who did their very best to make the conference a festive occasion and a very pleasant experience for all the attendees. The city of Riga is very pretty and all ICALP participants had a very warm welcome. The University of Latvia was also enrolling a new batch of students during ICALP and this meant that there was a continuous flow of young and happy-looking people on the university premises. This made the main hall of the university a very lively place to be. We were also blessed with sunny and warm weather, which also helped to lift the spirits of the conference participants.

According to the data presented by Agnis Skuskovniks, on behalf of the organizing committee, to the EATCS council and to the EATCS general assembly, there were 193 registered participants in ICALP 2013, of which 67 were students. Including the local participants, the six invited speakers, and the two recipients

of the honorary doctorates awarded on Tuesday, 9 July 2013, a total of 217 people attended ICALP 2013. The pre-conference workshops were attended by 102 participants, which is a very healthy number.

ICALP 2013 was an action packed conference and I think that it was a great success, both scientifically and socially. The scientific programme for ICALP 2013 consisted of six invited lectures (two of which were delivered by women), the presentation of 124 contributed papers (which were selected by the program committees out of 423 submissions) and an award session, where, in addition to the presentation of the EATCS and the Presburger awards, honorary doctorates were bestowed on Jozef Gruska and Juris Hartmanis.

The 124 contributed papers for ICALP 2013 were divided into the three tracks of ICALP 2013 as follows:

- 71 papers for “Track A: Algorithms, Complexity and Games”, which were selected from 249 submissions;
- 33 papers for “Track B: Logic, Semantics, Automata and Theory of Programming”, which were selected from 114 submissions; and
- 20 papers for “Track C: Foundations of Networked Computation”, which were selected from 60 submissions.

The PC chairs for the three tracks of ICALP 2013 were Fedor V. Fomin (Track A), Marta Kwiatkowska (Track B) and David Peleg (Track C). I take this opportunity of thanking them, their PCs and the sub-reviewers for doing an exceptional job. To give you an idea of the amount of work that is involved in the selection of papers for ICALP, the PCs for the three tracks of ICALP 2013 had 71 members in total, 1299 reviews were produced during the PC work, of which 794 reviews were written by 684 external reviewers. It is thus fair to say that a large fraction of the TCS community was actively involved in the PC work for ICALP 2013.

Statistical information about the number of papers submitted and accepted for the last five editions of the ICALP conference, as well as acceptance rates, are available in Tables 1–3. The breakdown by country for each track of ICALP 2013, limited to the top ten countries by number of submissions, is in Tables 4–6. I thank Fedor Fomin, Marta Kwiatkowska and David Peleg for sharing this information with me.

I let you draw your own conclusions on how well each country did at ICALP 2013.

ICALP 2013 in Riga featured five invited presentations and a special EATCS lecture to celebrate the 40th edition of the ICALP conference. The scientific program for the conference was preceded by short presentations by the rector of the University of Latvia and by Rusins Freivalds. The rector welcomed the ICALP

| | | | | | |
|---------|-------------|------|------|------|------|
| | 2013 | 2012 | 2011 | 2010 | 2009 |
| Total | 124 | 123 | 114 | 106 | 108 |
| Track A | 71 | 71 | 68 | 60 | 62 |
| Track B | 33 | 30 | 29 | 30 | 24 |
| Track C | 20 | 22 | 17 | 16 | 22 |

Table 1: Number of accepted papers at ICALP 2009–2013

| | | | | | |
|---------|-------------|------|------|------|------|
| | 2013 | 2012 | 2011 | 2010 | 2009 |
| Total | 423 | 432 | 398 | 389 | 370 |
| Track A | 249 | 248 | 243 | 222 | 223 |
| Track B | 114 | 105 | 103 | 114 | 84 |
| Track C | 60 | 79 | 52 | 53 | 63 |

Table 2: Number of submitted papers at ICALP 2009–2013

| | | | | | |
|---------|-------------|------|------|------|------|
| | 2013 | 2012 | 2011 | 2010 | 2009 |
| Total | 29.3 | 28.5 | 28.6 | 27.2 | 29.2 |
| Track A | 28.5 | 28.6 | 28 | 27 | 27.8 |
| Track B | 28.9 | 28.6 | 28.2 | 26.3 | 28.6 |
| Track C | 33.3 | 27.9 | 32.7 | 30.2 | 34.9 |

Table 3: Acceptance rates for ICALP 2009–2013

| country | authors | submitted | accepted | accept rate | PC members |
|---------------|---------|-----------|----------|-------------|------------|
| United States | 179 | 73.61 | 20.83 | 0.28 | 6 |
| Germany | 68 | 30.99 | 13.99 | 0.45 | 1 |
| Israel | 41 | 20.8 | 6.49 | 0.31 | 2 |
| France | 28 | 11.56 | 3.71 | 0.32 | 1 |
| Japan | 26 | 10.75 | 1.25 | 0.12 | 1 |
| China | 24 | 10.58 | 0 | 0 | 0 |
| Sweden | 17 | 8.72 | 3.3 | 0.38 | 0 |
| Poland | 13 | 7.75 | 2 | 0.26 | 0 |
| Canada | 25 | 7.72 | 2.63 | 0.34 | 1 |
| India | 21 | 7.27 | 2.27 | 0.31 | 1 |

Table 4: ICALP 2013: Breakdown by country (Track A)

| country | authors | submitted | accepted | accept rate | PC members |
|----------------|---------|-----------|----------|-------------|------------|
| France | 52 | 21.33 | 7.08 | 0.33 | 2 |
| UK | 36 | 17.02 | 7.07 | 0.42 | 5 |
| Germany | 27 | 12.58 | 5.5 | 0.44 | 3 |
| United States | 22 | 11.38 | 3.83 | 0.34 | 3 |
| Italy | 21 | 7.83 | 1.5 | 0.19 | 1 |
| China | 12 | 5.17 | 1 | 0.19 | 1 |
| Czech Republic | 10 | 3.83 | 0.83 | 0.22 | 1 |
| Israel | 6 | 3.75 | 0.5 | 0.13 | 0 |
| Netherlands | 9 | 3.17 | 0.33 | 0.11 | 1 |
| Poland | 7 | 2.35 | 1.35 | 0.57 | 2 |

Table 5: ICALP 2013: Breakdown by country (Track B)

| country | authors | submitted | accepted | accept rate | PC members |
|---------------|---------|-----------|----------|-------------|------------|
| United States | 40 | 13.28 | 2.07 | 0.16 | 5 |
| Germany | 19 | 7.05 | 3.55 | 0.5 | 1 |
| Israel | 15 | 6.5 | 0.83 | 0.13 | 2 |
| UK | 11 | 5.02 | 2.58 | 0.51 | 1 |
| Canada | 9 | 3.67 | 2.33 | 0.64 | 1 |
| Italy | 15 | 3.67 | 1.07 | 0.29 | 2 |
| Greece | 8 | 3.03 | 1.58 | 0.52 | 1 |
| France | 8 | 2.6 | 0.6 | 0.23 | 2 |
| Hong Kong | 4 | 2 | 0 | 0 | 0 |
| Switzerland | 5 | 2 | 0 | 0 | 2 |

Table 6: ICALP 2013: Breakdown by country (Track C)

participants, gave us some interesting information about the University of Latvia and wished us long coffee breaks. Rusins discussed the unity of science, and reminded us that, even at the time of the iron curtain, there was *one* Computer Science.

The conference proper was kicked off on Monday, 8 July, by an invited talk delivered by the Liverpool-bound Paul Spirakis. Paul's talk was entitled *A Guided Tour in Random Intersection Graphs*. Random intersection graphs are random graphs in which there is a universe M of labels and each one of the vertices selects a random subset of M . Two vertices are connected if, and only if, their corresponding subsets of labels intersect. Random intersection graphs were introduced by Karonski, Sheinerman and Singer-Cohen and have several applications, as well as a rich theory. Paul's talk provided a survey of the main results on the topic obtained by his research group on combinatorial problems over random intersection graphs, such as independent sets, Hamiltonian cycles, colouring, maximum cliques, expansion and random walks. Paul closed the talk by saying that this model is an excellent area of study for PhD students in TCS.

The invited presentation for Tuesday, 9 July, was delivered by Dániel Marx. Dániel's talk had three chapters (his words) and was entitled *The Square Root Phenomenon in Planar Graphs*. The starting point of the talk was the observation that most of the classic NP-hard problems remain NP-hard even when restricted to planar graphs, and only exponential-time algorithms are known for the exact solution of these planar problems. However, in many cases, the exponential-time algorithms on planar graphs are significantly faster than the algorithms for general graphs. Indeed, for various problems on planar graphs, one often sees a square root appearing in the exponent of the running time of the best algorithms for their solution. Dániel told his audience that, by now, we have a good understanding of why this square root appears: most of these algorithms rely on the notion of treewidth and its relation to grid minors in planar graphs. Dániel also argued that, under the Exponential Time Hypothesis, one can show that these algorithms are essentially the best possible, and therefore the square root must appear in the running time. (In passing, let me remark that Dániel contributed also one paper to ICALP Track A and one to ICALP Track B!)

Susanne Albers delivered the invited talk on Wednesday, 10 July, on *Recent Advances for a Classical Scheduling Problem*. In her talk, Susanne revisited the classic on-line makespan minimization problem, which has been studied since the 1960s. After presenting the classic results on this problem, starting from Graham's 1966 List algorithm and its competitive analysis, she surveyed recent research on settings in which an online algorithm is given extra information or power while processing a job sequence.

The scientific programme on Thursday, 11 July, started with an invited talk by Orna Kupferman, who gave the only invited address that could be readily classi-

fied as belonging to ICALP Track B. Orna's presentation dealt with *Formalizing and Reasoning about Quality*. Traditionally, formal approaches to the verification of reactive systems are boolean in nature: either a system satisfies its specification or it doesn't. In case a system does not meet its specification, one expects a good verification framework to provide a counter-example, that is, a reason why the system is not correct. Orna and her co-authors have generalized formal specification and verification methods to address the quality of systems. In her talk, Orna introduced the linear temporal logic $LTL[F]$, where F is a set arbitrary functions over the interval $[0, 1]$. Formulae in $LTL[F]$ are interpreted over computations consisting of sequences of atomic propositions. The satisfaction value of an $LTL[F]$ formula is a number between 0 and 1 that describes how well a computation satisfies a formula. The logic generalizes traditional LTL with the functions in F ; examples of functions that might be in F are the maximum or minimum between the satisfaction values of subformulae (these are the quantitative counterparts of boolean OR and AND, respectively), their product and their average. In her talk, Orna showed us how to generalize classic decision problems in formal methods, such as satisfiability, model checking and synthesis, to search and optimization problems in the quantitative setting. This is achieved by means of an extension of the automata-theoretic approach to LTL to the setting of $LTL[F]$.

Before the conference dinner, Jon Kleinberg delivered a special EATCS lecture to celebrate the 40th ICALP. Jon gave an inspiring and very articulate talk entitled *Algorithms, Networks, and Social Phenomena*. (The slides for the talk are available at <http://www.icalp2013.lu.lv/>.) Jon's presentation discussed the development of computational models for systems involving social networks and large human audiences. In particular, Jon focused on how information spreads through such systems, and the ways in which this spread is affected by the underlying network structure. Jon said a few times that, despite having so much data at our disposal, we still do not understand human behaviour. However, in my humble opinion, the work by Jon and his coworkers is shedding some light on some aspects of our behaviour.

During his presentation, Jon gave us a very interesting view of the hot-spots in the history of ICALP, as seen from title word frequencies, which you can find in Table 7. Some bibliographic notes on the method for constructing the timeline, courtesy of Jon, may be of interest to the readers of this report. The timeline was built from an algorithm in a paper presented at KDD 2002 (see <http://www.cs.cornell.edu/home/kleinber/bhs.pdf>) and, in particular, using the methodology described in Section 4 of that article, where time-lines for other conferences are presented. (For the analysis of title word frequencies for ICALP, Jon removed the phrases "extended abstract" and "preliminary version", which had a lot of temporal variation, and also a small number of very common function words.) In order to interpret the results presented in Table 7, it is also important to

note that, since the algorithm is looking for words with large variation over time, a number of terms from ICALP titles that had high frequency throughout the history of the conference didn't produce enough temporal variation to register as a hot-spot, and therefore are not present in the table. These terms include, for example, "complexity", "algorithms", "graphs", "automata", and a number of other words such as "model" and "logic".

Peter Widmayer delivered the last invited talk on Friday, 12 July. His presentation was entitled *To Be Uncertain Is Uncomfortable, But to Be Certain Is Ridiculous*, and was accessible and well paced. The starting point of Peter's talk was a "Socratic dialogue" between a statistical physicist and himself. Traditionally, in combinatorial optimization one assumes that an input instance is given with absolute certainty. The goal is then to find an optimum solution for the given instance. In contrast, as the statistical physicist would argue, in reality input data are uncertain, noisy and inaccurate. As a consequence, an optimum solution to a combinatorial optimization problem might not be meaningful in practice. (For example, the shortest path to our work place we computed yesterday evening might not be usable this morning because of changed traffic conditions.) Peter advocated the development of algorithms that find "meaningful" solutions in the presence of uncertain inputs, proposed an approach towards reaching this goal and argued that it leads to good solutions in the real world.

Videos of the invited talks (with the exception of Kleinberg's talk, which, as far as I know, was not recorded) will be available in due course on the EATCS YouTube channel at

<https://www.youtube.com/channel/UChc3QOHDEbDdPRErx1uS16A>.

The best paper award session at ICALP 2013 was held on Monday, 8 July, before the welcome reception, which included excellent, and plentiful, finger food and wine. Mark Bun, John Fearnley and Dominik Pajak delivered very good presentations of the award-winning papers, which were:

- Track A: Mark Bun and Justin Thaler. *Dual Lower Bounds for Approximate Degree and Markov-Bernstein Inequalities*.
- Track B: John Fearnley and Marcin Jurdzinski. *Reachability in Two-Clock Timed Automata is PSPACE-complete*.
- Track C: Dariusz Dereniowski, Yann Disser, Adrian Kosowski, Dominik Pajak and Przemyslaw Uznanski. *Fast Collaborative Graph Exploration*.

I hope that you will check out their papers.

The EATCS Award and the Presburger Award were delivered on Tuesday, 9 July, in a joint ceremony that also included the award of honorary doctorates to

| Word | Hot-Spot Interval |
|----------------|-------------------|
| grammars | 1977 — 1982 |
| languages | 1977 — 1982 |
| data | 1977 — 1983 |
| some | 1977 — 1986 |
| equivalence | 1977 — 1988 |
| types | 1977 — 1990 |
| sets | 1978 — 1986 |
| nondeterminism | 1979 — 1982 |
| semantics | 1979 — 1992 |
| language | 1979 — 1994 |
| processes | 1983 — 1998 |
| parallel | 1986 — 1996 |
| systems | 1988 — 1994 |
| equivalences | 1990 — 1999 |
| nets | 1992 — 2000 |
| scheduling | 2001 — 2010 |
| succinct | 2003 — 2011 |
| quantum | 2004 — |
| security | 2004 — 2008 |
| cover | 2005 — |
| stochastic | 2005 — |
| encryption | 2005 — 2008 |
| games | 2006 — |
| network | 2008 — |
| via | 2008 — |
| online | 2010 — |

Table 7: ICALP, as seen from title word frequencies (courtesy of Jon Kleinberg)

Josef Gruska and Juris Hartmanis. The master of ceremony for the award session was Paul Spirakis. First, Martin Dyer received the EATCS Award from Friedhelm Meyer auf der Heide and delivered a presentation entitled *Counting ain't easy*. Martin started by citing the following fragment of a rhyme from the Winnie the Pooh books:

Cheers for Pooh!
(For who?)
For Pooh -
(Why, what did he do?)
I thought you knew

He then proceeded to give an accessible historical overview of what he did do, covering essentially all the work mentioned in the laudatio for the award.

Next, Antonin Kucera presented the Presburger Award 2013 to Erik Demaine. Unfortunately, Erik could not be with us in Riga, but we had a virtual presentation of the award to him via Skype. Moreover, Erik produced an excellent video of a presentation that we could play and enjoy at the conference. Rather than attempting to summarize Erik's inspirational talk, I will simply limit myself to point you to <https://www.youtube.com/watch?v=ROYIVVZ5gvE>.

The honorary doctorates were an excellent addition to the standard session devoted to the EATCS Awards. Gruska and Hartmanis delivered lucid and inspirational presentations. It was truly awesome to see Juris Hartmanis deliver an off-the-cuff speech on how he left Latvia and ended up at Cornell as chair of the newly-founded Computer Science department. At 85, he is still very articulate and an inspirational figure.

The general assembly of the EATCS was held on Wednesday, 10 July, immediately after the excursion and was well attended. The general assembly decided that ICALP 2015 will be held in Kyoto, Japan, and will be co-located with LICS 2015. Kazuo Iwama is the ICALP 2015 general chair. This will be the first ever ICALP outside Europe. During the general assembly, Orna Kupferman gave a thought-provoking talk on *The Gender Challenge in TCS*. It really got the audience thinking about this important matter.

During the general assembly, the best student paper awards were presented to the authors of the following papers:

- Track A: Radu Curticapean. *Counting matchings of size k is $\#W[1]$ -hard.*
- Track B: Nicolas Basset. *A maximal entropy stochastic process for a timed automaton.*

None of the accepted papers for Track C was a student paper.

In case you are interested in having a look, the slides I used for the EATCS general assembly are available at

<http://www.ru.is/~luca/EATCS/GA2013.pdf> .

I hope that this conference report gives you a glimpse of the rich scientific and social programme that made the 40th ICALP in Riga an excellent conference. Everyone involved in the organization of ICALP 2013 deserves the warmest thanks from the TCS community.

ICALP 2014 will be held from Tuesday, 8 July 2014, to Friday, 11 July 2014, on the premises of the IT University in Copenhagen, Denmark, after SEA 2014 (29 June–1 July 2014) and SWAT 2014 (2–4 July 2013). It will be a four-day ICALP and the general chair for the conference is Thore Husfeldt. For jazz lovers, let me also remark that ICALP 2014 will overlap with the Copenhagen Jazz Festival, which will be held in the period 4–13 July 2014.

I hope that you will make plans to submit your best work to ICALP 2014 and to go to Copenhagen for the conference. I heartily recommend it and look forward to seeing you there.