Parameterized Complexity News

Newsletter of the Parameterized Complexity Community

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Editors: Frances Rosamond (Univ Bergen) Frances.Rosamond@uib.no and Valia Mitsou (Univ Paris Diderot) vmitsou@liris.cnrs.fr. Congratulations to all for many awards and prizes, graduates, new jobs, and wonderful research. Read an article by Martin Koutecký, and the PACE report by Édouard Bonnet and Florian Sikora. Compete in the new Parameterized Complexity Essay Contest. Follow fb page `@MikeFellowsFPT`.

Figure 1: Rod Downey (Victoria Univ of Wellington), awarded the Rutherford Medal. Michael Fellows (Univ Bergen), elected Member of Academia Europaea.

Rod Downey - Rutherford Award

CONGRATULATIONS to **Rod Downey FRSNZ** (Victoria Univ of Wellington). Rod has been awarded the Rutherford Medal by Royal Society Te Apārangi for his revolutionary research into mathematical logic and computer science. The Rutherford Medal is the highest honour awarded by the Society for an exceptional contribution to advancing and promoting knowledge for the benefit of New Zealand. Rod gives a brief comment about parameterized complexity and its usefulness here.

Mike Fellows - Academia Europaea

CONGRATULATIONS to **Michael Fellows AC HFRSNZ MAE** (Univ Bergen) for becoming an elected Member of Academia Europaea. Similar to the US Academy of Sciences, the Academia Europaea is an independent learned society and European Union's Academy of Humanities and Sciences. On the initiative of Royal Society and other National Academies in Europe, the Academia was founded in 1988 as the functioning Europe-wide Academy that encompasses all fields of scholarly inquiry. Members include Gregory Gutin (Royal Holloway, Univ London), Georg Gottlob FRS (Univ Oxford).

Sang-il Oum - New Research Group

CONGRATULATIONS to **Sang-il Oum** (Kaist Univ, Korea), who is starting the IBS Discrete Mathematics Group (DIMAG) research group at the Institute for Basic Science, a government-funded research institution in Korea. See here for postdoc positions available.

Nerode Prize Winners

CONGRATULATIONS to Nerode Prize Winners **Stefan Kratsch** (Humboldt-Univ zu Berlin) and **Magnus Wahlström** (Royal Holloway, Univ London) for *Compression via Matroids: A Randomized Polynomial Ker-*

Contents of this issue:

nel for Odd Cycle Transversal (ACM Trans. Algorithms 10(4): 20:1-20:15, 2014).

Figure 2: Christophe Paul (LIRMM, CNRS) IPEC2018 Program co-chair who read the laudation, Stefan Kratsch, Magnus Walström, Michael Fellows (Univ Bergen) who praised the significance.

Jansen, Saurabh – ERC Winners

CONGRATULATIONS to **Bart Jansen** (Eindhoven Univ of Technology, Netherlands) for the ERC Starting Grant *REDUCESEARCH: Rigorous Search Space Reduction*. The project will develop preprocessing methods that reduce the search space of problem-solving algorithms.

CONGRATULATIONS to **Saket Saurabh** (Univ Bergen, Norway) for the ERC Consolidator Grant *Making Sense of Big Data*. This is the second ERC grant for Saket who held an ERC starting grant from 2013 to 2017. The project is estimated at 2 million euro and will support 11 years of post-doc research (5 persons).

Figure 3: Bart Jansen (Eindhoven Univ of Technology), Saket Saurabh (Univ Bergen), EunJung Kim (Paris Dauphine Univ).

Eunjung Kim - ANR Grant Award

CONGRATULATIONS to **Eunjung Kim** (Chargé de Recherche, CNRS, LAMSADE, Paris Dauphine Univ). Dr. Kim has been awarded 210,000€ by the National Research Agency (ANR) of France for her research project *Algorithms with Small Separations acKnowledged: graphs and linear matroids (ASSK)*. The theme of this project is small separation phenomena on graphs and linear matroids, emphasizing the applications on algorithm design. The grant duration will be 2019-2022, with a postdoc position.

Roth, Schmitt – IPEC Best Paper, Excellent Student Paper

CONGRATULATIONS to **Marc Roth** (Saarland University and Cluster of Excellence (MMCI), Saarbrücken, Germany), **Johannes Schmitt** (ETH Zürich, Zürich, Switzerland). The 2018 IPEC Program Committee has selected their paper, *Counting Induced Subgraphs: A Topological Approach to #-W[1]-hardness* for the IPEC 2018 Excellent Student Paper Award and for the IPEC 2018 Best Paper Award.

Figure 4: Marc Roth receives Best Paper and Excellent Student Paper Awards. IPEC Program Co-Chairs Michal Pilipczuk and Christophe Paul. Frances Rosamond presents the award.

(New) PC Essay Contest

Invitation to the Parameterized Complexity Essay Contest by Frances Rosamond, Univ Bergen.

Master's or PhD students of Computer Science are invited to compete in writing an essay. The subject of your essay is to explain parameterized complexity to the "universal" curious person. The size is limited to one single-sided A4 sheet of paper, including figures and/or text (12-point minimum).

As a general rule, your essay should be accessible to 12-year-old students. On the one hand, aiming this essay at older students would mean that there will be assumptions made about a knowledge base that would not necessarily be valid for the lay audience. On the other hand, being able to explain your field to a 12-year-old means that your understanding is on a level that allows you to discuss it with colleagues in other disciplines, as well as with the general public: possibly your siblings or children have asked what you do in your research; we are interested in your answer.

Rules

1. Topic: Answer the question: "*What is Parameterized Complexity? Why should one care about it?* In other words, the theme tries to capture what it is about PC that stimulates or enlightens you."
2. Audience: Essays must be targeted to 12-year-olds.
3. Eligibility: The essay contest is open to all Computer Science Master's or PhD students at the time of submission. Essays can be authored by one or more students but each student can (co-)author only one essay.
4. Format: Essays should be submitted as one A4 single-sided page of text and/or figures, any style, with font size 12 point or larger. Submit as a pdf document via email to pcessaycontest@gmail.com.
5. Dates: Submissions are due by 15 June 2019. Winners will be announced in August 2019.
6. Criteria: Winning essays will be selected based on clarity and correctness of the information, and whether the essay captures the interest of the targeted audience (12-year-olds).
7. Prizes: Winning essays will receive $100, $75, or $50 awards and be published in the *Parameterized Complexity Newsletter*. All authors receive a certificate of participation in the competition.
8. Jury: Entries will be judged by a jury of parameterized complexity researchers, non-science authors, and school students.
9. Contact: For questions or clarifications, please contact: Frances.Rosamond@uib.no.

Juraj Hromkovič-Happy Birthday

BEST WISHES to **Juraj Hromkovič** (ETH – Zürich) who was celebrated with a Springer festschrift, *Adventures Between Lower Bounds and Higher Altitudes: Essays Dedicated to Juraj Hromkovič on the Occasion of His 60th Birthday* (Lecture Notes in Computer Science Book 11011) Editors: Hans-Joachim Böckenhauer, Dennis Komm, Walter Unger.

PACE Winners

CONGRATULATIONS to all **PACE** participants. This year, there were over 40 teams and 80 participants coming from fifteen countries and four continents, including Austria, Brazil, Canada, Czechia, Denmark, England, Finland, France, Germany, India, Japan, Mexico, the Netherlands, Norway, Poland, and Romania. The number of teams and participants both doubled compared to PACE 2017. The 2017 edition doubled over 2016.

PACE Register your team now

JOIN THE CHALLENGE. The two problems in 2019 are Vertex Cover and Hypertree Width.
Dates:
• November 16th, 2018: Announcement of the tracks and additional information (input formats and problem feasibility checker are available online)
November 30th, 2018: Public instances are available
• December 11th, 2018: optil.io open for submission and testing (see tba)
• tba / May 2nd, 2019 (AOE) or 2 weeks prior to IPEC Deadline1 – Deadline (DS) – Submission of the final version of the solver
• tba / IPEC Deadline (tba) – Deadline (DD) – Submission of a solver description / short abstract (via Easychair)
• tba / Award Ceremony and notification about the solver performance, September 11-13, IPEC 2019, Munich, Germany.
• A Poster Session (tbd).
Old website: https://pacechallenge.wordpress.com/pace-2018/
New website: https://pacechallenge.org/2019/

PACE'18 report by Édouard Bonnet and Florian Sikora (PACE'18 PCs)

This year, all three tracks were dedicated to solve the Steiner Tree problem. Congratulations to the Parameterized Algorithms Computational Experiments (PACE 2018) winning teams and participants.

Track A (limited number of terminals) winners:

1. Yoichi Iwata and Takuto Shigemura (Japanese National Institute of Informatics and University of Tokyo)
2. Krzysztof Maziarz and Adam Polak (Jagiellonian University)
3. Thorsten Koch and Daniel Rehfeldt (Zuse Institute Berlin and TU Berlin)
4. Andre Schidler, Johannes Fichte, and Markus Hecher (TU Vienna)

Track B (limited treewidth) winners:

1. Thorsten Koch and Daniel Rehfeldt (Zuse Institute Berlin and TU Berlin)
2. Yoichi Iwata and Takuto Shigemura (Japanese National Institute of Informatics and the University of Tokyo)
3. Tom van der Zanden (Utrecht University)

Track C (heuristics) winners:

1. Emmanuel Romero Ruiz, Emmanuel Antonio Cuevas, Irwin Enrique Villalobos López, and Carlos Segura González (Center for Research in Mathematics, Guanajuato)
2. Thorsten Koch and Daniel Rehfeldt (Zuse Institute Berlin and TU Berlin)
3. Martin Josef Geiger (HSU Hamburg)
4. Radek Hušek, Tomáš Toufar, Dušan Knop, Tomáš Masařík, and Eduard Eiben (Charles University, Prague and University of Bergen)

More details on the strategies used in Track B can be found in Table 1.

This year was a success with more than 80 participants on 40 teams from 16 countries. See the complete ranking with scores, links to source code as well as winning strategies in *The PACE 2018 Parameterized Algorithms and Computational Experiments Challenge: The Third Iteration* (IPEC 2018 proceedings).

The 2019 Steering Committee Chair for PACE is Bart Jansen (Eindhoven Univ of Technology). The PACE 2019 PCs are Johannes Fichte (TU Dresden) and Markus Hecher (TU Vienna).

The PACE challenge was supported by Networks, by `data-experts.de`, and by *Freunde der Saarbrücker Informatik* (`FdSI`). We welcome anyone who is interested to add their name to the mailing list on the fresh new website `pacechallenge.org` to receive PACE updates and join the discussion. PACE 2019 will be on Vertex Cover and Hypertree Width.

Iterative Augmentation: Integer Programming in Variable Dimension

by Martin Koutecký (Technion & Charles University), `koutecky@iuuk.mff.cuni.cz`. Based mainly on [1].

We consider the Integer Programming problem

$$\min\{f(\mathbf{x}) \mid A\mathbf{x} = \mathbf{b},\, \mathbf{l} \leq \mathbf{x} \leq \mathbf{u},\, \mathbf{x} \in \mathbb{Z}^n\}, \qquad \text{(IP)}$$

with $f\colon \mathbb{Z}^n \to \mathbb{Z}$ the *objective function*, $\mathbf{x}$ the vector of *variables*, $A \in \mathbb{Z}^{m\times n}$ the *constraint matrix*, $\mathbf{b} \in \mathbb{Z}^m$ the *right hand side*, and $\mathbf{l}, \mathbf{u} \in \mathbb{Z}^n$ the *lower and upper bounds*.

Our recent results in [1] improve and unify most existing results related to (IP) in variable dimension, and in this article we will describe the main ideas behind this recent progress.

Let $f_{\max} = \max_{\mathbf{x}:\mathbf{l}\leq\mathbf{x}\leq\mathbf{u}} |f(\mathbf{x})|$, and $L = \langle f_{\max}, \mathbf{b}, \mathbf{l}, \mathbf{u}\rangle$, where $\langle\bullet\rangle$ denotes the binary encoding length. The *primal graph* $G_P(A)$ of A has a vertex for each column, and two columns are connected if they share a row which is non-zero in both. The *dual graph* $G_D(A)$ is $G_P(A^\intercal)$. The primal and dual treedepth of A, denoted $\mathrm{td}_P(A)$ and $\mathrm{td}_D(A)$, are the treedepth of the $G_P(A)$ and $G_D(A)$, respectively. The main result then reads as follows:

Theorem 1. *Problem* (IP) *is solvable in time* $g\left(\|A\|_\infty, \min\{\mathrm{td}_P(A), \mathrm{td}_D(A)\}\right) \mathit{poly}(n, L)$ *for a computable function* g.

Iterative Augmentation. At the highest level, the algorithm starts from a feasible solution $\mathbf{x}$ and repeatedly calls an *augmentation oracle* $\mathfrak{A}$ which either provides an augmenting step $\mathbf{h} \in \mathbb{Z}^n$ and sets $\mathbf{x} := \mathbf{x} + \mathbf{h}$, or reports that $\mathbf{x}$ is optimal. A vector $\mathbf{h} \in \mathbb{Z}^n$ is an *augmenting step for* $\mathbf{x}$ if $A\mathbf{h} = \mathbf{0}$, $\mathbf{l} \leq \mathbf{x} + \mathbf{h} \leq \mathbf{u}$, and $f(\mathbf{x} + \mathbf{h}) < f(\mathbf{x})$.

A central notion is the Graver basis of A. For two vectors $\mathbf{x}, \mathbf{y} \in \mathbb{R}^n$ we write $\mathbf{x} \sqsubseteq \mathbf{y}$ if $\mathbf{x}, \mathbf{y}$ belong to the

Rank	score	treewidth approach	first unsolved	switching to DW-like	criterion to switch
1	**92**	no	26, $w = 9$	no	–
2	77	w^w DP	26, $w = 9$	EMV	$w > 10$ or ($w > 8$ and $t < 300$)
3	58	$2^{O(w)}$ rank-based	**54**, $w = 16$	EMV	$3^t < 5^w$
4	52	$2^{O(w)}$ rank-based	39, $w = 11$	no	–
5	52	$2^{O(w)}$ rank-based	13, $w = 7$	DW	$w > 15$
6	49	$2^{O(w)}$ rank-based	39, $w = 11$	no	–
7	33	$2^{O(w)}$ rank-based	32, $w = 10$	no	–
8	33	$2^{O(w)}$ rank-based	13, $w = 7$	no	–

Table 1: Track B recap table. For each team: *score* is the number of private instances solved (over 100), *treewidth approach*, the treewidth-based algorithm used, if any, *first unsolved*, the number of the first unsolved private instance (we recall that the instances of Track B were sorted lexicographically by increasing (w, e)) and the corresponding value of the treewidth, *switching to DW-like*, if the treewidth approach is substituted to a terminal-based algorithm (DW = Dreyfus-Wagner algorithm, EMV = Erickson-Monma-Veinott algorithm), and *criterion to switch* what is the test to switch to such an algorithm.

same orthant ($x_i \cdot y_i \geq 0$ for all $i \in [n]$) and $|x_i| \leq |y_i|$ for all $i \in [n]$; $\sqsubseteq$ forms a partial order over $\mathbb{Z}^n$. The *Graver basis of* A, denoted $\mathcal{G}(A)$, is the set of non-zero $\sqsubseteq$-minimal vectors of $\mathbb{Z}^n$. For $S, P \subseteq \mathbb{Z}^n$, we say that $\mathbf{y}$ is a solution to

$$S\text{-best}\min\{f(\mathbf{x}) \mid \mathbf{x} \in P\},$$

if $\mathbf{y} \in P$ and $f(\mathbf{y}) \leq \min\{f(\mathbf{x}) \mid \mathbf{x} \in P \cap S\}$. For $\lambda \in \mathbb{N}$ and $\mathbf{x} \in \mathbb{Z}^n$ we repeatedly need to solve:

$$\mathcal{G}(A)\text{-best}\min\{f(\mathbf{x}+\lambda\mathbf{g}) \mid A\mathbf{g} = \mathbf{0},\, \mathbf{l} \leq \mathbf{x}+\lambda\mathbf{g} \leq \mathbf{u},\, \mathbf{g} \in \mathbb{Z}^n\} \quad \text{(AugIP)}$$

Lemma 1. *An augmentation oracle $\mathfrak{A}$ which converges in $\mathcal{O}(nL)$ iterations can be realized by solving $\mathcal{O}(L)$ instances of* (AugIP).

However, handling $\mathcal{G}(A)$ (in (AugIP)) directly is difficult. Let $g_\infty = \max_{\mathbf{g}\in\mathcal{G}(A)} \|\mathbf{g}\|_\infty$ and $g_1 = \max_{\mathbf{g}\in\mathcal{G}(A)} \|\mathbf{g}\|_1$, and let $B_1(\rho)$ and $B_\infty(\rho)$ be the ℓ_∞- and ℓ_1-balls of radius ρ around the origin, respectively. Instead of solving (AugIP), we do something more and find $B_\infty(g_\infty)$- and $B_1(g_1)$-best solutions of (AugIP) instead, which is clearly sufficient since $\mathcal{G}(A)$ is contained in $B_1(g_1)$ and $B_\infty(g_\infty)$. This involves two steps: bounding g_∞ and g_1, and solving (AugIP) with these norm bounds.

Norm Bounds (the hard part). One can show that:

Lemma 2. *1.* $g_\infty \leq g_P(\|A\|_\infty, \mathrm{td}_P(A))$

2. $g_1 \leq g_D(\|A\|_\infty, \mathrm{td}_D(A))$

Here, g_P and g_D are computable functions. We note that the proof techniques are quite different: the bound on g_∞ is obtained by a Ramsey-type argument, while the bound on g_1 is obtained using the Steinitz lemma.

Dynamic Programming (the easy part). Analogously, we have

Lemma 3. *Problem* (AugIP) *can be solved in time* $\min\{g_\infty^{\mathcal{O}(td_P(A))}, (\|A\|_\infty g_1)^{\mathcal{O}(\mathrm{td}_D(A))}\} \cdot n$.

In this part, the proof techniques are again different, but not as complicated and essentially use standard ideas for dynamic programming over tree decompositions.

Combining Lemmas 1, 2 and 3 yields Theorem 1.

Strongly Polynomial Algorithms.

With some restrictions, Theorem 1 can be additionally extended to run in *strongly polynomial time*, i.e., in number of arithmetic operations independent of the length of numeric input L. We will give a brief outline. The techniques used here such as proximity theorems or objective reduction are of independent interest.

1. Relaxation. When f is a linear function $f(\mathbf{x}) = \mathbf{w}\mathbf{x}$, the continuous relaxation of (IP) can be solved in time independent of $\langle \mathbf{w}, \mathbf{b}, \mathbf{l}, \mathbf{u} \rangle$ by an algorithm of Tardos, giving us a continuous optimum $\mathbf{y}^*$.

2. Proximity. It is known that there exists an integer optimum $\mathbf{x}^*$ for which $\|\mathbf{y}^* - \mathbf{x}^*\|_\infty \leq n \cdot g_\infty$. Using this and a variable transformation we may construct an instance of IP equivalent to the original instance whose bounds $\mathbf{l}', \mathbf{u}'$ are contained in $B_\infty(n \cdot g_\infty)$. Then we may accordingly construct a reduced right hand side $\mathbf{b}'$ with $\langle \mathbf{b}' \rangle \leq \mathrm{poly}(n, g_\infty)$.

3. Objective Reduction. Frank and Tardos have shown that when f is linear and the feasible region is contained in $B_\infty(\rho)$ for $\rho \in \mathbb{N}$, then there exists an objective f' such that $f(\mathbf{x}) \leq f(\mathbf{y}) \Leftrightarrow f'(\mathbf{x}) \leq f'(\mathbf{y})$ for all $\mathbf{x}, \mathbf{y} \in B_\infty(\rho)$, and, $\langle \max_{\mathbf{x}\in B_\infty(\rho)} |f'(\mathbf{x})| \rangle \leq \mathrm{poly}(n, \rho)$.

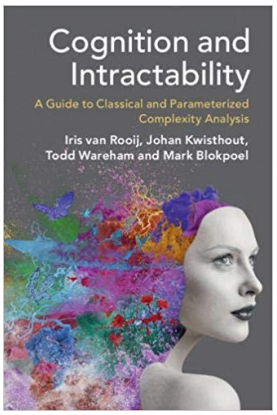
4. Convergence. In conclusion, we have obtained an equivalent instance with $\langle f'_{\max}, \mathbf{b}', \mathbf{l}', \mathbf{u}' \rangle \leq \mathrm{poly}(n, g_\infty)$. Applying Theorem 1 to this instance thus gives a strongly polynomial algorithm.

References

[1] Martin Koutecký, Asaf Levin, and Shmuel Onn. A parameterized strongly polynomial algorithm for block structured integer programs. *ICALP 2018.*

New Book – Cognition and Intractability

Cognition and Intractability: A Guide to Classical and Parameterized Complexity Analysis by Iris van Rooij (Radboud Univ Nijmegen), Johan Kwisthout (Radboud Univ Nijmegen), Todd Wareham (Memorial Univ of Newfoundland), and Mark Blokpoel (Radboud Univ Nijmegen), Cambridge University Press, 2019. ISSN 9781107358331.



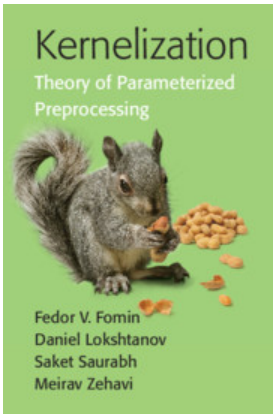
From the book's synopsis: *"... Covering both classical and parameterized complexity analysis,* [this book] *it introduces the mathematical concepts and proof techniques that can be used to test one's intuition of (in)tractability. It also describes how these tools can be applied to cognitive modeling to deal with intractability, and its ramifications, in a systematic way. Aimed at students and researchers in philosophy, cognitive neuroscience, psychology, artificial intelligence, and linguistics who want to build a firm understanding of intractability and its implications in their modeling work, it is an ideal resource for teaching or self-study."*

Advance praise: *'Computational complexity has long been the elephant in the room in cognitive science. Researchers, including myself, blithely propose models that,*

if taken literally, would imply the brain can solve computational problems that are known to be intractable. This excellent introduction to both the technical results and their cognitive relevance should alert students and researchers to these pressing questions.' Nick Chater - University of Warwick.

New Book – Kernelization

Kernelization: Theory of Parameterized Preprocessing by Fedor V. Fomin (Univ Bergen), Daniel Lokshtanov (Univ Bergen), Saket Saurabh (Institute of Mathematical Sciences, India and Univ Bergen), Meirav Zehavi (Ben-Gurion Univ of the Negev, Israel), Cambridge University Press, anticipated December 2018. ISSN 9781107415157



Book's synopsis: *"Preprocessing, or data reduction, is a standard technique for simplifying and speeding up computation. Written by a team of experts in the field, this book introduces a rapidly developing area of preprocessing analysis known as kernelization. The authors provide an overview of basic methods and important results, with accessible explanations of the most recent advances in the area, such as meta-kernelization, representative sets, polynomial lower bounds, and lossy kernelization. The text is divided into four parts, which cover the different theoretical aspects of the area: upper bounds, meta-theorems, lower bounds, and beyond kernelization. The methods are demonstrated through extensive examples using a single data set. Written to be self-contained, the book only requires a basic background in algorithmics and will be of use to professionals, researchers and graduate students in theoretical computer science, optimization, combinatorics, and related fields."*

Advance praise: *'Kernelization is one of the most important and most practical techniques coming from parameterized complexity. In parameterized complexity, kernelization is the technique of data reduction with a performance guarantee. From humble beginnings in the 1990's it has now blossomed into a deep and broad subject with important applications, and a well-developed theory. Time is right for a monograph on this subject. The authors are some of the leading lights in this area. This is an excellent and well-designed monograph, fully suitable for both graduate students and practitioners to bring them to the state of the art. The authors are to be congratulated for this fine book.'* Rod Downey, Victoria University of Wellington.

Call for papers – Algorithms Special Issue

Contributions of research articles are invited for a forthcoming special issue of "Algorithms" dedicated to *New Frontiers in Parameterized Complexity and Algorithms*. Submissions are welcome encompassing the entire breadth of research in this area, both theoretical and experimental. This includes new developments in lower bounds and fine-grained parameterized complexity analysis. Particularly invited are articles on new research directions and new paradigms of problem parameterization that have been little explored.

Deadline for manuscript submissions: 15 July 2019
More information is at the website: https://www.mdpi.com/journal/algorithms/special_issues/Parameterized_Complexity
Guest Editor Frances Rosamond (Univ Bergen)
Co-Guest Editors Neeldhara Misra (IIT-Gandhinaga), Meirav Zehavi (Ben-Gurion Univ)

Algorithms (ISSN 1999-4893; CODEN: ALGOCH) is a peer-reviewed open access journal which provides an advanced forum for studies related to algorithms and their applications. Algorithms is published monthly online by MDPI and is indexed by DBLP, Emerging Sources Citation Index (ESCI - Web of Science), Ei Compendex, Scopus and other databases.

IPEC 2018 Business Meeting

The IPEC 2018 Business Meeting Report is on the wiki at http://fpt.wikidot.com/ipec. Special appreciation to Stefan Kratsch who has been the Chair. The new chair is Henning Fernau. Thank you to departing members Jiong Guo, Danny Hermelin, and Stefan Kratsch. Ongoing members are Daniel Lokshtanov, Naomi Nishimura, Christophe Paul, Michal Pilipczuk and Magnus Wahlström. New members (2018 –2021) are Bart Jansen, Jan Arne Telle, and Saket Saurabh.

Workshops and Conferences

7th Data61 International Optimisation Summer School

January 13th to 18th 2019, Kioloa, NSW, Australia.

Spend a week by the beach learning about the latest optimisation technologies. How can you help a business reduce its costs? Or reduce their carbon footprint? Or do both? The school will focus on solving large scale combinatorial optimisation problems in practice. The school is intended for undergraduate students (3rd year or later), masters or early stage PhD students. Every undergraduate participant will be assigned an individual mentor. Organizer Prof. Toby Walsh, UNSW and Data61.

Apply immediately to ensure a place. Applications processed in order of receipt.

http://tinyurl.com/optschool

Winter school on Theoretical Foundations of Computer Science

February 4-9, 2019, Tbilisi, Georgia.

The school will be organized by the International Black Sea University with the support of Shota Rustaveli National Science Foundation of Georgia (SRNSFG). The intended audience includes master and PhD students as well as young researchers from the fields of computer science and mathematics.

https://cte.ibsu.edu.ge/wstfcs2019/

Latin and American Algorithms, Graphs and Optimization Symposium LAGOS 2019

June 2nd – 7th, 2019, Belo Horizonte, Brazil

Conference themes include parameterized complexity. Confirmed Invited Speakers:
Karen Aardal (Delft University of Technology, Netherlands) Sebastian Cioabă (University of Delaware, USA) Michael Fellows (University of Bergen, Norway) Fabio Protti (UFF, Brazil) Ignasi Sau (CNRS, LIRMM, Université de Montpellier, France) Maya Stein (Universidad de Chile, Chile) Vilmar Trevisan (UFRGS, Brazil) Mario Valencia-Pabon (Université Paris-13, France)

Dates:
Submission deadline: November 26th, 2018 (23h55 GMT). Notification of acceptance: February 15th, 2019 Registration opening: TBA Conference: June 2nd – 7th, 2019

http://lagos2019.dcc.ufmg.br

WorKer 2019 in Bergen

The Workshop on Kernelization (Worker) is the biennial meeting of the kernelization community. Worker 2019 is to be held on June 3-7, 2019 in Norway and is by invitation only.

Invited tutorials: Christian Sohler (Google Switzerland and Technische Universität Dortmund, Germany) and TBA.

Invited talks: Rajesh Chitnis (University of Warwick, England), Yoichi Iwata (National Institute of Informatics, Japan), Bart Jansen (Eindhoven University of Technology, The Netherlands), Stefan Kratsch (Humboldt-Universität zu Berlin, Germany), Pranabendu Misra (University of Bergen, Norway), Marcin Pilipczuk (University of Warsaw, Poland), Sebastian Siebertz (Humboldt-Universität zu Berlin, Germany)

Organisers: Fedor Fomin (Univ. of Bergen, Norway), Daniel Lokshtanov (UCSB, USA), Marcin Pilipczuk (Univ. of Warsaw, Poland), Saket Saurabh (Univ. of Bergen, Norway and Institute of Mathematical Sciences, Chennai, India), Eduard Eiben (Univ. of Bergen, Norway), Torstein Strømme (Univ. of Bergen, Norway), Erlend Raa Vågset (Univ. of Bergen, Norway), Manuel Sorge (Univ. of Warsaw, Poland).

http://worker2019.mimuw.edu.pl

Computer Science Symposium in Russia (CSR 2019)

July 1-5, 2019, Novosibirsk, Russia.

CSR covers a broad range of TCS topics. CSR'19 will be part of the Computer Science Summer in Russia (http://cssr.nsu.ru) which will also include the Ershov Informatics Conference (PSI'19) and Summer School in Computer Science for students.

Dates: Deadline for submissions: December 23, 2018 Notification of acceptance: February 13, 2019 Conference dates: July 1-5, 2019

Yandex Awards for the best paper and for the best student paper will be given by the PC.

Distinguished Lecture by Andrew Yao (Tsinghua U, China)

Invited Speakers: Michael Fellows (U Bergen, Norway), Giuseppe Italiano (LUISS U, Italy), Meena Mahajan (IMSC, India), Petros Petrosyan (Erevan State U, Armenia), David Woodruff (Carnegie Mellon U, USA), Dmitry Zhuk (Moscow U, Russia).

Conference Chair: Renè van Bevern (Novosibirsk State U)

https://logic.pdmi.ras.ru/csr2019/

Computability in Europe 2019

July 15th - 19th, 2019, Durham UK.

Daniel Paulusma, Durham University (co-chair) Daniela Petrisan, Paris Diderot University Giuseppe Primiero, University of Milan (co-chair)

Dates: Paper Registration (Abstract Submission): 7th January 2019 AOE Paper Submission: 14th January 2019 AOE Notification: 18th March 2019 Final Version: 4th April 2019

Informal Presentations: 1st May 2019 Notification for Informal Presentations: within a few days of submission.

VeRoLog Solver Challenge 2019

The VeRoLog Solver Challenge (VSC) is an initiative of VeRoLog, the Working Group on Vehicle Routing and Logistics within EURO, the Association of the European Operational Research Societies. The VSC is aimed at promoting the development of effective algorithms for real-world applications in Vehicle Routing. The challenge is open to everybody. Registration is free.

The challenge consists of two parts. Participants may compete –and win money prizes– in one or in both parts of the challenge.

The awards will be presented during the VeRoLog conference in Seville, June 3-5, 2019. Selected participants will have the possibility to present during this conference and to publish in a special issue of the journal Networks. Conference: (https://verolog2019.sciencesconf.org/)

Website: https://verolog2019.ortec.com/
Contact: Pim.vantHof@ortec.com

14th IPEC (2019)

14th IPEC 2019 will take place with ALGO 2019, Munich, Germany, September 11–13, 2019. The PC chairs are **Bart Jansen** (TU Eindhoven), **Jan Arne Telle** (Bergen U).

IPEC 2020 will take place December 2020 in Hong Kong, Co-located with ISAAC 2020. The Local organizer is Yixin Cao. The PC chairs will be determined by the new SC.

Moving Around – Congratulations to all

Édouard Bonnet has accepted a CR CNRS (permanent junior researcher) position and has joined the MC2 team at LIP, Lyon since September 2018.

Archontia Giannopoulou has accepted an assistant professor position at the Department of Informatics and Telecommunications at the National and Kapodistrian University of Athens. Archontia will be moving to Athens in Spring 2019.

Lukas Larisch is at King Abdullah University of Science and Technology (KAUST).

William Lochet has joined UIB since September 2018 as a postdoctoral researcher, working with Mike Fellows and Saket Saurabh.

Daniel Lokshtanov has accepted a position at Univ California, Santa Barbara.

Felix Reidl is now at Birkbeck University in London (Igor Razgon is there as well).

CONGRATULATIONS New PhDs

Kamran Najeebullah, *Complexity of Optimally Attacking and Defending a Network*, UNSW Sydney (University of New South Wales), Australia.

Advisors: Serge Gaspers, Haris Aziz, and Toby Walsh.

Examiners: Gregory Gutin and Leizhen Cai.

Kamran has since joined Data61, CSIRO in Brisbane, Australia, as a postdoctoral researcher. Congratulations, Dr Najeebullah.