Parameterized Complexity News

Newsletter of the Parameterized Complexity Community

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Welcome

Co-editors Valia Mitsou (Univ Paris Diderot) vmitsou@liris.cnrs.fr and Frances Rosamond (Univ Bergen) Frances.Rosamond@uib.no.

Congratulations to all for many awards and prizes, graduates, new jobs, and wonderful research. ALGO 2017 showcased ten awards and 8 of them were related to parameterized complexity! This newsletter includes articles by the IPEC Best Paper and Excellent Student Paper Award winners. Articles by PACE winners will be featured in the January 2018 newsletter. See ALGO photos on Mike's facebook page @MikeFellowsFPT.

2017 Nerode Prize – Congratulations!

The EATCS-IPEC Nerode Prize 2017 for outstanding papers in multivariate algorithmics has been awarded to **Fedor Fomin** (Univ Bergen), **Fabrizio Grandoni** (IDSIA, Univ Lugano), and **Dieter Kratsch** (Univ Lorraine-Metz) for: *A measure and conquer approach for the analysis of exact algorithms* (JACM 65 (5): Article 25, 2009).

Sullivan awarded US Army Grant

Dr. Blair Sullivan, Associate Professor of Computer Science at NC State University, has been awarded $538,199 by the US Army Research Office to support her FPT oriented research proposal: *Algorithms for Exploiting Approximate Network Structure*. Erik Demaine (MIT) is co-PI. The award will run from 2017 - 2020.

Figure 1: Dr. Blair Sullivan, US Army grant winner.

Figure 2: Prof Gregory Gutin, M.A.E.

Gregory Gutin to Academia Europaea

Congratulations to **Gregory Gutin** (Professor of Computer Science, Royal Holloway, University of London),

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who has been elected to the Academia Europaea as a Member of the Informatics Section. See http://www.ae-info.org/ae/Member/Gutin_Gregory

Stewart and Paulusma win EPSRC

Congratulations to **Iain Stewart** and **Daniel Paulusma** (Durham Univ), who have won an EPSRC grant for **ALGOUK** - a network of six UK univ (Durham, King's College London, Royal Holloway, Liverpool, Leicester, Warwick), for 3 years (£100K). ALGOUK will fund a range of activities to bring together researchers on algorithms in the UK and facilitate interactions with researchers in other disciplines and industry.

Pieterse and Jansen win IPEC Excellent Student Paper Award

Congratulations to **Astrid Pieterse** and **Bart M. P. Jansen** (Eindhoven Univ of Technology) for winning the IPEC 2017 Excellent Student Paper Award for *Optimal Data Reduction for Graph Coloring Using Low-Degree Polynomials*. A summary follows in this newsletter.

Figure 3: IPEC 2017 Excellent Student Paper Award winners Bart Jansen and Astrid Pieterse.

Curticapean, Dell, Fomin, Goldberg, Lapinskas win IPEC Best Paper Award

Congratulations to **Radu Curticapean** (Hungarian Academy of Sciences), **Holger Dell** (Saarland Univ), **Fedor Fomin** (Univ Bergen), **Leslie Ann Goldberg** (Univ Oxford) and **John Lapinskas** (Univ Oxford), who have won IPEC 2017 Best Paper Award for *A Fixed-Parameter Perspective on #BIS*. See following summary.

Tamaki wins ESA Track B Best Paper

Congratulations to **Hisao Tamaki** (Meiji Univ), who has won ESA 2017 Track B Best Paper Award for his paper accompanying his PACE 2017 submission, *Positive-instance driven dynamic programming for treewidth*. He says this work would not have happened without the motivation of the PACE challenge. Hisao's research will be showcased in the January 2018 Newsletter.

Bentert, van Bevern, Nichterlein, Niedermeier win ALGOSENSORS Best Paper

Congratulations to **Matthias Bentert, René van Bevern, André Nichterlein, Rolf Niedermeier**, for winning ALGOSENSORS Best Paper Award, Algorithms Track for *Parameterized algorithms for power-efficient connected symmetric wireless sensor networks*.

Roth wins ESA Best Student Paper Award

Congratulations to **Marc Roth** (Saarland Univ), who has won ESA 2017 Best Student Paper Award for *Counting restricted homomorphisms via Möbius inversion over matroid lattices*.

Cygan, Kowalik, Socala win ESA Track A Best Paper Award

Congratulations to **Marek Cygan**, **Lukasz Kowalik**, **Arkadiusz Socala** (Univ Warsaw), for winning ESA 2017 Track A Best Paper Award for *Improving TSP tours using dynamic programming over tree decompositions*.

Bentert, Fluschnik, Nichterlein, Niedermeier win FCT Best Student Paper

Congratulations to **Matthias Bentert, Till Fluschnik, André Nichterlein, Rolf Niedermeier** for winning Best Student Paper Award at the 21st Symposium on Fundamentals of Computation Theory (FCT '17) for *Parameterized Aspects of Triangle Enumeration*.

Aleksandrov, Walsh win at KI'2017

Congratulations to **Martin Aleksandrov** and **Toby Walsh** for *Expected Outcomes and Manipulations in Online Fair Division*, which won Best Paper Prize at the 40th German Conference on Artificial Intelligence (KI'2017). This is the second time Martin has won a best paper award during his PhD.

PACE'17 Experiments Challenge winners

TRACK A: OPTIMAL TREE DECOMPOSITION

1. **Lukas Larisch** (King-Abdullah Univ Science and Engineering), **Felix Salfelder** (Univ Leeds)
2. **Hiromu Ohtsuka**, **Hisao Tamaki** (Meiji Univ)
3. **Max Bannach** (Univ Lübeck), **Sebastian Berndt** (Univ Lübeck), **Thorsten Ehlers** (Univ Kiel)

TRACK A: HEURISTIC TREE DECOMPOSITION

1. **Keitaro Makii**, **Hiromu Ohtsuka**, **Takuto Sato**, **Hisao Tamaki** (Meiji Univ)
2. **Ben Strasser** (Karlsruhe Institute of Technology)

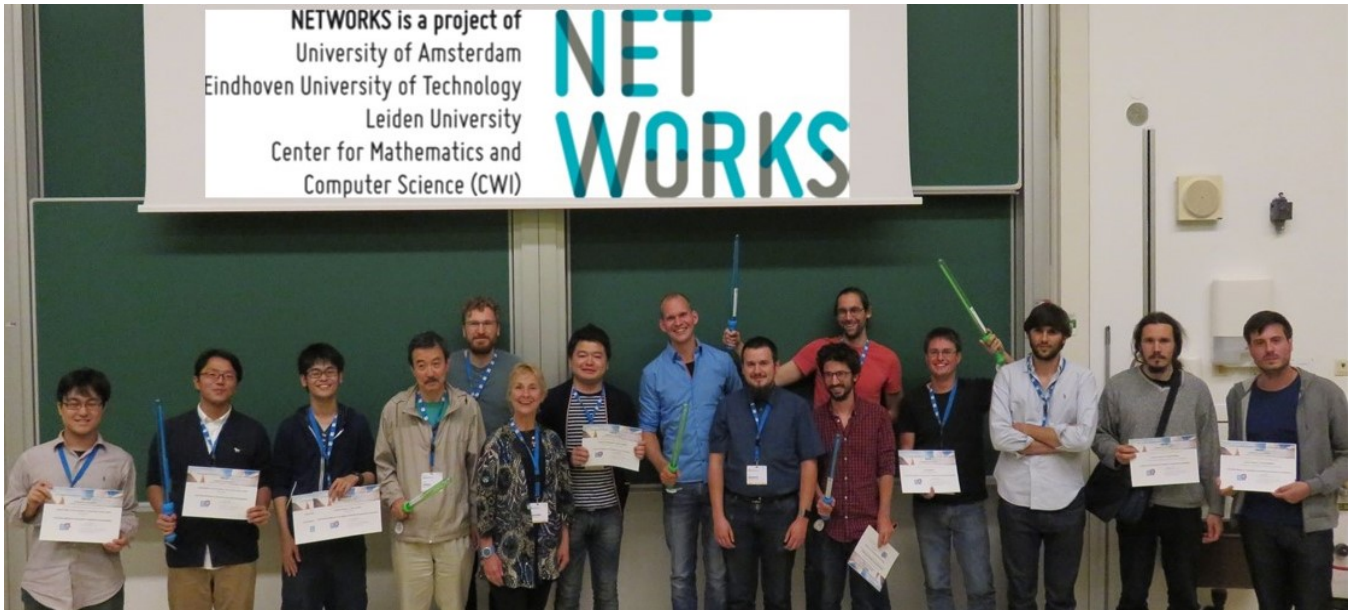

Figure 4: PACE 2017 Award Winners

3. **Michael Abseher**, **Nysret Musliu**, **Stefan Woltran** (TU Wien)

TRACK A: HONORS

4. **Max Bannach** (Univ Lübeck), **Sebastian Berndt** (Univ Lübeck), **Thorsten Ehlers** (Univ Kiel)
5. **Philippe Jégou**, **Hanan Kanso**, **Cyril Terrioux** (Aix-Marseille Université, LSIS)
6. **Lukas Larisch** (King-Abdullah Univ Science and Engineering), **Felix Salfelder** (Univ Leeds)

TRACK B: MINIMUM FILL-IN

1. **Yasuaki Kobayashi** (Kyoto Univ), **Hisao Tamaki** (Meiji Univ)
2. **Jeremias Berg**, **Matti Järvisalo**, **Tuukka Korhonen** (Univ Helsinki)
3. **Édouard Bonnet** (UnivParis-Dauphine), **R.B. Sandeep** (Hungarian Academy of Sciences), **Florian Sikora** (Univ Paris-Dauphine)

TRACK B: HONORS

4. **Anders Wind Steffensen**, **Mikael Lindemann** (IT Univ Copenhagen)
5. **Kaustubh Joglekar**, **Akshay Kamble**, **Rajesh Pandian** (Indian Institute Of Technology, Madras)
6. **Saket Saurabh** (Univ Bergen), **Prafullkumar Tale** (Institute of Mathematical Sciences, Chennai)
7. **Mani Ghahremani** (Univ Portsmouth)
8. **Frederik Madsen**, **Mikkel Gaub**, **Malthe Kirkbro** (IT Univ Copenhagen)

Congratulations to Parameterized Algorithms Computational Experiments (PACE 2017) winning teams and participants. See https://pacechallenge.wordpress.com/ for a list of papers resulting from PACE. Read about winning strategies in *The PACE 2017 Parameterized Algorithms and Computational Experiments Challenge: The Second Iteration* (IPEC 2017 Proceedings). The libraries developed will be useful for Masters projects. Let us know how you use the results. Some instances were real-world transit and road graphs submitted by **Johannes Fichte** (TU Wien) and **Ben Strasser** (Karlsruhe Institute of Technology).

The 2018 Steering Committee Chair for PACE is **Bart Jansen** (Eindhoven Univ of Technology). The PACE 2018 PCs are **Édouard Bonnet** and **Florian Sikora**, both at Univ Paris-Dauphine. Huge thanks to the PCs who have done so much during the 2016 and 2017 challenges: Track A: **Holger Dell** (Saarland Univ), Track B: **Christian Komusiewicz** (Chair) (Friedrich-Schiller-Univ Jena), **Nimrod Talmon** (Weizmann Institute of Science), **Mathias Weller** (Lab of Informatics, Robotics, and Microelectronics of Montpellier (LIRMM)).

Grateful appreciation goes to the NWO Gravitation Project Networks, our PACE sponsor. Photos, thanks to **Rudolf Fleischer** (GUtech), are on facebook @MikeFellowsFPT, and at ALGO Gallery and Dropbox. The PACE Award Ceremony was fun with prizes courtesy of **Frances Rosamond** (Univ Bergen). Sign up for the PACE Newsletter and join the 2018 Steiner Tree Challenge at http://pacechallenge.wordpress.comp.

Optimal Data Reduction for Graph Coloring Using Low-Degree Polynomials

by Astrid Pieterse (Eindhoven Univ of Technology, NL). a.pieterse@tue.nl.

This short article summarizes the main algorithmic idea in the IPEC 2017 Best Student Paper Award paper by Bart M. P. Jansen and Astrid Pieterse [2].

Introduction The q-Coloring problem, asking whether the vertices of a graph can be properly colored using at most q different colors, has been widely studied. Since, even 3-Coloring is NP-hard, the number of colors is not a suitable parameter and the problem has been studied using several structural parameters. Jansen and Kratsch [1] studied the problem for a hierarchy of different parameters. One of their results was that q-Coloring parameterized by the size of a Vertex Cover in the graph has a kernel of bitsize $O(k^q)$. Furthermore, they showed for $q \geq 4$ that it has no kernel of size $O(k^{q-1-\varepsilon})$, unless NP $\subseteq$ coNP/poly. This left a factor-k gap between the upper and lower bound, and it was not clear which could be strengthened. We show that q-Coloring parameterized by Vertex Cover has a kernel with $O(k^{q-1})$ vertices and bitsize $O(k^{q-1} \log k)$, thereby closing the gap between the upper and lower bound up to $k^{o(1)}$ factors.

In previous work [4], the current authors showed for $q \geq 4$, that the q-Coloring problem with n vertices has no kernel of size $O(n^{2-\varepsilon})$, unless NP $\subseteq$ coNP/poly. It remained unclear whether the same was true for 3-Coloring. One might think that dense graphs are either not 3-colorable, or have very specific structure. This could then be exploited to find a better kernel. However, we show in the paper [2] that 3-Coloring has no kernel of size $O(n^{2-\varepsilon})$, strengthening our previous result. This also implies that 3-Coloring parameterized by Vertex Cover has no kernel of size $O(k^{2-\varepsilon})$, under the same assumption. Together with the known lower bound by Jansen and Kratsch [1], this shows that q-Coloring parameterized by Vertex Cover has no kernel of size $O(k^{q-1-\varepsilon})$ for $q \geq 3$, unless NP $\subseteq$ coNP/poly.

Kernelization In this summary, we will show how to obtain a kernel of bitsize $O(k^{q-1} \log k)$ for q-Coloring parameterized by Vertex Cover. Consider input graph G with vertex cover VC. The remaining vertices form independent set IS. The challenge is that IS may be large compared to the size of the vertex cover. To obtain a kernel, we will find vertices in $v \in$ IS, such that any coloring of $G - v$ can be extended to color the entire graph. We call such vertices redundant.

The kernel is based on the observation that each vertex $v \in$ IS poses a constraint on its neighborhood, namely that "The neighborhood of v should not use all q colors". Equivalently, for each vertex $v \in$ IS, for each $S \subseteq N(v)$ with $|S| = q$, we require that "Some color is used twice in S". Note that this is equivalent to saying that S leaves some color unused, by the size of S. If some coloring of VC satisfies all $\binom{|N(v)|}{q}$ constraints corresponding to $v \in$ IS, it is easy to see that this coloring can be extended to v. We will now find redundant vertices, by replacing all vertices in IS by constraints. This gives a set of constraints L. Then we find a subset $L' \subseteq L$ of relevant constraints. This subset is chosen such that any coloring satisfying the constraints in L', must satisfy all original constraints.

The problem now boils down to finding a small set of relevant constraints. For this, we use a technique that we introduced in previous work [3]. There, we give a polynomial-time algorithm that does the following: Given a set L of polynomial equalities of degree at most d over n boolean variables, it outputs $L' \subseteq L$ with $|L'| \leq n^d + 1$ such that any boolean assignment satisfying all equalities in L', satisfies L. In particular, this technique works when given equalities over the integers modulo 2. All that is needed to obtain L' is to form a linear system over an extended set of variables: there is one meta-variable for each monomial. A constraint then translates into a linear equality on these meta-variables, and L' can be found by computing a basis of the associated extended linear system using Gaussian elimination.

In order to use the above result, we must model the constraints as a set of polynomial equalities over boolean variables. First of all, create q boolean variables for each vertex in VC, and label them $y_{v,k}$ for $v \in$ VC and $k \in [q]$. To describe the color of a vertex, let $y_{v,k} = 1$ if vertex v has color k, and zero otherwise. It remains to replace the constraint "these q vertices use at least one color twice" by a low-degree polynomial equality. Let $S \subseteq$ VC with $|S| = q$ be the considered set of vertices. Then we use the following polynomial equality of degree $q - 1$:

$$\sum_{\substack{v_1,\ldots,v_{q-1} \in S \\ \text{distinct}}} \prod_{k=1}^{q-1} y_{v_k,k} \equiv 0 \pmod 2.$$

For $q = 3$ and $S = \{u, v, w\}$ this boils down to

$$y_{u,1} \cdot y_{v,2} + y_{u,1} \cdot y_{w,2} + y_{v,1} \cdot y_{u,2} + y_{v,1} \cdot y_{w,2} + y_{w,1} \cdot y_{u,2} + y_{w,1} \cdot y_{v,2} \equiv 0 \pmod 2.$$

One may verify that this polynomial equality is satisfied by assignments corresponding to colorings of S that use some color at least twice, and not satisfied by assignments corresponding to a coloring of S using all q different colors. What happens for assignments not corresponding to a coloring of S is not relevant for our purposes.

Using the technique we described earlier, we arrive at a set L' of $O(k^{q-1})$ relevant constraints. Each constraint was generated from a vertex in IS. Vertex $v \in IS$ is redundant if none of its implied constraints belong to L'. Such vertices can therefore be removed without changing the answer. This reduces the size of the independent set to $O(k^{q-1})$ vertices. After also omitting edges between IS and VC that are not involved in any active constraints in L', the instance can be encoded in $O(k^{q-1} \log k)$ bits.

Future work We have seen that our method of finding redundant constraints for a certain type of constraint

satisfaction problem is very useful to improve the kernel for q-Coloring. It would be interesting to see if this technique can be applied to improve kernel bounds for other graph problems, or even different types of problems.

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A Fixed-Parameter Perspective on #BIS

by Radu Curticapean (MTA SZTAKI), Holger Dell (MMCI), Fedor Fomin (Univ Bergen), Leslie Ann Goldberg (Univ Oxford), and John Lapinskas (Univ Oxford). radu.curticapean@gmail.com, hdell@mmci.uni-saarland.de, fomin@ii.uib.no, leslie.goldberg@cs.ox.ac.uk, lapinskas@cs.ox.ac.uk.

Introduction The problem of (approximately) counting the independent sets of a bipartite graph, called #BIS, is one of the most important problems in the field of approximate counting. This problem is known [3] to be complete in the intermediate complexity class $\#\mathrm{RHII}_1$. Many approximate counting problems are equivalent in difficulty to #BIS, including those that arise in spin-system problems [4, 5] and in other domains. These problems are not believed to have efficient approximation algorithms, but they are also not believed to be NP-hard.

In our paper [2], we study the robustness of the intermediate complexity of #BIS by considering relevant fixed parameters. It is already known that the complexity of #BIS is unchanged when the *degree* of the input graph is restricted (even if it is restricted to be at most 6) [1] but there is an efficient approximation algorithm when a stronger degree restriction (degree at most 5) is applied, even to the vertices in just one of the parts of the vertex partition of the bipartite graph [6].

We consider variants of the problem parameterised by the *size* of the independent set. We first show that all of the following problems are #P-hard to solve exactly and NP-hard to approximate *within any polynomial factor*.

- #Size-BIS: Given a bipartite graph G and a non-negative integer k, count the size-k independent sets of G.
- #Size-Left-BIS: Given a bipartite graph G with vertex partition (U, V) and a non-negative integer k, count the independent sets of G that have k vertices in U.
- #Size-Left-Max-BIS: Given a bipartite graph G with vertex partition (U, V) and a non-negative integer k, count the maximum independent sets amongst all independent sets of G with k vertices in U.

The NP-hardness of these approximate counting problems is surprising given that the corresponding problems without the parameter k (that is, the problem #BIS and also the problem #Max-BIS, which is the problem of counting the *maximum* independent sets of a bipartite graph) are both complete in $\#\mathrm{RHII}_1$, and hence are not believed to be NP-hard. Therefore, it is the introduction of the parameter k that causes the hardness.

To gain a more refined perspective on these problems, we also study them from the perspective of parameterised complexity, taking the number of vertices, n, as the size of the input and k as the fixed parameter. We find an efficient FPT approximation algorithm (an FPTRAS) for #Size-BIS, and show that it is #W[1]-complete to solve exactly. The remaining two problems are both W[1]-hard to approximate to within any polynomial factor, and #Size-Left-BIS in particular is #W[2]-hard to solve exactly. (Note that each parameterised counting problem in the class #W[i] has a randomised FPT approximation algorithm using a W[i] oracle [7], so W[i]-hardness is the appropriate hardness notion for parameterised approximate counting problems.) Thus we have mapped the complexity landscape for the three problems in all four settings: polynomial exact counting, polynomial approximation, FPT exact counting, and FPT approximation.

Motivated by the fact that #BIS is known to be #P-complete to solve exactly even on graphs of degree 3 [10], we also consider the case where the input graph has bounded degree Δ. From a polynomial perspective, all our problems remain #P-complete when $\Delta = 3$. Despite this, we show they admit FPT algorithms with running time $O(nk^{O(k)})$ for all constant Δ. (Note that an FPT algorithm for bounded-degree #Size-BIS is also implicit in independent work by Patel and Regts [8], and later made explicit in [9].)

References

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IPEC 2017 Business Meeting

by Frances Rosamond, *University of Bergen.*

The Business Meeting was led by Stefan Kratsch, Chair of IPEC Steering Committee. Stefan thanked Thore Husfeldt, Iyad Kanj and Gerhard Woeginger, who ended their term in the SC this year, and welcomed new members- Christophe Paul, Michał Pilipczuk, and Magnus Wahlström.

The Parameterized Complexity Summer School immediately preceding ALGO exceeded even the most optimistic predictions with over 100 participants. Congratulations to organizers Robert Ganian, Sebastian Ordyniak and M. S. Ramanujan. Many thanks to all speakers and participants.

The IPEC 2017 Program Committee Chair report was given by PC co-chair Daniel Lokshtanov (Univ Bergen). Out of 68 submissions, 29 papers were accepted (42.6%). This was both the highest number of submissions and the lowest acceptance of any IPEC since 2004. The next highest number of submissions was 58 in 2013. The next lowest acceptance was 48% in 2009. The papers were generally of high quality, and the reason for the low acceptance rate was the number of available time slots in the program. It is discouraging to have good papers rejected. Suggestions about how to increase the number of time slots were, parallel sessions or adding a fourth day. Both options found support in the business meeting and will be explored subject to local organization of future ALGOs. For IPEC 2018 the PC chairs will have the option of using parallel sessions on Thursday.

Deadlines for IPEC 2018 will be early due to early ALGO 2018, which will be held during August 22-24, 2018 in Helsinki, Finland. IPEC 2018 PC chairs are Christophe Paul (LIRMM) and Michał Pilipczuk (Univ Warsaw). Submission deadline is May 14 + 17, 2018 (abstract/full paper).

A bid to host IPEC in December 2020, co-located with ISAAC 2020 has been made by Yixin Cao (Hong Kong Polytechnic Univ). Stefan pointed out that the *2015 Summary of PC/MVA* located on the wiki Welcome Page (top of left column) lists many PC groups in Asia. The suggestion of holding IPEC in Hong Kong/outside of Europe was hugely popular.

Nerode Prize eligibility is a journal publication of a paper/series of papers on multivariate algorithmics at least two and at most ten years ago. After discussion, most felt that 'at most ten years' was too stringent a requirement.

Applied and engineering papers in IPEC were discussed. The Call for Papers states: *In particular, studies on parameterized and exact computations for real-world applications and algorithmic engineering are especially encouraged,* however Daniel reported that the PC is finding it difficult to compare these with theoretical papers. Applied papers have received rejects saying "Out of scope". Of 5 applied/engineering papers submitted, 2 were accepted. A PACE competitor said he would not submit to IPEC until it was clear his paper would be adequately reviewed. Note that the PACE-inspired paper by Hisao Tamaki won ESA Best Paper Award. Tamaki and David Coudert (who won the Flinders Hamiltonian Cycle Problem Challenge in 2016) have been invited to the IPEC 2018 PC.

The Publicity Report was given by Frances Rosamond (Univ Bergen). The Parameterized Complexity community has 5 communication/publicity channels: (1) Wiki (`http://fpt.wikidot.com`) (2) Parameterized Complexity Newsletter (ISSN 2203-109X) has 1592 members on the mailing list. The newsletter is sent via email and is on the wiki. Welcome to Valia Mitsou - the new co-Editor. (3) PACE (`https://pacechallenge.wordpress.com/`): Over 63 subscribed to the *PACE Newsletter.* Read the Report in the IPEC Proceedings. (4) Wikipedia page. Help is needed to keep this updated. (5) Facebook (@MikeFellowsFPT). The most views for any post is 385.

The 2017 IPEC Excellent Student Paper Award was presented to **Bart M. P. Jansen**, **Astrid Pieterse** (Eindhoven Univ of Technology) for *Optimal Data Reduction for Graph Coloring Using Low-Degree Polynomials.*

The 2017 IPEC Best Paper Award was presented to **Radu Curticapean** (Hungarian Academy of Sciences), **Holger Dell** (Saarland Univ), **Fedor V. Fomin** (Univ Bergen), **Leslie Ann Goldberg** (Univ Oxford), **John Lapinskas** (Univ Oxford) for *A Fixed-Parameter Perspective on #BIS.*

Note that the ALGO Awards page shows that **8 of the 10 awards were presented to Parameterized Complexity related papers**! Congratulations all!

Conferences and Workshops

October – Lyon, France

Games and Graphs Workshop will be held from 23 – 25 October in Lyon, France. The workshop will provide a forum for researchers working on the intersection of combinatorial game theory and graph theory to exchange recent advances and ideas as well as to establish new collaborations. Topics include parameterized complexity of games. Free registration.

(https://liris.cnrs.fr/gag/workshop/index.html).

December – Tel Aviv
Recent Advances in Parameterized Complexity (https://rapctelaviv.weebly.com) will be held 3–7 December 2017 in Tel Aviv, Israel. Recent Advances in Parameterized Complexity has a twofold purpose. First, the event would present an overview of several recent, exciting advances in the field of Parameterized Complexity. Second, to attract new researchers to work on topics in this field of research, the program would also consist of a preparatory school at the level of an introductory course. We thus invite both graduate students and established researchers to participate in Recent Advances in Parameterized Complexity. For more details, see rapctelaviv.weebly.com.

June–FAW'17
There will be a TCS Special Issue from FAW'17 which was held 23-25 in Chengdu, China. **11th International Frontiers of Algorithmics Workshop**. Program Co-Chairs: Frances Rosamond (Univ of Bergen) and Mingyu Xiao (Univ of Electronic Science and Technology of China).

Note about JOBS
Looking for a position in the UK? View **www.jobs.ac.uk**. The UK is attending to a Regulated Qualifications Framework (RQF) and seeking researchers with high-profile quality papers, grants, ability to recruit students, and impact. Experience in programming competitions (e.g., PACE) and other outreach is valued.

Moving Around – Congratulations to all

Ralph Bottesch is finishing a post-doc position at CWI Amsterdam. He has a new little 8-month-old daughter. Congratulations, Ralph.

Jiehua Chen has a post-doc position with Danny Hermelin at Ben-Gurion Univ of the Negev.

Rajesh Chitnis has accepted a post-doc at Univ Warwick with Graham Cormode and Artur Czumaj. He will be further exploring parameterized streaming algorithms.

Edward Eiben has accepted a post-doc with Daniel Lokshtanov at the University of Bergen.

Serge Gaspers, UNSW Sydney, Australia, has secured a permanent position at UNSW as of July 2017. Moreover, he will be promoted to Associate Professor with effect from January 2018. As part of the negotiations, UNSW also agreed to hire a junior academic (lecturer/senior lecturer) in algorithms. This will be a convertible tenure track position. Send expressions of interest to Serge.

Danny Hermelin (Ben-Gurion Univ, Israel) has been promoted to Associate Professor.

Dusan Knop has accepted a postdoc position with Fedor Fomin. Welcome to Bergen, Dusan.

Stefan Kratsch has accepted a full professor (W3) position at Humboldt University, Berlin.

Christian Komusiewicz has taken up a position as an Associate Professor at University of Marburg.

Valia Mitsou has accepted an ATER (temporary teaching and research associate) position at IRIF, Université Paris Diderot.

George Mertzios (Durham Univ, UK) has been promoted to Associate Professor.

M. S. Ramanujan has accepted a permanent position at Warwick University. Also, MSR is getting married in October. Best congratulations to MSR and Vaishnavi!

Manuel Sorge has a post-doc position with Danny Hermelin at Ben-Gurion Univ of the Negev.

Ben Strasser will take up a position at Daimler. He will be working on navigation systems.

Magnus Wahlström has been promoted from Reader to Associate Professor at Royal Holloway, Univ of London.

Mathias Weller is now Chargé de Recherche (in charge of research) at the Laboratoire Gaspard-Monge hosted by the Université Paris Est Marne-La-Vallée (http://ligm.u-pem.fr/). Mathias will be working with Philippe Gambette, Stéphane Vialette, Gregory Kucherov and Laurent Bulteau, among others.

CONGRATULATIONS New PhDs

Jannis Bulian, *Parameterized complexity of distances to sparse graph classes*, Cambridge University. Advisor: Professor Anuj Dawar (Computer Laboratory, University of Cambridge). See http://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-903.pdf for the version that was published as a technical report. Jannis has since joined Google Research Europe. Congratulations, Dr. Bulian.

Thorsten Ehlers, *SAT and CP - Parallelisation and Applications*, University of Kiel, Germany. Advisor: Prof. Dirk Nowotka. Congratulations, Dr. Ehlers.

Jennifer Iglesias, *Approximation Algorithms for Faster Communication and Cheaper Networks Using Linear Programming*, Carnegie Mellon University. Advisor: Prof. Ravo Ramamoorthis. Congratulations, Dr. Iglesias. Jennifer has accepted a position at Google.

Simon Mackenzie, *Upper bounds for cake cutting*, UNSW Sydney. Advisor: Dr. Serge Gaspers, co-supervisor: Prof. Toby Walsh. Congratulations, Dr. Mackenzie. Simon has taken up a postdoctoral position with Ariel Procaccia at Carnegie Mellon University.

Irene Muzi, *Paths and Topological Minors in Directed and Undirected Graphs*, Sapienza University of Rome. Advisor: Prof. Paul Wollan. Congratulations, Dr. Muzi.

Irene has accepted a post-doc with Michał Pilipczuk at the University of Warsaw.

Bin Shen, *Polynomial and FPT algorithms for Chinese Postman, Packing and Acyclicity*, Royal Holloway, University of London. Advisors: Prof. Gregory Gutin, Associate Prof. Magnus Wahlström. Bin Shen will join Nanjing University. Congratulations, Dr. Bin Shen.

Welcome New FPTers

Perhaps it is time to start a PreSchool in FPT.

Figure 5: *Shrihan*, son of Saket Saurabh and Sushmita Gupta and *Sybil*, daughter of Sebastian Berndt.

Figure 6: *Farhan and Ehan* Panolan with Dad Fahad and Mom Jeshma. *Noah* with Dad Noy Rothbart. *Tristan*, son of Blair Sullivan.

At the PACE Award Ceremony

Figure 7: On the occasion of transferring the Steering Committee Chair of PACE, Christian Komusiewicz (Uni-Jena) is gifting Frances Rosamond (Univ Bergen) with an artistic creation of Felix Reidl.

Felix says: I am very happy you liked the picture! PACE has, in my opinion, shown that many FPT algorithms are (with a good dose of engineering) very competitive. While the general perception seems to be that "theory equals slow equals useless," our field is making real progress in countering this narrative.