Parameterized Complexity News

Newsletter of the Parameterized Complexity Community

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Enjoy the Newsletter

Congratulations to all for many awards and prizes, graduates, new jobs, and research. Read two research articles: *Parameterized Algorithmics: Experimental Research* by Gregory Gutin, Daniel Karapetyan, and *Graph Modification Problems* by Paloma Lima. We send deep condolences to the family of Dieter Kratsch and we add our own fond memories to those expressed in the Memoriam by Hans Bodlaender and Haiko Müller. Please add to the *FPT Complexity* Youtube Channel. Update Wikipedia with your new results. Follow fb page `@MikeFellowsFPT`. Send us news via Google form `https://forms.gle/sfZNzKFsbfqSywgy7` or directly to our emails. Please keep well. Take good care of yourselves. Wishing you all the best from Frances.Rosamond@uib.no, Valia Mitsou vmitsou@irif.fr, Benjamin.Bergougnoux@uib.no and the News Team.

IPEC CALL FOR PAPERS

The International Symposium on Parameterized and Exact Computation (IPEC) is an annual conference covering all aspects of parameterized and exact algorithms and complexity. Its 16th edition will be part of ALGO 2021, which also hosts ESA 2021 and a number of more specialized conferences and workshops. ALGO 2021 will take place on September 6-10, 2021, Lisbon, Portugal. Due to the COVID-19 pandemic, IPEC might be held online.

Website: algo2021.tecnico.ulisboa.pt/IPEC2021/.

Paper Registration: June 25, 2021 (23:59 AoE)
Full Paper Submission: June 28, 2021 (23:59 AoE)
Notification of acceptance: July 30, 2021
Conference dates: September 8-10, 2021

Program Committee Co-chairs: Meirav Zehavi (Ben-Gurion Univ of the Negev, Israel), Petr Golovach (Univ of Bergen, Norway).

EATCS-IPEC Nerode Prize - Call for Nominations - Deadline: April 15, 2021

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The EATCS-IPEC Nerode Prize for outstanding papers in the area of multivariate algorithmics, is presented annually with the presentation taking place at IPEC (International Symposium on Parameterized and Exact Computation). IPEC 2021 will be part of ALGO 2021, September 8-10, 2021, Lisbon, Portugal. The Prize is named in honor of Anil Nerode in recognition of his major contributions to mathematical logic, theory of automata, computability and complexity theory.

Award Committee: Virginia V. Williams (Chair, MIT, virgi@mit.edu), Anuj Dawar (University of Cambridge, anuj.dawar@cl.cam.ac.uk), Fedor Fomin (University of Bergen, fomin@ii.uib.no)

Eligibility: Any research paper or series of research papers by a single author or a team published in a rec-

Contents

ognized refereed journal. The research should be in the area of multivariate algorithms and complexity meant in a broad sense, and encompasses, but is not restricted to those areas covered by IPEC. The Award Committee has the ultimate authority to decide on the eligibility of a nomination. Papers authored by a member of the Award Committee are not eligible for nomination.

Nominations may be made by any member of the scientific community including the members of the Award Committee. A nomination should contain a brief summary of the technical content of each nominated paper and a brief explanation of its significance. Nominations are done by an email to the Award Committee Chair with copies to the members of the committee. The Subject line of the nomination E-mail should contain the group of words "Nerode Prize Nomination".

More information on https://eatcs.org/.../2875-eatcs-ipec-nerode-prize-call-for-nominations.

Sharma wins ACM India Dissertation Honorable Mention

Figure 1: Roohani Sharma awarded India ACM Dissertation honors.

CONGRATULATIONS Roohani Sharma (Institute of Mathematical Sciences) for the ACM India Doctoral Dissertation Honorable Mention Award, for her dissertation "Advancing the Algorithmic Tool-kit for Parameterized Cut Problems." Roohani's advisor was Saket Saraubh. She is now a researcher at Max Planck Institute for Informatics.

Fomin, Golovach, Saurabh awarded NRC grant

CONGRATULATIONS Fedor Fomin, Petr Golovach and Saket Saurabh (University of Bergen) for a Norwegian Research Council grant for 12 millions NOK over 6 years, "Beyond Worst-Case Analysis in Algorithms". It aims at developing novel algorithmic and complexity methods for reconciling the worst-case algorithmic intractability with machine learning. There will be several postdoc and PhD positions on this grant, please contact Fedor if you are interested!

Saket Saurabh wins ACM India Early Career Researcher Award

CONGRATULATIONS Saket Saurabh (Institute of Mathematical Sciences and University of Bergen). The Association for Computing Machinery (ACM) India Council has selected Saket as the recipient of the 2020 ACM India Early Career Researcher (ECR) Award (india.acm.org/.../early-career-researcher-award). A selection committee comprising eminent international personalities chose Saket for this inaugural edition of the award.

The ACM India ECR Award recognizes individuals in early stages of their careers who have made fundamental, innovative, and impactful contributions to the computing field while primarily working in India. The winner of the ECR award receives a prize of Rs15 lakhs. The Honorable Mention award carries a prize of Rs7.5 lakhs. Financial support for both of these awards is provided by Persistent Foundation (www.persistentfoundation.org).

Saket is recognized for his fundamental contributions to the area of Parameterized Complexity, including methods for showing algorithmic lower bounds, and meta-theorems for polynomial time preprocessing. His work over the last decade can be characterized by these contributions, establishing him as an outstanding researcher, educator, and scientific leader:

* performing research of the highest quality in multiple areas of algorithms; * leading the field of parameterized complexity by initiating new research directions to the community; * mentoring students pursuing undergraduate and graduate to postdoctoral fellowships; * sharing his knowledge in the form of new courses, lecture notes, surveys, schools, and workshops; and * serving the community in conference program committees and journal editorial boards.

Saket received his PhD in Theoretical Computer Science from the Institute of Mathematical Sciences, Chennai. After spending a couple of years as a postdoc at the University of Bergen, Norway, he joined his alma mater for a faculty position, where he is currently a Professor. He is also a Visiting Professor at the University of Bergen.

M.S. Ramanujan (MSR) awarded EPSRC New Investigator Award

CONGRATULATIONS M. S. Ramanujan (MSR) (Univ Warwick, UK) who has received an EPSRC New Investigator Award for his project, PARITY: New

Frontiers in Parameterizing Away from Triviality (msramanujan.weebly.com/parity-project) with a 2 year Postdoc position attached to it. Apply now.

The project asks: What if an observed network is not contained in a specific graph class, but resembles the graphs in this class, except for a few differences? Could one lift efficient algorithms that work on this graph class, to efficient algorithms for those graphs that are not contained within the classes, yet are still reasonably "close" to it? For example, suppose that we want to query for a smallest set of vertices that are cumulatively incident on all the edges in our graph. If our graph is a complete graph, then this query can be answered efficiently. But what if our graph is "close" to complete, that is, except for a few pairs of vertices, every other pair of vertices has an edge linking them? Could the same query still be answered efficiently? The answer turns out to be, yes!

This project aims to take a significant stride forward in this area by formally introducing new and more complex notions of graph edit distance and studying their impact on efficient solvability of NP-hard problems. These notions of edit distance will depend not on the number of edit operations as they traditionally have, but on their inherent structure. The success of parameterized complexity has shown that studying the structure of relevant objects as opposed to only considering their size, can have a powerful impact on efficient solvability of computational problems. In summary, this project will lay the foundations for an advanced algorithmic theory built on "structural edit distances" between graphs, develop new algorithms for fundamental problems and uncover hitherto unknown efficiently solvable instances.

Toby Walsh wins IJCAI-20 Award

Figure 2: Toby Walsh recognized for extensive contributions and service.

CONGRATULATIONS TOBY WALSH, Scientia Professor of Artificial Intelligence at UNSW, and leader of the Algorithmic Decision Theory group at Data61. Toby has received the Donald E. Walker Distinguished Service Award at IJCAI-20. Professor Walsh is recognized for his substantial contributions, as well as his extensive service to the field of Artificial Intelligence throughout his career.

Damir Ferizovic wins DFG Young Talent Award

CONGRATULATIONS Damir Ferizovic who has won the German Science Foundation (DFG) Young Talent Award for his Master Thesis "Engineering Kernelization for the Maximum Cut Problem". The main message of Damir's thesis is that kernelization (if carefully engineered) can speed up max cut computation by two orders of magnitude when compared to the performance of state-of-the-art solvers which have been carefully engineered for many years. The award was made at the Annual Meeting of the SPP 1736 Priority Programm "Algorithms for Big Data" of the DFG. Damir is the MSc student of Matthias Mnich. Damir has won many awards, including the 2019 1st Place: Internal Microsoft Hackathon. He is currently a Microsoft software engineer in Redmond, Washington. See his blog at https://www.damirferizovic.com/.

Figure 3: Damir Ferizovic recognized for Master Thesis on kernelization.

Parameterized Algorithmics: Experimental Research

by Gregory Gutin, *Royal Holloway University of London, UK and* Daniel Karapetyan, *University of Nottingham, UK*

Five years ago the first author contributed a short note to FPT News on a huge imbalance in parameterized algorithmics. He argued there why experimental research in parameterized algorithmics is important for the whole community. He is happy to say that there has been quite a bit of progress on this front such as Parameterized Algorithms and Computational Experiments

challenges (PACE) at IPEC conferences (IPEC 2020 had the 5th PACE). The experimental research has resulted in many interesting papers published in IPEC proceedings and elsewhere. He'd like to thank everybody who has participated in parameterized algorithmics experimental research.

In this note, we'd like to talk about a recent paper [1] which, in our view, made an important contribution to the experimental research. While the paper is on a problem in information security, some of its findings are of much wider interest. Since the paper is freely available from the JAIR website, we'll only very briefly outline some of its findings.

The paper studies the Workflow Satisfiability Problem (WSP) which in its basic form coincides with the CSP. The parameterization is by the number k of variables because in WSP applications k is usually much smaller than the number n of values in the variable domains. While a SAT solver using the natural SAT formulation of WSP is relatively slow and demonstrates non-FPT behaviour, our careful implementation of the FPT algorithm of [1] outperforms it by many orders of magnitude, particularly for $n \gg k$. While this is an important result, practitioners usually prefer to use off-the-shelf solvers. In this respect, two interesting facts were discovered in [1]:

- The performance of the SAT solver can be significantly improved by a special 'FPT' encoding of constraints; such a solver is 'only' a couple of orders of magnitude slower than our implementation and it demonstrates FPT-like running times (i.e. it is not very sensitive to the value of n);
- Similar performance is achieved by Google's CSP solver even when the encoding does not explicitly include any FPT-related structures.

This means that the solution methods based on off-the-shelf solvers may benefit a lot from appropriate FPT encodings. Moreover, in some cases the off-the-shelf solvers may be able to exploit FPT tractability of parameterized problems without the need for special formulations. Thus, even a purely theoretical knowledge that the problem under consideration is FPT, may be of value, as it suggests that an off-the-shelf solver may demonstrate FPT-like performance, and sets a target in experimenting with formulations.

References

[1] Daniel Karapetyan, Andrew J. Parkes, Gregory Gutin and Andrei Gagarin, Pattern-Based Approach to the Workflow Satisfiability Problem with User-Independent Constraints, J. AI Research, 66 (2019) 85–122.

Decreasing Graph Transversals via Edge Contractions

by Paloma Lima, *University of Bergen, Norway.*

This short article summarizes the main ideas in the MFCS 2020 paper [4] co-authored by Paloma T. Lima, Vinicius F. dos Santos, Ignasi Sau and Uéverton S. Souza.

Introduction. Graph modification problems play a central role in algorithmic graph theory and have been the object of study of many readers of this Newsletter. In this type of problem, we want to perform a small number of modifications so that the resulting graph satisfies a desired property. Typically, this property is described as a graph class to which the resulting graph must belong. A distinct type of graph modification problem that has been considered more recently is concerned with *graph parameters*, instead of graph classes. The goal here is to perform a small number of modifications in order to decrease (or increase) a given measure of the input graph. These are the so-called *blocker problems*, the main object of study of our work. More precisely, in a blocker problem with parameter π, we are given a graph G, integers k and d, and a set $\mathcal{M}$ of graph modification operations, and the question is whether G can be modified into a graph G' such that $\pi(G') \leq \pi(G) - d$, via at most k operations from $\mathcal{M}$. The name *blocker* comes from the fact that the set of vertices or edges involved in the modifications can be viewed as "blocking" the parameter π. For instance, in a minimization problem, these vertices or edges can be seen as preventing π from being smaller.

In our work, the allowed operation is edge contraction. The parameters we consider are minimum $\mathcal{H}$*-transversals*, that is, the minimum size of a vertex set of a graph that hits all the occurrences of graphs in a fixed (finite or infinite) collection $\mathcal{H}$ according to a specified containment relation $\prec$. Note that particular cases of $\mathcal{H}$ and $\prec$ capture, for instance, the vertex cover, feedback vertex set, and odd cycle transversal numbers. Our results show that, even when $k = d = 1$, the blocker problem is co-NP-hard for many types of transversals (but luckily not for all of them). We show co-NP-hardness when $\mathcal{H}$ is a family of 2-connected graphs containing at least one non-complete graph and $\prec$ is any of the subgraph, induced subgraph, minor, or topological minor containment relations. This implies that it is co-NP-hard to test whether we can reduce the feedback vertex set or the odd cycle transversal number of a graph by performing one single edge contraction. We also show other hardness results when $\mathcal{H}$ is a family of cliques of size at least three or a family of graphs containing a path on at least four vertices and any collection of 2-connected graphs. At this point we asked ourselves: is everything hard?

An interesting contrast: the case of vertex cover. We show that the picture changes completely when the parameter in question is the vertex cover number of a

graph. We prove that, in this case, the blocker problem can be solved in XP time parameterized by d on *general graphs*, hence in polynomial time for any fixed d. This result was in some way unexpected for us! Let me explain why. When studying the domination number of a graph, Galby et al. [2] showed that if an edge is *given as part of the input*, the problem of deciding whether the contraction *of that specific edge* reduces the domination number of the input graph admits no polynomial-time algorithm unless P=NP. It is easy to observe that their proof works for many other graph measures, including the vertex cover number. In sharp contrast, in the particular case where $k = d = 1$, our algorithm allows to efficiently determine if *there exists* an edge the contraction of which decreases the vertex cover number of the input graph. It seems peculiar, but that has a simple explanation: our algorithm exploits the fact that, in some cases, we know such an edge exists, so the algorithm can correctly reply 'yes', but we don't know precisely which edge should be contracted.

Open problems on the horizon. Going back to our XP algorithm for the vertex cover case, here is the main question we left open: is the problem FPT parameterized by d? The fact that our algorithm has only one step that needs $n^{O(d)}$ time gives hope for a positive answer, which we tend to believe to be the case. There are also other families $\mathcal{H}$ that are not covered by our work, the most interesting of them perhaps being the case when $\mathcal{H} = \{P_3\}$ or, more generally, when $\mathcal{H} = \{T\}$, for a fixed tree T.

Finally, beyond the scope of this work, there are many other graph measures and modification operations to be considered in the blocker setting, especially from the viewpoint of parameterized complexity. When the operation in question is edge contraction, other parameters such as independence number, clique number, diameter and domination number [1, 2, 3] had already been previously studied, mostly from a graph classes perspective. Other modification operations such as edge deletion, vertex deletion and edge addition have also been studied for a number of graph measures. For references concerning these operations or for even more open problems related to our work, I kindly invite you to check out our MFCS article [4].

References

[1] Ö. Y. Diner, D. Paulusma, C. Picouleau and B. Ries. Contraction and deletion blockers for perfect graphs and H-free graphs, *Theor. Comput. Sci.* 746:49–72, 2018.

[2] E. Galby, P. T. Lima and B. Ries. Decreasing the domination number of a graph via edge contractions and vertex deletions, *Discrete Math.* 344(1): 112169, 2021.

[3] P. A. Golovach, P. Heggernes, P. van 't Hof and C. Paul. Hadwiger Number of Graphs with Small Chordality, *SIAM J. Discrete Math.* 29(3):1427–1451, 2015.

[4] P. T. Lima, I. Sau, V. F. dos Santos and U. S. Souza. Decreasing graph transversals via edge contractions. In: *Proc. of MFCS 2020*, LIPIcs 170 (2020) 64:1 – 64:15.

Add your presentation to the FPT Complexity Youtube Channel

Send your presentations to the FPT COMPLEXITY Youtube Channel.

Contact Jungho Ahn (junghoahn@kaist.ac.kr), student of Sang-il, who has volunteered to organize an FPT COMPLEXITY Youtube channel and has already gathered quite a large playlist. Please inform Jungho of videos that you would like posted.

Some videos about parameterized complexity can also be found on the Youtube channel of IMSC and the Youtube channel of MathNet Korea organized by Sang-il Oum (KAIST).

Frontiers of Parameterized Complexity online talk series

Frontiers of parameterized complexity online talk series are about the latest discoveries in the field. All are welcome to attend these online talks and interact with the speaker and other attendees remotely via Zoom.

Talks will be held every Thursday at 17:00 Bergen time (GMT+1). More information about this can be found on this website. Join the talk every Thursday at 17:00 Bergen time. The link to join the zoom talk is https://uib.zoom.us/j/4231169675.

Meeting ID: 423 116 9675 Password: Name of the W[1]-complete problem, six letters, all capital. Set of pairwise adjacent vertices.

To get a glance of what has happened so far, see the list of previous talks (https://frontpc.blogspot.com/2020/) and their video recordings at our YouTube channel Frontiers of Parameterized Complexity.

To receive notifications of the talk announcements, please send an email at rsharma@mpi-inf.mpg.de with the subject 'Subscribe FrontPC' (Not needed if you are already subscribed to these notifications). For further questions, please contact one of the following.

Roohani Sharma, Max Planck Institute for Informatics: rsharma@mpi-inf.mpg.de Saket Saurabh, Institute of Mathematical Science, saket@imsc.res.in Fedor Fomin, University of Bergen, fomin@ii.uib.no

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Parameterized Complexity online seminar - India

Pratibha Choudhary is co-organizer, with Saket Saurabh, of the India PC Online Seminar Series, with interesting recent work in parameterized complexity being presented

every Tuesday at 8:30pm IST. The link for the PC Seminar is https://sites.google.com/view/pcseminar. If you wish to be added to the mailing list or interested in giving a talk, please contact Pratibha Choudhary or Saket Saurabh.

Figure 4: Pratibha Choudhary organizes India PC seminar series.

Teaching Tip

This is a teaching tip from Mikhail Barash (University of Bergen). The topic is Concurrent Programming rather than FPT, but the clever tip for online teaching is to use short (less than 10 minutes) pre-recorded videos with obligatory quizzes on each. Mikhail's course was for both Bachelor- and Master-level students, with 130 students signed up.

Videos There are 70 videos altogether, with duration of 5 to 10 minutes on average. Each video is devoted to a particular topic, e.g., "tie-breaker algorithm", or "The Sleeping Barber Problem". If a video turns out to be longer than 10 minutes, I would suggest splitting it into two videos, even if one of them becomes much shorter: say, two videos of 3 and 9 minutes are "better" than a single 12-minute video. The course lasted 14 weeks, and each week I shared 5-7 videos with the students. There was enough material there for two 90-minutes lectures, though the duration of the videos was "just" around 60 minutes or even less. I would say 20-25 minutes in the videos correspond to one lecture. Because the videos were so dense, I told my students to watch them during the week, rather than all at once: a proper watching requires much more than the 60 minutes on the gauge. I also suggested students to write out the most essential points when they watch the videos: this would be their own "cheat sheet" for the exam.

Slides and scripts To prevent rushing through course material in the videos, I started each video with a blank PowerPoint presentation and recorded how I typed the key points I was making. This helps a lot with the right tempo. When I needed to type in a formula, or format nicely a piece of code, I would pause the recording, do the formatting, and then resume. Oftentimes such formatting modifications were minor, and I wouldn't pause the recording, but then I cut them out in the final video, trying to have the final result as "clean" as possible, and not "waste" viewers' time on my technicalities. What I find particularly important when producing the videos is to have (ideally, a very detailed) script of what you are going to say, so that when recording a video, you'd just read it out loud. Even though it takes time to produce a script, it significantly reduces the amount of time for post-editing of the videos. Another technical advice is to keep a 5-seconds silence between the "paragraphs" in the recording: this would help locating time points, and cutting out occasional spoiled fragments. Of course, you'd have to cut out those silent pauses, too, but the hurdle is worth it.

Code snippets The course combines a strong theoretical foundation with practical exercises, and I showcased a lot of 20-30 line code pieces in multiple programming languages. Instead of using a desktop Integrated Development Environment, I used a web-based code editor REPL.IT to run the code, so that the students don't have to install and configure anything. The tool supports over 50 programming languages, and can store code snippets under unique readable names, such as `https://repl.it/@mikbar/RustyCheeryFibonacci`. I could then share the link with the students, and they could run the code straight away.

Quizzes From my experience, it is absolutely necessary to help the students with watching the course videos "uniformly" during the entire semester; otherwise the students risk dropping watching the videos altogether. For this, I had an obligatory quiz for each of the videos (thus, 70 quizzes in total). Each quiz had 2-4 very simple questions that were formulated in a way that reading the book wouldn't lead anywhere – one really had to watch the video to find the answer. Such questions were along the lines of: "What is the main difference between X and Y mentioned in the video?", "What is X at `mm` min `ss` sec in the video?".

Software I used TechSmit Camtasia for video editing. The tool has functionality for recording the screen and screen regions, and allows adding text boxes, arrows, and so on on top of the recorded videos (this turned out quite useful when I needed to point at a particular line of code in an already recorded video, or highlight an important definition, and so on). Apart from producing an MP4 file, Camtasia can generate a web-page with support of quizzes embedded into a video itself. I did not use this functionality, however, as the quizzes were handled via the Canvas learning platform that University of Bergen uses in teaching.

Out and About - Moving Around

Pratibha Choudhary has accepted a postdoc position at the Czech Technical University in Prague.

Holger Dell has accepted a tenure-track position at the University of Frankfurt. Congratulations, Holger.

Pål Grønås Drange is a new Associate Professor in the Algorithms group of the University of Bergen. Our very best wishes to Pål.

Tanmay Inamdar has started in November a two-years position as Researcher in Saket's ERC LOPRE project. He will be affiliated in the Algorithms group of the University of Bergen. All our very best wishes to Tanmay.

Lawqueen Kanesh has started her postdoc at the National University of Singapore.

Sanjukta Roy has started her postdoc in TU Wien.

Vibha Sahlot has started her postdoc at Charles University.

Conferences and Seminars

The Sixth Iteration of PACE, the Parameterized Algorithms and Computational Experiments Challenge, will hold its Award ceremony at IPEC 2021 on September 6-10, 2021.

This year, the challenge is on Cluster Editing. The rules, prizes and the three tracks (Exact, Heuristic, Kernelization); the goals of PACE, as well as official reports for past challenges can be found on this website.

Input: An undirected graph *Output*: A cluster editing set of minimum cardinality.Here, a cluster editing set is a set of edge modifications (addition or deletion) that transforms the graph into a cluster graph (each connected component is a clique)

Thanks to the generous sponsoring of the NETWORKS project (http://thenetworkcenter.nl/) prize money is available for the winners of the competition.

Timeline

March 2021: Submission via optil.io is open (for testing and unofficial, auxiliary leaderboard)
May/June 2021 (AOE): Submission of the final version (solver description due two weeks after the source code)
July 2021: Announcement of the results
September 6-10, 2021: Award ceremony at IPEC 2021).

Program committee: André Nichterlein (chair), Leon Kellerhals, Tomohiro Koana, and Philipp Zschoche from Technische Universität Berlin.

Steering committee: Édouard Bonnet (LIP, ENS Lyon), Holger Dell (Goethe University Frankfurt and IT University of Copenhagen), Johannes Fichte (Technische Universität Dresden), Markus Hecher (Technische Universität Wien), Bart M. P. Jansen (chair) (Eindhoven University of Technology), Petteri Kaski (Aalto University), Łukasz Kowalik (University of Warsaw), Marcin Pilipczuk (University of Warsaw) and Manuel Sorge (Technische Universität Wien).

Social Choice Seminar Series For upcoming seminars on social choice and time slots where you can volunteer to give a talk, see this website.

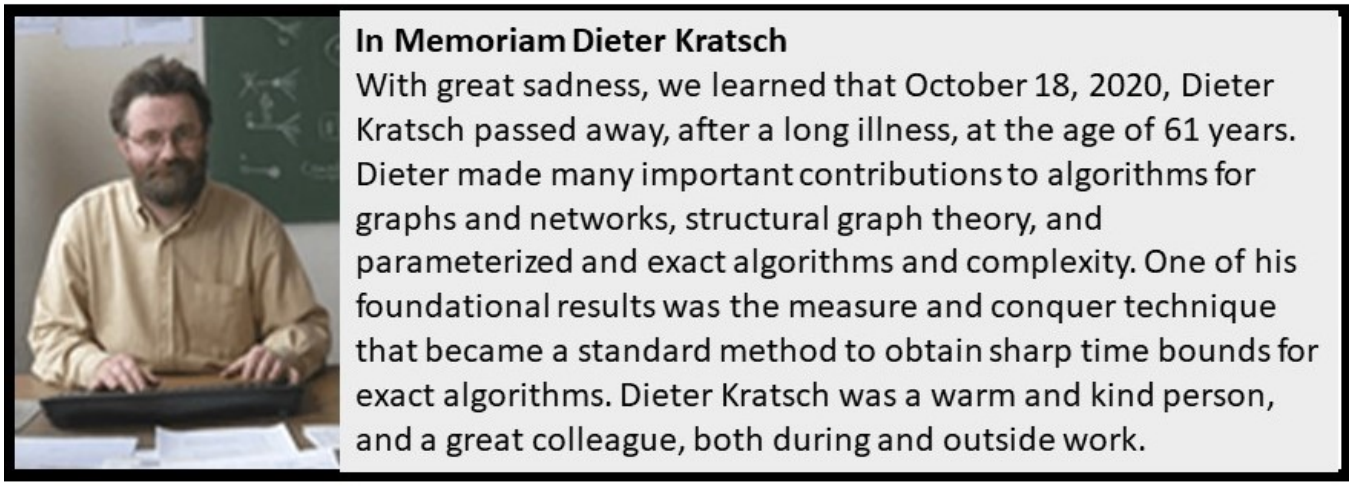
The 47th edition of WG will take place from Wednesday 23rd June to Friday 25th June 2021. Due to the COVID-19 pandemic, the event will be held **entirely online**. Further information on arrangements related to remote participation will be announced at a later date. Please follow the announcements on the conference website: `https://wg2021.mimuw.edu.pl`.

== INVITED SPEAKERS ==
Édouard Bonnet (CNRS, ENS Lyon, France)
Vida Dujmović (University of Ottawa, Canada)
Wojciech Samotij (Tel Aviv University, Israel)

Family Matters

Hoorah, another little FPTer.

Welcome to Milou Kiara, born born 25th October 2020 to the proud parents Bart M. P. Jansen and Irene van der Zanden. Bart says, "Milou already joined us on campervan adventures, ice-skating across the canal, and has frequently joined Bart for a run in her stroller. We look forward to teach her about FPT and Computer Science Unplugged when she grows up!"



IN MEMORIAM DIETER KRATSCH

by Hans Bodlaender*, Utrecht University and Technical University Eindhoven and* Haiko Müller*, University of Leeds, UK.*

With great sadness, we learned that October 18, 2020, Dieter Kratsch passed away, after a long illness, at the age of 61 years.

Dieter Kratsch was born on August 1, 1959 in Altenburg, Germany. In 1989, he obtained his PhD at the Friedrich-Schiller University of Jena, under supervision of Andreas Brandstädt, on a thesis on the complexity of NP–complete graph problems when restricted to chordal graphs and subclasses. In 1996, he obtained his habilitation at the Friedrich-Schiller University of Jena. In 1999, he became full professor at the University of Metz, France.

The scientific work of Dieter Kratsch lists many important contributions to the fields of algorithms for graphs and networks, structural graph theory, and parameterized and exact algorithms and complexity. A large part of his work is dedicated to the investigation of special structures in graphs – to find these, or to use these to obtain faster algorithms for hard problems. Such structures can come from a graph being member of a special graph class, or from a parameter of the graph, like treewidth or treedepth, of which the investigation was pioneered by Dieter under the older name of graph ranking. One of his foundational results was the discovery of the *measure and conquer technique* that became a standard method to obtain sharp time bounds for exact algorithms; this work was awarded the EATCS-IPEC Nerode prize in 2017. He coauthored with Fedor Fomin a textbook on exact, exponential time algorithms, which became a standard in the field.

Dieter Kratsch was an active member of the scientific community. He was for many years one of the most active members of the steering committee of WG, and several times PC chair and local organizer of WG. He also was scientific organizer of several workshops, e.g. at Dagstuhl, and a frequent member of program committees.

Dieter Kratsch was a warm and kind person, and a great colleague, both during and outside work. Many researchers have fond memories of research visits, by or to Dieter, and greatly enjoyed his hospitality when visiting Dieter for joint research at Jena or Metz.