

Welcome

Frances Rosamond, Editor

Welcome to the Parameterized Complexity Newsletter. This issue announces an exciting new Compendium created by Anthony Perez. We feature Holger Dell with new kernelization, and Xiuzhen Huang, who has received an NIH award for parameterized algorithms for protein prediction. We also have announcements of latest results, and a huge list of PC papers at conferences. Congratulations to all who have new positions and awards. We especially congratulate new graduates, and we urge everyone to help them find postdocs or other positions.

The FPT WIKI is located at www.fpt.wikidot.com, and that is where the Table of Races and event information is archived. Please remember to update the Table of Races with your latest results.

IPEC–New Name

Make plans now to attend IPEC, the *International Symposium on Parameterized and Exact Computation* which will be held this December 13–15, 2010 in Chennai, India. The IWPEC name has been modified by changing the title of “Workshop” to “Symposium” and deleting the “W” (hmmm). The IPEC Symposium will be colocated with FSTTCS, the annual theory meeting that is held in India. The nice website is being created by Neeldhara Misra, see <http://www.imsc.res.in/ipec>. There will be an Excellent Student Paper Award for a paper submitted by authors who have not yet received their Ph.D. at the time of submission. Key dates:

- July 5th (Mon) – submissions due
- August 23rd (Mon) – Notification

- September 10th (Fri) – Final version due
- Dec 13-15 – Symposium



Figure 1: Xiaojing Liu, “A Little FPT’er”, joins her mother Xiuzhen Huang, Danny Hermelin, Frances Rosamond and Mike Fellows, at Dagstuhl, Dec 09.

Online Compendium for Parameterized Problems

By Anthony Perez, LIRMM, Montpellier, France

In the last decades, parameterized complexity has become a very active research field. From the viewpoint of both parameterized algorithms and kernelization, a lot of results have been published these last years, often yielding new techniques and improving over and over

Contents of this issue:	
Welcome	1
IPEC–New Name	1
Anthony Perez Online Compendium	1
Holger Dell on Kernelization.....	2
Xiuzhen Huang Protein Structure Prediction ...	2
Open Problems.....	3
Interesting Parameters	3
Table of Races	4
Honorary Doctorate to Anil Nerode	9
Award to Mike Fellows	9
Post-Doctoral Research Fellow.....	9
Moving Around	9
Congratulations	9
Congratulations New PhDs.....	9
Worth a Watch	10

time complexity (which we call the O^* complexity). Facing this amount of results, a compendium putting together all these results seemed to be something that could be very helpful. Some attempts have been made to establish such a Compendium of Parameterized Problems, the most concrete at this point being the - astonishing! - one made by Marco Cesati (<http://bravo.ce.uniroma2.it/home/cesati/research/compendium/>).

In Cesati's compendium, you will be able to find results for more than 300 problems. Unfortunately, it has not been updated since 2006, and is now out of date. Furthermore, it "only" contains complexity results (meaning FPT and W-hardness results), and nothing is said about kernelization.

Trying to remedy this, an **Online Compendium of Parameterized Problems** has been created. See <http://www.lirmm.fr/~perez/compendium>. Its aim is to put together a large amount of results regarding parameterized problems, and provide an effective way of search (using problem names, keywords, ...). Moreover, it is really easy for anyone to suggest a new result, a better running time for an existing problem or even an open problem. At this point, more than a hundred problems have been indexed in this online compendium. So far, only a few results are about kernelization, but we will try to add as many results as possible. Moreover, this compendium will index results for exact exponential algorithms, which are very important in parameterized complexity - as any kernel associated with an exact exponential algorithm will yield an FPT algorithm. Online Compendium of NP-Completeness results have existed for quite a long time, but - to our knowledge - this is the first one entirely dedicated to parameterized algorithms, and we hope that you will find it useful. Please, do not hesitate to send us any comment that could help improve this compendium.

Polynomial Lower Bounds for Kernels

By Holger Dell

It is well-known that parameterized problems are FPT if and only if they admit polynomial-time kernelization algorithms. However, this paradigm only guarantees kernels of superpolynomial size. In recent years, Bodlaender et al. and Fortnow et al. developed techniques for showing that certain parameterized problems do not have kernels of size bounded by any polynomial in the parameter unless coNP is in NP/poly, which implies that the polynomial-time hierarchy collapses to its third level, a complexity event considered unlikely. Dell et al. extend and refine these techniques and apply them to problems that do have polynomial kernels, such as vertex cover

and the satisfiability of d -CNF formulas. For any integer $d \geq 2$ and positive real ϵ their results imply that the vertex cover problem on n -vertex d -uniform hypergraphs cannot be polynomial-time reduced to instances of size $O(n^{d-\epsilon})$ unless coNP is in NP/poly. The result is asymptotically optimal as any n -vertex d -uniform hypergraph has size at most n^d .

In the FPT-community, the term "kernelization" refers to a polynomial-time mapping reduction from a problem to itself with bounds on the size of the output instances, which many authors measure in terms of the number of vertices. The above lower bound framework even applies to more general polynomial-time reductions that are not necessarily self-reductions and size is measured by the length of a binary representation.

By reduction, similar results hold for other NP-complete problems. For the satisfiability problem of n -variable d -CNF formulas, the above statement holds for any integer $d \geq 3$. The case $d = 2$ implies that no NP-hard vertex deletion problem based on a graph property that is inherited by subgraphs can have kernels consisting of $O(k^{2-\epsilon})$ edges unless coNP is in NP/poly, where k denotes the size of the deletion set. Kernels consisting of $O(k^2)$ edges are known for several problems in the class, including vertex cover, feedback vertex set, and bounded-degree deletion.

Protein Structure Prediction

Congratulations to Xiuzhen Huang (Arkansas State University) whose project on protein structure-function relationship study with parameterized algorithms and biological validations, has recently been supported by NIH Grant Number P20 RR-16460 from the IDeA Networks of Biomedical Research Excellence (INBRE) Program of the National Center for Research Resources for 2010-2015. Huang's research in bioinformatics has been largely supported by funds from NSF and NIH. Below, she and her biologist collaborator describe one of their projects on an RTB model protein.

By Xiuzhen Huang and Carole L. Cramer, edited by Frances Rosamond.

The ability to input primary protein sequence and recover accurate and reliable protein structure within a time frame that supports 'research at the bench' will be transformational in driving our understanding of structure-function relationships, substrate/inhibitor interactions, protein-protein interactions, and the interface of proteins with their complex cellular milieu. Current computational approaches provide limited accuracy, often cannot handle large proteins, and require significant computational time. Determining protein structure from its primary sequence is a challenging problem. One of the most promising template-based computational methods for protein structure prediction is known as protein

threading. The core computational part of a threading method is the sequence-structure alignment. “Protein Threading and Treewidth” has been written about by F. Rosamond in the FPT Newsletter (Nov 2006) [4].

Our research is focused on the development of parameterized algorithms to improve the computational efficiency and accuracy of protein structure prediction, and to validate our predictions experimentally. Our strategy is to link (1) *algorithm development* with biological aspects to ensure that predictive capabilities support (2) *experimental outputs* in protein structure-function relationships. Our experiments will use a biologically relevant model, RTB, the non-toxic carbohydrate binding subunit of ricin under development as a vaccine and a drug carrier. Somewhat surprisingly, the RTB subunit is non-toxic, and appears to have multiple ways of gaining access to cells and interacting with the immune system. The Cramer laboratory has developed a rapid plant-based production system for recombinant RTB [3] and conjugation chemistries [2]. Dr. Cramer is internationally recognized in plant-based bioproduction of complex proteins with vaccine and therapeutic applications. Huang’s lab and Cramer’s biological lab collaborate on the project related to RTB protein. Cramer’s wet lab does the biological experiments for RTB protein function assay and structure validation.

We will model RTB and RTB variants, develop parameterized algorithms for the protein threading, implement the algorithms and directly test the predictions, and validate RTB proteins with mass spectrometry and other laboratory means. We are collaborating with Liming Cai at the University of Georgia. Our previous research demonstrated successful application of parameterized approaches to RNA secondary structures in whole genome searches [5, 1]. Initial results from our current work supports similar ideas for protein structure prediction. We have already developed a threading program, *ProteinESP* (Protein Empowered Structure Prediction), that uses a graphic model and parameterization with large proteins.

[1] Cai, L., Huang, X., Liu, C., Rosamond, F., and Song, Y., Parameterized complexity and biopolymer sequence comparison, *The Computer Journal, Special Issue on Parameterized Complexity*, 51(3): 270-291 (2008).

[2] Cramer, C.L., Reidy, M.J., and Dolan, M.C. Methods of delivery of molecules to cells using a ricin subunit and compositions relating to same, US Patent 60/944193; provisional application filed 2007, full patent filed 2008, patent pending.

[3] Medrano, G., Reidy, M.J., Liu, J., Ayala, J., Dolan, M.C. and Cramer, C.L., Rapid system for evaluating bioproduction capacity of complex pharmaceutical proteins in plants. *Methods in Biotechnology: Recombinant Proteins from Plants*, L. Faye, V. Gomond, eds., Humana Press, USA, pp51-68, (2009).

[4] Rosamond, F., Protein Threading and Treewidth report in this *FPT Newsletter*, November (2006).

[5] Song, F., Liu, C., Huang, X., Malmberg, R.L., Xu, Y., and Cai, L., Efficient parameterized algorithms for biopolymer structure-sequence alignment. *IEEE/ACM Transact. Com-*

put. Biol. Bioinf. 3:423-432 (2006).

Open Problems

Open Problems from Dagstuhl Seminar 09511: Parameterized Complexity and Approximation Algorithms is on the web at <http://erikdemaine.org/papers/DagstuhlFPT2009Open/paper.pdf>. The well-attended and interesting Seminar was organized by Erik Demaine, MohammadTaghi Hajiaghayi, and Dániel Marx.

Thanks to those who have been clarifying blogs: (<http://rjlipton.wordpress.com/2010/04/22/how-fast-can-we-simulate-guessing/>) and at The Math Forum.



Figure 2: Jochen Renz, Ljiljana Brankovic, Herbert Pérez-Rosés, Toby Walsh, Catherine McCartin, Danny Harabor, Debdeep Banerjee, Jason Li, Christina Burt at the Univ. Newcastle PC Workshop, March 2010.

Interesting Parameters

Iris van Rooij (Donders) We have new complexity results relevant for explaining the human ability to do ‘mind reading’, i.e., infer other peoples beliefs and intentions from merely observing their behaviour. This is an important topic for cognitive neuroscience, due in part to the discovery of mirror neurons. Our stance on the topic is basically that, contrary to popular belief, the direct mapping mechanism postulated by mirror neuron theorists is computationally too limited to account for ‘intention reading’, because ‘intention reading’ is essentially a form of abduction, a process known to be intractable under a wide variety of formal models (ranging from models in nonmonotonic logic to probabilistic models and constraint satisfaction models). We are currently researching candidate parameters that may help explain the tractability of ‘intention reading’ in everyday situations. Preliminary results are reported at CogSci10.

Bernhard Nebel (Freiburg) and **Jochen Renz** (ANU, Canberra) In “A fixed-parameter tractable algorithm for spatio-temporal calendar management,” the authors develop an FPT algorithm for calendar management, which formally can be seen as a *prize-winning travelling salesman problem with time-windows that limit when tasks can occur*. The parameter is the maximal number of jobs that can be revisited from some other job, as in the management of spatially distributed jobs where travel times play a role, and jobs have a processing time.

Table of Races

The results are improving ever more rapidly. Please add your latest to www.fpt.wikidot.com. Ioannis Koutis and Ryan Williams have improved a few rows with randomized algorithms. Henning Fernau suggested adding additional rows for deterministic ‘D’, and randomized ‘R’. Kernel sizes are measured in the number of vertices.

Problem	$f(k)$	kernel	Ref
Vertex Cover	1.2738^k	$2k$	1
VC-max degree 3	$O^*(1.1616^k)$		2
Connected VC	2.4882^k	no $k^{O(1)}$	3
Feedback Vertex Set	3.83^k	$4k^2$	4
Planar DS	$2^{15.13\sqrt{k}}$	$67k$	5
Edge Dominating Set	2.3819^k	$8k^2$	6
Nonblocker	2.5154^k	$5k/3$	7
Max Leaf-D	3.4581^k	$4k$	8
Max Leaf-R	2^k		9
Directed Max Leaf	3.72^k	k^2	10
Set Splitting	1.96^k	$2k$	11
3-D Matching-D	2.77^{3k}		12
3-D Matching-R	2^k		13
k -Path-D	4^k	no $k^{O(1)}$	14
k -Path-R	2^k		15
Convex Recolouring	4^k	$O(k^2)$	16
Clique Cover	$2^{\Delta k}$	2^k	17
Clique Partition		2^k	18
Cluster Editing	1.82^k	$2k$	19
Steiner Tree	2^k	no $k^{O(1)}$	20
3-Hitting Set	2.076^k	$O(k^2)$	21
Minimum Fill/ Interval Completion	$O(k^{2k}n^3m)$		22
1-Sided Crossing Min	1.4656^k		23

1) J. Chen, I. Kanj and G. Xia. Improved Parameter-

ized Upper Bounds for Vertex Cover. *MFCFS 2006*.

2) Mingyu Xiao. A note on Vertex Cover in graphs with maximum degree 3. *COCOON 2010*.

3) Daniel Raible, with polynomial space-requirements in dissertation *Amortized Analysis of Exponential Time and Parameterized Algorithms: Measure and Conquer and Reference Search Trees* (<http://www.informatik.uni-trier.de/~raible/Dissertation.pdf>), 2010.

4) Yixin Cao, Jianer Chen, Yang Liu. On Feedback Vertex Set, New Measure and New Structures. *SWAT 2010* S. Thomassé. A quadratic kernel for feedback vertex set. *SODA 2009*.

5) F. Fomin and D. Thilikos. Dominating sets in planar graphs: Branch-width and exponential speed-up. *SODA 2003*, for the running time.

6) D. Raible’s dissertation: 2.3819^k with poly-space-requirements. H. Fernau. EDGE DOMINATING SET: Efficient Enumeration-Based Exact Algorithms. *IWPEC 2006*, for the kernel.

7) F. Dehne, M. Fellows, H. Fernau, E. Prieto, and F. Rosamond. Nonblocker: Parameterized Algorithms for Minimum Dominating Set. *SOFSEM 2006*. H. Fernau. Parameterized Algorithmics: A Graph Theoretic Approach. *HabSchrift. Wilhelm-Schickard Institut für Informatik, Universität Tübingen, 2005*, for the kernel.

8) D. Raible, The run time is 3.4581^k with poly-space-requirements. There is a SOFEM 2010 version: H. Fernau and D. Raible SOFSEM, the more detailed version is to be found in Raible’s dissertation. V. Estivill-Castro, M. Fellows, M. Langston and F. Rosamond. Fixed-Parameter Tractability is Polynomial-Time Extremal Structure Theory I: The Case of Max Leaf. *ACiD 2004*, for the kernel.

9) Ioannis Koutis, Ryan Williams: Limits and Applications of Group Algebras for Parameterized Problems. *ICALP (1) 2009*: 653-664.

10) Jean Daligault, Stéphan Thomassé: On Finding Directed Trees with Many Leaves. *IWPEC 2009*: 86-97.

11) Daniel Lokshantov, Saket Saurabh: Even Faster Algorithm for Set Splitting! *IWPEC 2009*: 288-299

12) Y. Liu, S. Lu, J. Chen and S-H. Sze. Greedy Localization and Color-Coding: Improved Matching and Packing Algorithms. *IWPEC 2006*.

13) Ioannis Koutis, Ryan Williams: Limits and Applications of Group Algebras for Parameterized Problems. *ICALP (1) 2009*: 653-664.

14) J. Chen, S. Lu, S-H. Sze, F. Zhang. Improved Algorithms for Path, Matching, and Packing Problems. *SODA 2007*. J. Kneis, D. Mölle, S. Richter and P. Rossmanith. Divide-and-Color. *WG 2006* (independently found the same algorithm). H. Bodlaender, R. Downey, M. Fellows and D. Hermelin. On Problems Without Polynomial Kernels. *ICALP 2008*. From Moritz Mueller: Pointed Path (the starting point of the length k path is given) has no strong subexponential kernelization (‘strong’ means that it doesn’t increase the parameter) unless ETH fails. Or: Path has no poly kernel even when restricted to planar and connected graphs. An open prob-

lem is the subexponential kernelizability for Path, and finding methods for excluding subexponential kernelizations.

15) R. Williams. Finding Paths of Length k in $O^*(2^k)$ Time. *IPL* 109(6):315–318, 2009, which builds on Ioannis Koutis: Faster Algebraic Algorithms for Path and Packing Problems. *ICALP* (1) 2008: 575–586.

16) O. Ponta, F. Hüffner and R. Niedermeier. Speeding up Dynamic Programming for Some NP-hard Graph Recoloring Problems. *TAMC 2008*. H. Bodlaender, M. Fellows, M. Langston, M. Ragan, F. Rosamond and M. Weyer. Kernelization for Convex Recoloring. *ACiD 2006*.

17) J. Gramm, J. Guo, F. Hüffner, and R. Niedermeier. Data reduction, exact, and heuristic algorithms for clique cover. *ALLENEX 2006*.

18) E. Mujuni and F. Rosamond. Parameterized Complexity of the Clique Partition Problem. *CATS 2008*.

19) S. Böcker, S. Briesemeister, Q. Bui and Anke Trus. PEACE: Parameterized and Exact Algorithms for Cluster Editing. Manuscript, Lehrstuhl für Bioinformatik, Friedrich-Schiller-Universität Jena, 2007. For the kernel: Jianer Chen and Jie Meng. A $2k$ Kernel for the Cluster Editing Problem. *COCOON 2010*.

20) A. Björklund, T. Husfeldt, P. Kaski and M. Koivisto. Fourier meets Möbius: Fast Subset Convolution. *STOC 2007*.

21) M. Wahlström. Algorithms, Measures and Upper Bounds for Satisfiability and Related Problems. PhD Thesis, Department of Computer and Information Science, Linköpings universitet, Sweden, 2007. F. Abu-Khzam. Kernelization Algorithms for d -hitting Set Problems. *WADS 2007*.

22) P. Heggernes, C. Paul, J. A. Telle, and Y. Villanger. Interval completion with few edges. *STOC 2007*.

23) V. Dujmovic, H. Fernau and M. Kaufmann. Fixed parameter algorithms for one-sided crossing minimization revisited. *GD 2003*.

Submission deadline: August 16, 2010. Venkatesh Raman is on the Program Committee.

- **ANALCO11**: Analytic Algorithmics and Combinatorics. 22 Jan 2011; San Francisco. <http://www.siam.org/meetings/analco11/>.

DECEMBER 2010

- **IPEC**: International Symposium on Parameterized and Exact Computation. Deadline submission: July 5. Conference: 13–15 December. Chennai, India.

- **FSTTCS**: Foundations of Software Technology and Theoretical Computer Science. Submission deadline: July 7, Conference: 15–18 December. Chennai, India.

- **Newcastle, AU Biomarker Discovery Conference**, Dec 6–10. See website at: <http://bdc.mtci.com.au/> or contact Pablo Moscato, Director of the Priority Research Centre for Bioinformatics, Biomarker Discovery and Information-Based Medicine (CIBM). Our inside scoop is that the meeting will be held at an inexpensive but stunningly beautiful location looking out on the ocean near Newcastle. Also see <http://www.abc.net.au/local/photos/2010/05/28/2912341.htm> for some of the Beauty of Biology with Pablo's clustering methods.

- **COCOA**: Conference on Combinatorial Optimization and Applications. Submission deadline: June 15, Conference: December 18–20. The Big Island, Hawaii, USA.

NOVEMBER

- **Kernelization Workshop** at the Lorentz Center in Leiden, Nov 8–12. Scientific organizers: H.L. Bodlaender, F. Fomin, and S. Saurabh.

OCTOBER

- **FOCS**: 51st Annual IEEE Symposium on Foundations of Computer Science, Las Vegas, Nevada, October 23–26, 2010.

- **SAGT**: Symposium on Algorithmic Game Theory, Athens, 18–20 Oct.

SEPTEMBER

- **ALGO 2010**. with several workshops, September, Liverpool, UK.
- **ESA**: European Symposium on Algorithms.
- **WAOA**: 8th Workshop on Approximation and Online Algorithms. Note that Parameterized Complexity is one of the Research Topics for which papers are being solicited!

- **Graph Drawing**: 18th International Symposium on Graph Drawing, 21–24 Sept., Konstanz, Germany.

- **COMSOC**: Workshop on Computational Social Choice, 14–16 Sept., Dusseldorf

- **APPROX and RANDOM**: 13th Intl. Workshop on Approximation Algorithms for Combinatorial Optimization Problems and 14th Intl. Workshop on Randomization and Computation, 1–3 Sept, Barcelona, Spain. One of the Workshop chairs is Klaus Jansen (U. Kiel).

- **ODSA**: Optimal Discrete Structures and Algorithms, Rostock, Germany, September 13–15.

Conferences-Schools

There are many parameterized and FPT related results at conferences this year. I apologize for those that I have missed, or misinterpreted. The <http://www.dur.ac.uk/tom.friedetzky/conf.html> is a great help for locating conferences/dates. Many thanks, Tom!

APRIL 2011

- **LAGOS 2011**: Latin-American Algorithms, Graphs and Optimization Symposium. Submission deadline: November 1, Conference dates: 4–8 April 2011, Bariloche, Argentina.

JANUARY 2011

- **CATS**: Computing: the Australasian Theory Symposium, will be held in Perth, Australia, in January 2011.

AUGUST

- **MFCS**: 35th International Symposiums on Mathematical Foundations of Computer Science and **CSL**: 19th EACSL Annual Conferences on Computer Science Logic will be held at Brno, Czech Republic, August 23–27, with Satellite Workshops August 21–22, and August 28–29. MFCS invited speakers include Andris Ambainis, Daniel Lokshтанov, and Juraj Hromkovic. A **Workshop on Parameterized Complexity of Computational Reasoning** is being organized by Stefan Szeider for August 28. Mike Fellows is an invited speaker. This workshop aims to support a fruitful exchange of ideas between the research on Parameterized Complexity on one side and the research on various forms of computational reasoning (such as Nonmonotonic, Probabilistic, and Constraint-based reasoning) on the other. Topics of interest include but are not limited to: multivariate analysis of reasoning problems, kernelization and preprocessing, fixed-parameter tractability and hardness, backdoors and decompositions. Contact Stefan for more information.
- **FAW**: Fourth International Frontiers of Algorithmics Workshop will be held on August 11-13, 2010 at Wuhan University, Wuhan, China.

JULY

- **AAAI**: 24th Conference on Artificial Intelligence, Atlanta, Georgia, USA, July 11–15. Fedor Fomin, Daniel Lokshтанov, Venkatesh Raman and Saket Saurabh: “Fast Local Search Algorithm for Weighted Feedback Arc Set in Tournaments”. Jiong Guo, Sepp Hartung, Christian Komusiewicz, Rolf Niedermeier, and Johannes Uhlmann: “Exact Algorithms and Experiments for Hierarchical Tree Clustering”. At AAAI, Ulle Endriss will give a tutorial on voting theory. Ariel Procaccia and Vincent Conitzer will give a tutorial on computational voting theory at both AAMAS and EC. Here is a description: <http://people.seas.harvard.edu/~arielpro/tutorial.html>.
- **AAIM**: Sixth International Conference on Algorithmic Aspects in Information and Management, July 19-21, Weihai, China. Zhi-Zhong Chen, Bin Fu, Haitao Jiang, Yang Liu, Lusheng Wang and Binhai Zhu: “A Linear Kernel for Co-Path/Cycle Packing”. Yong Zhang and Ge Xia: “Kernelization for Cycle Transversal Problems”.
- **COCOON**: 16th Annual International Computing and Combinatorics Conference, Nha Trang, Vietnam, July 19 – 21. Zhi-Zhong Chen, Bin Ma and Lusheng Wang: “A Three-String Approach to the Closest String Problem.” Vlad Estivill-Castro, Apichat Heednacram and Francis Suraweera: “The Rectilinear k -Bends TSP.” Daniel Lokshтанov, Neeldhara Misra and Saket Saurabh: “Imbalance is Fixed Parameter Tractable.” Henning Fernau, Fedor Fomin, Geevarghese Philip and Saket Saurabh: “The Curse of Connectivity: t -Total Vertex(Edge) Cover.” Jianer Chen and Jie Meng: “A $2k$ Kernel for the Cluster Editing Problem.” Mingyu Xiao: “A note on Vertex Cover in graphs with maximum degree 3.”

- **ICALP**: 37th International Colloquium on Automata, Languages and Programming, July 5-10 in Bordeaux, France. Antonis Achilleos, Michael Lampis and Valia Mitsou: “Parameterized Modal Satisfiability.” Stefan Kratsch and Magnus Wahlström: “Preprocessing of Min Ones Problems: A Dichotomy.” Yijia Chen and Jörg Flum: “On optimal proof systems and logics for PTIME.”

JUNE

- **STOC**: Symposium on Theory of Computing. Conference: June 6- 8, Cambridge, MA, USA. The STOC conference is one of the most prestigious conferences in the world in the field of theoretical computer science, and the competition to have a paper accepted is extremely tough. Daniel Lokshтанov, who received his PhD last semester, and Jesper Nederlof, a PhD student, both from the Algorithms research group at the Department of Informatics, Bergen, have a joint paper accepted to this year’s STOC: “Saving Space by Algebraization”. Dániel Marx has two papers at this year’s STOC and one at CCC. Dániel Marx: “Tractable hypergraph properties for constraint satisfaction and conjunctive queries.” MohammadHossein Bateni, MohammadTaghi Hajiaghayi and Dániel Marx: “Approximation Schemes for Steiner Forest on Planar Graphs and Graphs of Bounded Treewidth.” Other related papers are: Ryan Williams: “Improving Exhaustive Search Implies Superpolynomial Lower Bounds.” Holger Dell and Dieter van Melkebeek: “Satisfiability Allows No Nontrivial Sparsification Unless The Polynomial-Time Hierarchy Collapses.” Vikraman Arvind and Srikanth Srinivasan: “On the Hardness of the Noncommutative Determinant.” Ken-ichi Kawarabayashi and P. Wollan: “A shorter proof of the Graph Minor Algorithm - The Unique Linkage Theorem.” Ken-ichi Kawarabayashi and Bruce Reed: “Odd Cycle Packing.”
- **CCC**: 25th IEEE Conference on Computational Complexity is co-located with STOC, June 9 - 11, Cambridge, Massachusetts, USA. “Completely inapproximable monotone and antimonotone parameterized problems” by Dániel Marx.
- **SWAT**: 12th Scandinavian Sym and Workshops on Algorithm Theory, June 21-23, Bergen, No. Appreciation to the Department of Informatics at the University of Bergen for organizing (Fredrik Manne and Jan Arne Telle, co-chairs). P. Heggernes, D. Kratsch, D. Lokshтанov, S. Saurabh and V. Raman: “Fixed-parameter algorithms for Chromatic Number and Disjoint Rectangle Stabbing”. Fedor V. Fomin, Petr Golovach and Daniel Lokshтанov: “Cops and Robber game without recharging”. Klaus Jansen, Stefan Kratsch, Daniel Marx and Ildiko Schlotter. Bin packing with fixed number of bins revisited (FPT approximation algorithm plus $W[1]$ hardness).
- **CPM**: 21st Annual Symposium on Combinatorial Pattern Matching, New York, NY, USA. R. Fleischer, Jiong Guo, Rolf Niedermeier, Johannes Uhlmann, Yihui Wang, Matthias Weller, and Xi Wu: “Extended islands of tractability for parsimony haplotyping”.

- **ISAAC**: The International Symposium on Algorithms and Computation. Submission deadline: June 18, Conference dates: December 15- 17, Jeju Island, Korea.
 - **WG**: 36th International Workshop on Graph Theoretic Concepts in Computer Science will be held in Zarós village in Central Crete. Abstracts of selected papers are on the website. There are many papers by members of the parameterized complexity community—Congratulations everyone! We appreciate WG for mentioning *Parameterized* among papers solicited. Yota Otachi, Hans L. Bodlaender and Erik Jan van Leeuwen: “Complexity Results for the Spanning Tree Congestion Problem”. Marcin Kaminski: “Max-Cut and containment relations in graphs”. Frederic Dorn, Hannes Moser, Rolf Niedermeier and Mathias Weller: “Efficient Algorithms for Eulerian Extension”. Ge Xia and Yong Zhang: “On the Small Cycle Transversal of Planar Graphs”. Panos Giannopoulos, Christian Knauer, Mike Fellows, Christophe Paul, Frances Rosamond, Sue Whitesides and Nathan Yu: “Milling a Graph with Turn Costs: a Parameterized Complexity Perspective”. Marek Cygan, Marcin Pilipczuk, Michal Pilipczuk and Jakub Wojtaszczyk: “Kernelization hardness of connectivity problems in d -degenerate graphs”. Isolde Adler, Binh-Minh Bui-Xuan, Yuri Rabinovich, Gabriel Renault, Jan Arne Telle and Martin Vatshelle: “On the boolean-width of a graph: structure and applications”. Geevarghese Philip, Venkatesh Raman and Yngve Villanger: “A Quartic Kernel for Pathwidth-One Vertex Deletion”. Renè van Bevern, Christian Komusiewicz, Hannes Moser and Rolf Niedermeier: “Measuring Indifference: Unit Interval Vertex Deletion”. Dániel Marx and Ildikó Schlotter: “Parameterized Complexity of the Arc-Preserving Subsequence Problem”.
 - **TAMC**: 7th Annual Conference on Theory and Applications of Models of Computation, Prague, Czech Republic. After six successful conferences in China at Beijing, Kunming, Shanghai, Xi’an, and ChangSha (2004-2009), TAMC is leaving Asia for this year, aiming at the heart of Europe! There are at least four papers with parameterized results. Sylvain Guillemot and Matthias Mnich: “Kernel and Fast Algorithm for Dense Triplet Inconsistency”. Pinar Heggernes, Daniel Meister and Udi Rotics: “Exploiting restricted linear structure to cope with the hardness of clique-width”. Johannes Uhlmann and Mathias Weller: “Two-Layer Planarization Parameterized by Feedback Edge Set”. Sepp Hartung and Rolf Niedermeier: “Incremental List Coloring of Graphs, Parameterized by Conservation”.
 - **CSR**: 5th International Computer Science Symposium in Russia, June 16-20 at the Institute of Informatics of the Tatarstan Academy of Sciences, and Kazan State University, located in Kazan, Russia. The Program Committee includes Fedor Fomin (Bergen) and Juraj Hromkovic (ETH).
 - **CIAC**: 7th International Conference on Algorithms and Complexity, Rome, Italy. Enjoy the ice-cream. Faisal Abu-Khzam, Amer Mouawad, and Mathieu Liedloff: “An Exact Algorithm for Connected Red-Blue Dominating Set”. Leizhen Cai and Boting Yang: “Parameterized Complexity of Even/Odd Subgraph Problems”. Pinar Heggernes, Federico Mancini, Jesper Nederlof, and Yngve Villanger: “A parameterized algorithm for Chordal Sandwich”. Bart Jansen: “Kernelization for Maximum Leaf Spanning Tree with Positive Vertex Weights”. Daniel Raible, Henning Fernau, Alexander Langer, Ljiljana Brankovic, Joachim Kneis, Peter Rossmanith, Mathieu Liedloff, and Dieter Kratsch: “A Parameterized Route to Exact Puzzles: Breaking the $2n$ -barrier for irredundancy”.
 - **LATA**: 4th International Conference on Language and Automata Theory and Applications. Christophe Costa Florncio and Henning Fernau. Finding Consistent Categorical Grammars of Bounded Value: a Parameterized Approach.
- APRIL
- **LATIN**: 9th Latin American Theoretical Informatics Symposium was held at the University of Oaxaca (UABJO), México in April. Nadja Betzler, Jiong Guo, Christian Komusiewicz and Rolf Niedermeier: “Average Parameterization and Partial Kernelization for Computing Medians”. Rene van Bevern, Hannes Moser and Rolf Niedermeier: “Kernelization Through Tidying—A Case Study Based on s -Plex Cluster Vertex Deletion.” Navid Imani and Qianping Gu: “Connectivity is Not a Limit for Kernelization: Planar Connected Dominating Set.” Fedor Fomin, Fabrizio Grandoni, Daniel Lokshtanov and Saket Saurabh: “Sharp Separation and Applications to Exact and Parameterized Algorithms”. Atlas F. Cook IV, Carola Wenk, Ovidiu Daescu, Steven Bitner, Yam K. Cheung and Anastasia Kurdia: “Visiting a Sequence of Points with a Bevel-Tip Needle.”
 - **SDM**: SIAM International Conference on Data Mining. Christian Komusiewicz (Jena) participating.
- MARCH
- **STACS, LORIA** in Nancy, France was held 4–6 March. An invited talk was given by Rolf Niedermeier, “Reflections on Multivariate Algorithmics and Problem Parameterization”. The STACS proceedings are published electronically, including through HAL and Leibniz International Proceedings in Informatics (LIPIcs) series, both available through Dagstuhl’s website. Both HAL and the LIPIcs series guarantee free and easy electronic access. The rights on the articles in the proceedings are kept with the authors and the papers are available freely under a Creative Commons license (see www.stacs-conf.org/faq.html for more details).
 - **STACS’11**: 28th International Symposium on Theoretical Aspects of Computer Science, Dortmund, Ger-

many. Rolf Niedermeier member of the Programm Committee.

- **EuroCG'10**: 26th European Workshop on Computational Geometry, Dortmund, Germany. Panos Giannopoulos, Christian Knauer, Magnus Wahlström and Daniel Werner: “Hardness of discrepancy and related problems parameterized by the dimension”.

- **Dagstuhl Seminar on Computational Foundations of Social Choice**. Rolf Niedermeier and Nadja Betzler participating.

- **Univ. Newcastle, AU Workshop on Parameterized Complexity** was held in March 2010. There were eleven presentations on a wide variety of aspects of parameterized complexity, and about 35 participants. Keynote talks were given by Mike Fellows: Multivariate Complexity; Toby Walsh (UNSW and NICTA), Toby is an international leader in AI. He spoke on Constraint Programming. Vladimir Estivill-Castro (Griffith University) is a leader in the field of Agent Management and Advisor of several international award winning Robot teams. Ron van der Meyden (UNSW) spoke on research in logic and security. Frances Rosamond spoke on PC in Computational Social Choice. Pablo Moscato, Director of the Centre for Bioinformatics, Biomarker Discovery and Information-Based Medicine (CIBM) gave a presentation on PC in bioinformatics. Jon Borwein, Director of CARMA, spoke briefly on the interconnections between PC and computing assisting mathematics. That very week, Jon had just been elected to the Australian Academy of Sciences. Both CIBM and CARMA were sponsors of the workshop. Program, Abstracts, Slides and Open Problems are on the wiki.

FEBRUARY

- **Mathematical and Computational Methods in the Social Sciences Workshop** took place 18-19 February at the Univ. Auckland at the newly created Centre for Algorithmic Aspects of Game Theory and Social Choice, a joint Centre between Economics, Mathematics and Computer Science, directed by Arkadii Slinko. Prof. Detlef Seese (Karlsruhe) presented a keynote on parameterized complexity. Slides from some of the talks are available at <http://www.cs.auckland.ac.nz/~mcw/cmss/aagtsc2010/slides/>. The workshop page is archived at <http://www.cs.auckland.ac.nz/~mcw/dmss/meetings/february-2010-workshop/>.

- **WALCOM** was held in West Palashi, BUET. A session on Parameterized Complexity was chaired by Sandeep Sen. Talks were presented by Neeldhara Misra, Geevarghese Philip, Venkatesh Raman, Saket Saurabh, and Somnath Sikdar, “FPT Algorithms for Connected Feedback Vertex Set”, and by Dintyala Sai Krishna, Sai Shashank, Thirumala Reddy T V and Chandrasekaran Pandurangan, “Pathwidth and Searching in Parameterized Threshold Graphs.”

- **CSASC'10**: 11th Conference of Czech Mathematicians, Prague, Czech Republic. Local organizers were Jirí Fiala, Jan Kratochvíl. Rolf Niedermeier (Jena) presented an invited talk on “Multivariate Complexity Analysis of Some Voting Problems” and Jirí Fiala (Charles University, Prague) presented “Complexity of the distance constrained labeling problem for trees”.

- **CATS**: 16th Computing: the Australasian Theory Symposium was held in Brisbane. At least two of the twelve accepted papers had parameterized results. Faisal Abu-Khzam, Henning Fernau, Michael A. Langston, Serena Lee-Cultura and Ulrike Stege: “A Fixed-Parameter Algorithm for String-to-String Correction.” Maw-Shang Chang, Ling-Ju Hung and Peter Rossmanith: “Probe Distance-Hereditary Graphs.”

- **KAIST, S. Korea** held a Winter School. There are some very nice slides by Sangil Oum providing an introduction to Parameterized Complexity at [http://www.mathnet.or.kr/real/2010/01/OumSangil\(0112\).pdf](http://www.mathnet.or.kr/real/2010/01/OumSangil(0112).pdf).

- **SOFSEM**: Theory and Practice of Computer Science, 36th Conference on Current Trends in Theory and Practice of Computer Science, Spindleruv Mlýn, Czech Republic. Hans L. Bodlaender, Marc Comas: A Kernel for Convex Recoloring of Weighted Forests. Robert Ganian, Petr Hliněný: New Results on the Complexity of Oriented Colouring on Restricted Digraph Classes. Pim van 't Hof, Marcin Kaminski, Daniël Paulusma, Stefan Szeider, Dimitrios M. Thilikos: On Contracting Graphs to Fixed Pattern Graphs. Daniel Raible, Henning Fernau: An Amortized Search Tree Analysis for k-Leaf Spanning Tree.

- **SODA**: ACM-SIAM Symposium on Discrete Algorithms. F. Fomin, P. Golovach, D. Lokshtanov, and S. Saurabh: “Algorithmic Lower Bounds for Problems Parameterized by Clique-width.” F. Fomin, D. Lokshtanov, S. Saurabh, and D. Thilikos: “Bidimensionality and Kernels.” N. Alon, G. Gutin, E. J. Kim, S. Szeider, and A. Yeo: “Solving MAX-k-SAT Above a Tight Lower Bound.” K. Kawarabayashi and B. Reed: “An (almost) Linear Time Algorithm For Odd Cycles Transversal.” S. Kreutzer and S. Tazari: “On brambles, grid-like minors, and parameterized intractability of monadic second-order logic.”

- **Warsaw, Poland** Otwarte wykłady dla doktorantów informatyki is a winter school with Open Lectures for PhD students in computer science with invited courses given by top researchers both from other parts of Poland and from abroad <http://phdopen.mimuw.edu.pl/index.php>. A tutorial given by Dániel Marx composed of 4X90 minute lectures and 2X60 minutes of exercise sessions can be found on Dániel's website. Dániel also has slides on “Survey of connections between approximation algorithms and parameterized complexity,” presented at the Operations Research Seminar, Technion, Haifa, Israel, Jan 18.

Honorary Doctorate to Anil Nerode

Anil Nerode, Cornell University, is being awarded an honorary doctorate at the University of Chicago on 12 June—a huge honour awarded to only a handful of famous mathematicians (Veblen, Birkhoff, Diaconis). Nerode has been an early and strong supporter of Parameterized Complexity. He is a very prominent mathematician and logician and was Director of the Mathematical Sciences Research Institute for many years. Anil was Frances Rosamond’s advisor for her PhD at Cornell University.

Award to Mike Fellows

Mike has been awarded a five-year Australian Research Professorship by the Australian Research Council to investigate *Multivariate Algorithmics*. Mike and Fran are now back home at the University of Newcastle and welcoming visitors.

Post-Doctoral Research Fellow

Masdar Institute and MIT have announced a Research Fellow for “Incentive Mechanisms in Social Computing”. The announcement does not mention parameterized complexity. The project PIs are: Dr. Iyad Rahwan, Masdar Institute and MIT, and Prof. Alex (Sandy) Pentland, MIT. Details: http://www.mit.edu/~irahwan/docs/20100529_postdoc_advert.pdf.

Moving Around

Rosa Enciso has accepted a position at Microsoft-Seattle. Rosa is on the MSN Relevance Team and reports: My team is perfect. We are about 15 people, and about half of them are women. The projects we are working on require optimization algorithms. There are 3 Ph.Ds in the team including me. Our manager really encourages us to do research, publish papers, attend conferences, and to collaborate. There is a lot of room for experimentation and a lot of resources. Rosa also said, “One of the aspects I am really interested in is that MSN offers a lot of support for outreach projects. I would really like to start some projects to help CS people in my home town of Cusco, Peru”. Very nice, Rosa. We have heard that there are postdoc positions available at all Microsoft Research Labs, see website and inquire with a member of the particular lab for more details.

Christian Knauer has a new address: Universität Bayreuth Institut für Informatik. Mail: Christian.Knauer@uni-bayreuth.de. We hope Christian enjoys the famous Richard Wagner festivals.

Prabhu Manyem (prabhu.manyem@gmail.com) has become Professor in the Department of Mathematics, Shanghai University. Congratulations, Prabhu. Li-hai, Xian-zhu! (Chinese for excellent and outstanding!)

Sylvain Guillemot has a postdoc in Jena with Sebastian Böcker. Congratulations, Sylvain.

Serge Gaspers has accepted a postdoc with Stefan Szeider starting in October at TU Vienna. Congratulations to both!

Stefan Kratsch has accepted a postdoc with Hans Bodlaender. Congratulations to both!

Naomi Nishimura is on Sabbatical from U. Waterloo. She will be physically located in Waterloo, working on extending the reach and applicability of parameterized complexity to new problem domains and paradigms. Of particular interest are problems and paradigms that handle either changes to data over time or reconciliation of multiple, possibly inaccurate, views of data.

Peter Taillon (Carleton). Her name is Katrina Louise. Yes, and despite being somewhat exhausted, I never tire of hanging out with her (even at 2am, changing a diaper!). And it is so true that children grow up quickly—she was walking at 9 months, and can now do chin-ups, sprinting, etc.

Congratulations

Monika Steinová (ETH), won a Best Paper Award for “Approximability of the Minimum Steiner Cycle Problem” at MEMICS 2009. For many years, Monika has worked with computer camps for high school students in Slovakia. She describes her most recent experience: I had around 10 hours of lectures (divide and conquer technique, hashing, decidability and NP hardness). I had the opportunity to the lecture best five participants in decidability and then three of them asked me to have extra lectures on NP hardness. I can not believe it, but I gave them a proof of the Cook Levin theorem and it seems that all three of them understood the main ideas.

CONGRATULATIONS New PhDs

Rosa Enciso, *Alliances in Graphs: Parameterized Algorithms and Partitioning Series-Parallel Graphs* (http://etd.fcla.edu/CF/CFE0002956/Enciso_Rosa_I_200912_PhD.pdf), University of Central Florida. Advisor: Ronald D. Dutton. Rosa is now at Microsoft Research. Congratulations, Dr. Enciso.

Luke Mathieson, *The Parameterized Complexity of Degree Constrained Editing Problems* (<http://etheses>).

dur.ac.uk/76/). University of Durham. Advisor: Stefan Szeider. Luke has returned home to Australia with a post-doc with Pablo Moscato at the University of Newcastle Priority Research Centre for Bioinformatics, Biomarker Discovery and Information-Based Medicine (CIBM). Congratulations, Dr. Mathieson.

Daniel Raible, *Amortized Analysis of Exponential Time and Parameterized Algorithms: Measure and Conquer and Reference Search Trees* (<http://www.informatik.uni-trier.de/~raible/Dissertation.pdf>). University of Trier. Advisor: Henning Fernau. Congratulations, Dr. Raible.

Rebecca Robinson, *Characterizations and algorithms for topological containment of wheel graphs* (<http://www.csse.monash.edu.au/~rebeccar/thesis.pdf>). Monash University. Advisor: Graham Farr. Congratulations, Dr. Robinson.

Alan Scott, *On the Parameterized Complexity of Finding Short Winning Strategies in Combinatorial Games*. University of Victoria, Canada. Advisor: Ulrike Stege.

Congratulations, Dr. Scott.

Peter Shaw, *Advances in Cluster Editing: Linear FPT Kernels and Comparative Implementations*, The University of Newcastle, Australia. Advisors: Frans Henskens from UoN and Mike Langston, who acted as Peter's external advisor. Congratulations, Dr. Shaw.

Worth a Watch

A palindrome reads the same backwards as forwards... this video text reads the exact opposite backwards as forwards.... very clever. This is only a 1 min. 44 sec. video. As you listen intently, follow along with the words forward and backward..... Make sure you read as well as listen. This is a video that was submitted in a contest by a 20 year old. The contest was titled "u at 50", by AARP. This video won second place. When they showed it, everyone in the room was awe-struck and broke into spontaneous applause. So simple and yet so brilliant. <http://www.youtube.com/watch?v=42E2fAWM6rA>