

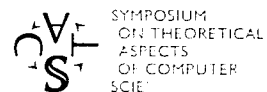
# 30th International Symposium on Theoretical Aspects of Computer Science <sup>ST</sup>

STACS'13, February 27th to March 2nd, 2013, Kiel, Germany

Edited by

Natacha Portier

Thomas Wilke



# Table of Contents

Foreword	v
Program Committee	vii
External Reviewers	ix

## Invited Talks

The complexity of analyzing infinite-state Markov chains, Markov decision processes, and stochastic games <i>Kousha Etessami</i> .....	1
Graph coloring, communication complexity, and the stubborn problem <i>Nicolas Bousquet, Aurélie Lagoutte, and Stéphan Thomassé</i> .....	3
Physarum Computations <i>Kurt Mehlhorn</i> .....	5

## Tutorial

Algorithmic Graph Structure Theory <i>Dániel Marx</i> .....	7
--	---

## Session 1A: Parametrized Complexity

Searching for better fill-in <i>Fedor V. Fomin and Yngve Villanger</i> .....	8
Probably Optimal Graph Motifs <i>Andreas Björklund, Petteri Kaski, and Lukasz Kowalik</i> .....	20
Tight bounds for Parameterized Complexity of Cluster Editing <i>Fedor V. Fomin, Stefan Kratsch, Marcin Pilipczuk, Michal Pilipczuk, and Yngve Villanger</i> .....	32

## Session 1B: Complexity and Logic

Bounded-width QBF is PSPACE-complete <i>Albert Atserias and Sergi Oliva</i> .....	44
Model Counting for CNF Formulas of Bounded Modular Treewidth <i>Daniel Paulusma, Friedrich Slivovsky, and Stefan Szeider</i> .....	55
Backdoors to q-Horn <i>Serge Gaspers, Sebastian Ordyniak, M. S. Ramanujan, Saket Saurabh, and Stefan Szeider</i> .....	67

30th International Symposium on Theoretical Aspects of Computer Science (STACS'13).

Editors: Natacha Portier and Thomas Wilke



Leibniz International Proceedings in Informatics

LIPICs Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

**Session 2A: Kernels**

On Polynomial Kernels for Sparse Integer Linear Programs <i>Stefan Kratsch</i> .....	80
Linear kernels for (connected) dominating set on graphs with excluded topological subgraphs <i>Fedor V. Fomin, Daniel Lokshтанov, Saket Saurabh, and Dimitrios M. Thilikos</i> ..	92

**Session 2B: Complexity and the Reals**

The PCP theorem for NP over the reals <i>Martijn Baartse and Klaus Meer</i> .....	104
Mutual Dimension <i>Adam Case and Jack H. Lutz</i> .....	116

**Session 3A: Constraint Satisfaction**

Exact and Approximation Algorithms for the Maximum Constraint Satisfaction Problem over the Point Algebra <i>Yoichi Iwata and Yuichi Yoshida</i> .....	127
Local Search is Better than Random Assignment for Bounded Occurrence Ordering $k$ -CSPs <i>Konstantin Makarychev</i> .....	139
The complexity of approximating conservative counting CSPs <i>Xi Chen, Martin Dyer, Leslie Ann Goldberg, Mark Jerrum, Pinyan Lu, Colin McQuillan, and David Richerby</i> .....	148

**Session 3B: Cryptography, Biology, Learning**

Lossy Chains and Fractional Secret Sharing <i>Yuval Ishai, Eyal Kushilevitz, and Omer Strulovich</i> .....	160
Two Hands Are Better Than One (up to constant factors): Self-Assembly In The 2HAM vs. aTAM <i>Sarah Cannon, Erik D. Demaine, Martin L. Demaine, Sarah Eisenstat, Matthew J. Patitz, Robert T. Schweller, Scott M. Summers, and Andrew Winslow</i> .....	172
Unlabeled Data Does Provably Help <i>Malte Darnstädt, Hans Ulrich Simon, and Balázs Szörényi</i> .....	185

**Session 4A: Graph Algorithms and Theory**

Computing cutwidth and pathwidth of semi-complete digraphs via degree orderings <i>Michał Pilipczuk</i> .....	197
On Pairwise Spanners <i>Marek Cygan, Fabrizio Grandoni, and Telikepalli Kavitha</i> .....	209

Excluded vertex-minors for graphs of linear rank-width at most $k$ <i>Jisu Jeong, O-joung Kwon, and Sang-il Oum</i> .....	221
--	-----

## Session 4B: Words

Recompression: a simple and powerful technique for word equations <i>Artur Jeż</i> .....	233
Fast Algorithms for Abelian Periods in Words and Greatest Common Divisor Queries <i>Tomasz Kociumaka, Jakub Radoszewski, and Wojciech Rytter</i> .....	245
Finding Pseudo-repetitions <i>Pawel Gawrychowski, Florin Manca, Robert Mercas, Dirk Nowotka, and Cătălin Tisescu</i> .....	257

## Session 5A: Computational Geometry

Algorithms for Designing Pop-Up Cards <i>Zachary Abel, Erik D. Demaine, Martin L. Demaine, Sarah Eisenstat, Anna Lubiw, André Schulz, Diane L. Souvaine, Giovanni Viglietta, and Andrew Winslow</i> .....	269
Space-Time Trade-offs for Stack-Based Algorithms <i>Luis Barba, Matias Korman, Stefan Langerman, Rodrigo I. Silveira, and Kunihiko Sadakane</i> .....	281
$L_1$ Shortest Path Queries among Polygonal Obstacles in the Plane <i>Danny Z. Chen and Haitao Wang</i> .....	293

## Session 5B: Two-Variable Logics

Quantifier Alternation in Two-Variable First-Order Logic with Successor Is Decidable <i>Manfred Kufleitner and Alexander Lauser</i> .....	305
$FO^2$ with one transitive relation is decidable <i>Wiesław Szwast and Lidia Tendera</i> .....	317
Two-variable first order logic with modular predicates over words <i>Luc Dartois and Charles Paperman</i> .....	329

## Session 6A: Parametrized Algorithms

Abusing the Tutte Matrix: An Algebraic Instance Compression for the K-set-cycle Problem <i>Magnus Wahlström</i> .....	341
Subexponential-Time Parameterized Algorithm for Steiner Tree on Planar Graphs <i>Marcin Pilipczuk, Michał Pilipczuk, Piotr Sankowski, and Erik Jan van Leeuwen</i> .	353

**Session 6B: Complexity**

The arithmetic complexity of tensor contractions <i>Florent Capelli, Arnaud Durand, and Stefan Mengel</i> .....	365
Search versus Decision for Election Manipulation Problems <i>Edith Hemaspaandra, Lane A. Hemaspaandra, and Curtis Menton</i> .....	377

**Session 7A: Matching**

Improved Bounds for Online Preemptive Matching <i>Leah Epstein, Asaf Levin, Danny Segev, and Oren Weimann</i> .....	389
Parameterized Matching in the Streaming Model <i>Markus Jalsenius, Benny Porat, and Benjamin Sach</i> .....	400
Popular Matchings: Structure and Cheating Strategies <i>Meghana Nasre</i> .....	412

**Session 7B: Quantum Computing**

Fooling One-Sided Quantum Protocols <i>Hartmut Klauck and Ronald de Wolf</i> .....	424
Explicit relation between all lower bound techniques for quantum query complexity <i>Loïck Magnin and Jérémie Roland</i> .....	434
Optimal quantum query bounds for almost all Boolean functions <i>Andris Ambainis, Arturs Bačkurs, Juris Smotrovs, and Ronald de Wolf</i> .....	446

**Session 8A: Algorithms for Concrete Problems**

Streaming Complexity of Checking Priority Queues <i>Nathanaël François and Frédéric Magniez</i> .....	454
Deterministic algorithms for skewed matrix products <i>Konstantin Kutskov</i> .....	466
The Simulated Greedy Algorithm for Several Submodular Matroid Secretary Problems <i>Tengyu Ma, Bo Tang, and Yajun Wang</i> .....	478

**Session 8B: (Un-)decidability**

Hardness of Conjugacy, Embedding and Factorization of multidimensional Subshifts of Finite Type <i>Emmanuel Jeandel and Pascal Vanier</i> .....	490
The finiteness of a group generated by a 2-letter invertible-reversible Mealy automaton is decidable <i>Ines Klimann</i> .....	502

Mortality of Iterated Piecewise Affine Functions over the Integers: Decidability and Complexity <i>Amir M. Ben-Amram</i> .....	514
<b>Session 9A: Algorithms and Algorithm Analysis</b>	
On the practically interesting instances of MAXCUT <i>Yonatan Bilu, Amit Daniely, Nati Linial, and Michael Saks</i> .....	526
First Fit bin packing: A tight analysis <i>György Dósa and Jiří Sgall</i> .....	538
Constrained Binary Identification Problem <i>Amin Karbasi and Morteza Zadimoghaddam</i> .....	550
<b>Session 9B: Automata and Languages</b>	
Regular languages of thin trees <i>Mikołaj Bojańczyk, Tomasz Idziaszek, and Michał Skrzypczak</i> .....	562
Approximate comparison of distance automata <i>Thomas Colcombet and Laure Daviaud</i> .....	574
The Rank of Tree-Automatic Linear Orderings <i>Martin Huschenbett</i> .....	586
<b>Session 10A: Algorithms and Information Theory</b>	
A general framework for the realistic analysis of sorting and searching algorithms. Application to some popular algorithms <i>Julien Clément, Thu Hien Nguyen Thi, and Brigitte Vallée</i> .....	598
Search using queries on indistinguishable items <i>Mark Braverman and Gal Oshri</i> .....	610
<b>Session 10B: Lower Bounds</b>	
Pebbling, Entropy and Branching Program Size Lower Bounds <i>Balagopal Komarath and Jayalal Sarma M N</i> .....	622
Advice Lower Bounds for the Dense Model Theorem <i>Thomas Watson</i> .....	634
Index of Authors .....	646