

41st International Symposium on Mathematical Foundations of Computer Science

MFCS 2016, August 22–26, 2016, Kraków, Poland

Edited by

Piotr Faliszewski

Anca Muscholl

Rolf Niedermeier



Editors

Piotr Faliszewski	Anca Muscholl	Rolf Niedermeier
AGH University	Université Bordeaux	Technische Universität Berlin
Kraków, Poland	Talence, France	Berlin, Germany
faliszew@agh.edu.pl	anca@labri.fr	rolf.niedermeier@tu-berlin.de

ACM Classification 1998
F. Theory of Computation

ISBN 978-3-95977-016-3

Published online and open access by

Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at <http://www.dagstuhl.de/dagpub/978-3-95977-016-3>.

Publication date

August, 2016

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

License

This work is licensed under a Creative Commons Attribution 3.0 Unported license (CC-BY 3.0): <http://creativecommons.org/licenses/by/3.0/legalcode>.



In brief, this license authorizes each and everybody to share (to copy, distribute and transmit) the work under the following conditions, without impairing or restricting the authors' moral rights:

- Attribution: The work must be attributed to its authors.

The copyright is retained by the corresponding authors.

Digital Object Identifier: 10.4230/LIPIcs.MFCS.2016.0

ISBN 978-3-95977-016-3

ISSN 1868-8969

<http://www.dagstuhl.de/lipics>

Print ISBN 978-1-5108-2931-2

■ Contents

Foreword <i>Piotr Faliszewski, Anca Muscholl, and Rolf Niedermeier</i>	0:xi
---	------

Invited Talks

How Far Are We From Having a Satisfactory Theory of Clustering? <i>Shai Ben-David</i>	1:1–1:1
Decidable Extensions of MSO <i>Mikolaj Bojańczyk</i>	2:1–2:1
Optimal Reachability in Weighted Timed Automata and Games <i>Patricia Bouyer-Decitre</i>	3:1–3:3
Scale-Free Networks, Hyperbolic Geometry, and Efficient Algorithms <i>Tobias Friedrich</i>	4:1–4:3
RNA-Folding - From Hardness to Algorithms <i>Virginia Vassilevska Williams</i>	5:1–5:1

Regular Papers

Integer Factoring Using Small Algebraic Dependencies <i>Manindra Agrawal, Nitin Saxena, and Shubham Sahai Srivastava</i>	6:1–6:14
Routing with Congestion in Acyclic Digraphs <i>Saeed Akhoondian Amiri, Stephan Kreutzer, Dániel Marx, and Roman Rabinovich</i>	7:1–7:11
Stochastic Timed Games Revisited <i>S. Akshay, Patricia Bouyer, Shankara Narayanan Krishna, Lakshmi Manasa, and Ashutosh Trivedi</i>	8:1–8:14
Inequity Aversion Pricing over Social Networks: Approximation Algorithms and Hardness Results <i>Georgios Amanatidis, Evangelos Markakis, and Krzysztof Sornat</i>	09:1–09:13
Trading Determinism for Time in Space Bounded Computations <i>Vivek Anand T Kallampally and Raghunath Tewari</i>	10:1–10:13
Families of DFAs as Acceptors of ω -Regular Languages <i>Dana Angluin, Udi Boker, and Dana Fisman</i>	11:1–11:14
On the Complexity of Probabilistic Trials for Hidden Satisfiability Problems <i>Itai Arad, Adam Bouldan, Daniel Grier, Miklos Santha, Aarthi Sundaram, and Shengyu Zhang</i>	12:1–12:14
The Parameterized Complexity of Fixing Number and Vertex Individualization in Graphs <i>Vikraman Arvind, Frank Fuhlbrück, Johannes Köbler, Sebastian Kuhnert, and Gaurav Rattan</i>	13:1–13:14

41st International Symposium on Mathematical Foundations of Computer Science (MFCS 2016).

Editors: Piotr Faliszewski, Anca Muscholl, and Rolf Niedermeier

Leibniz International Proceedings in Informatics



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

Real Interactive Proofs for VPSPACE <i>Martijn Baartse and Klaus Meer</i>	14:1–14:13
Synchronizing Data Words for Register Automata <i>Parvaneh Babari, Karin Quaas, and Mahsa Shirmohammadi</i>	15:1–15:15
On the Sensitivity Conjecture for Read- k Formulas <i>Mitali Bafna*, Satyanarayana V. Lokam, Sébastien Tavenas, and Ameya Velinger</i>	16:1–16:14
Graph Properties in Node-Query Setting: Effect of Breaking Symmetry <i>Nikhil Balaji, Samir Datta, Raghav Kulkarni, and Supartha Podder</i>	17:1–17:14
Stable States of Perturbed Markov Chains <i>Volker Betz and Stéphane Le Roux</i>	18:1–18:14
On Degeneration of Tensors and Algebras <i>Markus Bläser and Vladimir Lysikov</i>	19:1–19:11
Using Contracted Solution Graphs for Solving Reconfiguration Problems <i>Paul Bonsma and Daniël Paulusma</i>	20:1–20:15
Pointer Quantum PCPs and Multi-Prover Games <i>Alex B. Grilo, Iordanis Kerenidis, and Attila Pereszlényi</i>	21:1–21:14
A Formal Exploration of Nominal Kleene Algebra <i>Paul Brunet and Damien Pouss</i>	22:1–22:13
On the Implicit Graph Conjecture <i>Maurice Chandoo</i>	23:1–23:13
Nested Weighted Limit-Average Automata of Bounded Width <i>Krishnendu Chatterjee, Thomas A. Henzinger, and Jan Otop</i>	24:1–24:14
Conditionally Optimal Algorithms for Generalized Büchi Games <i>Krishnendu Chatterjee, Wolfgang Dvořák, Monika Henzinger, and Veronika Loitzenbauer</i>	25:1–25:15
FPT Algorithms for Plane Completion Problems <i>Dimitris Chatzidimitriou, Archontia C. Giannopoulou, Spyridon Maniatis, Clément Requilé, Dimitrios M. Thilikos, and Dimitris Zoros</i>	26:1–26:13
Some Lower Bounds in Parameterized AC ⁰ <i>Yijia Chen and Jörg Flum</i>	27:1–27:14
Space-Efficient Approximation Scheme for Maximum Matching in Sparse Graphs <i>Samir Datta, Raghav Kulkarni, and Anish Mukherjee</i>	28:1–28:12
Logical Characterization of Bisimulation for Transition Relations over Probability Distributions with Internal Actions <i>Matias David Lee and Erik P. de Vink</i>	29:1–29:14
Ackermannian Integer Compression and the Word Problem for Hydra Groups <i>Will Dison, Eduard Einstein, and Timothy R. Riley</i>	30:1–30:14
A Note on the Advice Complexity of Multipass Randomized Logspace <i>Peter Dixon, Debasis Mandal, A. Pavan, and N. V. Vinodchandran</i>	31:1–31:7

Complexity of Constraint Satisfaction Problems over Finite Subsets of Natural Numbers
Titus Dose 32:1–32:13

Faster Algorithms for the Maximum Common Subtree Isomorphism Problem
Andre Droschinsky, Nils M. Kriege, and Petra Mutzel 33:1–33:14

A Single-Exponential Fixed-Parameter Algorithm for Distance-Hereditary Vertex Deletion
Eduard Eiben, Robert Ganian, and O-joung Kwon 34:1–34:14

Preprocessing Under Uncertainty: Matroid Intersection
Stefan Fafianie, Eva-Maria C. Hols, Stefan Kratsch, and Vuong Anh Quyen 35:1–35:14

Ride Sharing with a Vehicle of Unlimited Capacity
Angelo Fanelli and Gianluigi Greco 36:1–36:14

On the General Chain Pair Simplification Problem
Chenglin Fan, Omrit Filtser, Matthew J. Katz, and Binhai Zhu 37:1–37:14

Computing DAWGs and Minimal Absent Words in Linear Time for Integer Alphabets
Yuta Fujishige, Yuki Tsujimaru, Shunsuke Inenaga, Hideo Bannai, and Masayuki Takeda 38:1–38:14

On Planar Valued CSPs
Peter Fulla and Stanislav Živný 39:1–39:14

Determining Sets of Quasiperiods of Infinite Words
Guilhem Gamard and Gwenael Richomme 40:1–40:13

On the Complexity Landscape of Connected f -Factor Problems
Robert Ganian, N. S. Narayanaswamy, Sebastian Ordyniak, C. S. Rahul, and M. S. Ramanujan 41:1–41:14

On Existential MSO and its Relation to ETH
Robert Ganian, Ronald de Haan, Iyad Kanj, and Stefan Szeider 42:1–42:14

Programming Biomolecules That Fold Greedily During Transcription
Cody Geary, Pierre-Étienne Meunier, Nicolas Schabanel, and Shinnosuke Seki ... 43:1–43:14

Connected Reversible Mealy Automata of Prime Size Cannot Generate Infinite Burnside Groups
Thibault Godin and Ines Klimann 44:1–44:14

Circuit Size Lower Bounds and #SAT Upper Bounds Through a General Framework
Alexander Golovnev, Alexander S. Kulikov, Alexander V. Smal, and Suguru Tamaki 45:1–45:16

On the Limits of Gate Elimination
Alexander Golovnev, Edward A. Hirsch, Alexander Knop, and Alexander S. Kulikov 46:1–46:13

Algebraic Problems Equivalent to Beating Exponent $3/2$ for Polynomial Factorization over Finite Fields
Zeyu Guo, Anand Kumar Narayanan, and Chris Umans 47:1–47:14

0:viii Contents

On Synchronizing Colorings and the Eigenvectors of Digraphs <i>Vladimir V. Gusev and Elena V. Pribavkina</i>	48:1–48:14
Competitive Packet Routing with Priority Lists <i>Tobias Harks, Britta Peis, Daniel Schmand, and Laura Vargas Koch</i>	49:1–49:14
The Ground-Set-Cost Budgeted Maximum Coverage Problem <i>Irving van Heuven van Staereling, Bart de Keijzer, and Guido Schäfer</i>	50:1–50:13
Computational and Proof Complexity of Partial String Avoidability <i>Dmitry Itsykson, Alexander Okhotin, and Vsevolod Oparin</i>	51:1–51:13
Deciding Semantic Finiteness of Pushdown Processes and First-Order Grammars w.r.t. Bisimulation Equivalence <i>Petr Jančar</i>	52:1–52:13
Minimal Phylogenetic Supertrees and Local Consensus Trees <i>Jesper Jansson and Wing-Kin Sung</i>	53:1–53:14
Quantum Communication Complexity of Distributed Set Joins <i>Stacey Jeffery and François Le Gall</i>	54:1–54:13
On the Voting Time of the Deterministic Majority Process <i>Dominik Kaaser, Frederik Mallmann-Trenn, and Emanuele Natale</i>	55:1–55:15
Space-Efficient Biconnected Components and Recognition of Outerplanar Graphs <i>Frank Kammer, Dieter Kratsch, and Moritz Laudahn</i>	56:1–56:14
Multi-Party Protocols, Information Complexity and Privacy <i>Iordanis Kerenidis, Adi Rosén, and Florent Urrutia</i>	57:1–57:16
Dividing by Zero – How Bad Is It, Really? <i>Takayuki Kihara and Arno Pauly</i>	58:1–58:14
Advice Complexity of the Online Induced Subgraph Problem <i>Dennis Komm, Rastislav Kráľovič, Richard Kráľovič, and Christian Kudahl</i>	59:1–59:13
Decidability of Predicate Logics with Team Semantics <i>Juha Kontinen, Antti Kuusisto, and Jonni Virtema</i>	60:1–60:14
On the Complexity of Universality for Partially Ordered NFAs <i>Markus Krötzsch, Tomáš Masopust, and Michaël Thomazo</i>	61:1–61:14
Eulerian Paths with Regular Constraints <i>Orna Kupferman and Gal Vardi</i>	62:1–62:15
On the Exact Learnability of Graph Parameters: The Case of Partition Functions <i>Nadia Labai and Johann A. Makowsky</i>	63:1–63:13
A Preliminary Investigation of Satisfiability Problems Not Harder Than 1-In-3-SAT <i>Victor Lagerkvist and Biman Roy</i>	64:1–64:14
Uniformization Problems for Tree-Automatic Relations and Top-Down Tree Transducers <i>Christof Löding and Sarah Winter</i>	65:1–65:14
Two-Variable Logic over Countable Linear Orderings <i>Amaldev Manuel and A. V. Sreejith</i>	66:1–66:13

Piecewise Testable Languages and Nondeterministic Automata <i>Tomáš Masopust</i>	67:1–67:14
Stably Computing Order Statistics with Arithmetic Population Protocols <i>George B. Mertzios, Sotiris E. Nikolettseas, Christoforos L. Raptopoulos, and Paul G. Spirakis</i>	68:1–68:14
Shortest Unique Substring Queries on Run-Length Encoded Strings <i>Takuya Mieno, Shunsuke Inenaga, Hideo Bannai, and Masayuki Takeda</i>	69:1–69:11
Shattered Sets and the Hilbert Function <i>Shay Moran and Cyrus Rashtchian</i>	70:1–70:14
Optimal Sparsification for Some Binary CSPs Using Low-Degree Polynomials <i>Bart M.P. Jansen and Astrid Pieterse</i>	71:1–71:14
Fully Dynamic Data Structure for LCE Queries in Compressed Space <i>Takaaki Nishimoto, Tomohiro I, Shunsuke Inenaga, Hideo Bannai, and Masayuki Takeda</i>	72:1–72:14
Undecidability of Two-Dimensional Robot Games <i>Reino Niskanen, Igor Potapov, and Julien Reichert</i>	73:1–73:13
Algebraic Independence over Positive Characteristic: New Criterion and Applications to Locally Low Algebraic Rank Circuits <i>Anurag Pandey, Nitin Saxena, and Amit Sinhababu</i>	74:1–74:15
Parameterized Algorithms on Perfect Graphs for Deletion to (r, ℓ) -Graphs <i>Sudeshna Kolay, Fahad Panolan, Venkatesh Raman, and Saket Saurabh</i>	75:1–75:13
Supplementarity is Necessary for Quantum Diagram Reasoning <i>Simon Perdrix and Quanlong Wang</i>	76:1–76:14
The Covering Problem: a Unified Approach for Investigating the Expressive Power of Logics <i>Thomas Place and Marc Zeitoun</i>	77:1–77:15
On the Complexity of Branching Games with Regular Conditions <i>Marcin Przybylko and Michał Skrzypczak</i>	78:1–78:14
Symbolic Lookaheads for Bottom-Up Parsing <i>Paola Quaglia</i>	79:1–79:13
Structural Control in Weighted Voting Games <i>Anja Rey and Jörg Rothe</i>	80:1–80:15
Every Binary Pattern of Length Greater Than 14 Is Abelian-2-Avoidable <i>Mathieu Rosenfeld</i>	81:1–81:11
Bounded Depth Circuits with Weighted Symmetric Gates: Satisfiability, Lower Bounds and Compression <i>Takayuki Sakai, Kazuhisa Seto, Suguru Tamaki, and Junichi Teruyama</i>	82:1–82:16
Transducer-Based Rewriting Games for Active XML <i>Martin Schuster</i>	83:1–83:13

0:x **Contents**

Vector Reachability Problem in $SL(2, \mathbb{Z})$ <i>Igor Potapov and Pavel Semukhin</i>	84:1–84:14
The Generalised Colouring Numbers on Classes of Bounded Expansion <i>Stephan Kreutzer, Michal Pilipczuk, Roman Rabinovich, and Sebastian Siebertz</i> ..	85:1–85:13
Polynomial Space Randomness in Analysis <i>Xiang Huang and Donald M. Stull</i>	86:1–86:13
Finding a Maximum 2-Matching Excluding Prescribed Cycles in Bipartite Graphs <i>Kenjiro Takazawa</i>	87:1–87:14
Transformation Between Regular Expressions and ω -Automata <i>Christof Löding and Andreas Tollkötter</i>	88:1–88:13
An Improved Approximation Algorithm for the Traveling Tournament Problem with Maximum Trip Length Two <i>Mingyu Xiao and Shaowei Kou</i>	89:1–89:14