

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, Lancaster, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Zürich, Switzerland

John C. Mitchell

Stanford University, Stanford, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, Dortmund, Germany

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbrücken, Germany

More information about this series at <http://www.springer.com/series/7407>

Thang N. Dinh · My T. Thai (Eds.)

Computing and Combinatorics

22nd International Conference, COCOON 2016
Ho Chi Minh City, Vietnam, August 2–4, 2016
Proceedings

Editors

Thang N. Dinh
Virginia Commonwealth University
Richmond, VA
USA

My T. Thai
University of Florida
Gainesville, FL
USA

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-42633-4 ISBN 978-3-319-42634-1 (eBook)
DOI 10.1007/978-3-319-42634-1

Library of Congress Control Number: 2016944821

LNCS Sublibrary: SL1 – Theoretical Computer Science and General Issues

© Springer International Publishing Switzerland 2016

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG Switzerland

Preface

The 22nd International Computing and Combinatorics Conference (COCOON 2016) was held during August 2–4, 2016, in Ho Chi Minh City, Vietnam. COCOON 2016 provided a forum for researchers working in the area of theoretical computer science and combinatorics.

The technical program of the conference included 50 regular papers selected by the Program Committee from 113 full submissions received in response to the call for papers. All the papers were peer reviewed by at least three Program Committee members or external reviewers. The papers cover various topics, including algorithms and data structures, algorithmic game theory, approximation algorithms and online algorithms, automata, languages, logic, and computability, complexity theory, computational learning theory, cryptography, reliability and security, database theory, computational biology and bioinformatics, computational algebra, geometry, number theory, graph drawing and information visualization, graph theory, communication networks, optimization, and parallel and distributed computing. Some of the papers will be selected for publication in special issues of *Theoretical Computer Science* (TCS) and *Journal of Combinatorial Optimization* (JOCO). It is expected that the journal version of the papers will be in a more complete form.

We would like to thank the Program Committee members and external reviewers for volunteering their time to review conference papers. We would like to extend special thanks to the publication, publicity, and local organization chairs for their hard work in making COCOON 2016 a successful event. Last but not least, we would like to thank all the authors for presenting their works at the conference.

August 2016

Thang N. Dinh
My T. Thai

Organization

Program Chairs

Thang N. Dinh
My T. Thai

Virginia Commonwealth University, USA
University of Florida, USA

Publicity Chairs

Chunyu Ai
Subhankar Mishra

University of South Carolina Upstate, USA
University of Florida, USA

Local Organization Chair

Hien T. Nguyen

Ton Duc Thang University, Vietnam

Program Committee

Eric Allender
Yossi Azar
Yixin Cao

Rutgers University, USA
Tel Aviv University, Israel
Hong Kong Polytechnic University, Hong Kong,
SAR China

Xi Chen
Francis Chin

Columbia University, USA
Hang Seng Management College, Hong Kong,
SAR China

Bhaskar DasGupta
David Eppstein
Uriel Feige
Zachary Friggstad
Raffaele Giancarlo
Mohammadtaghi Hajiaghayi
Lenwood Heath
Pinar Heggernes
Xiaodong Hu
Hiro Ito
Valentine Kabanets
Ming-Yang Kao
Donghyun Kim
Stavros Kolliopoulos

University of Illinois at Chicago, USA
University of California, Irvine, USA
Weizmann Institute of Science, Israel
University of Alberta, Canada
University of Palermo, Italy
University of Maryland, USA
Virginia Tech, USA
University of Bergen, Norway
Chinese Academy of Sciences, China
The University of Electro-Communications, Japan
Simon Fraser University, Canada
Northwestern University, USA
North Carolina Central University, USA
National and Kapodistrian University of Athens,
Greece

Nam Nguyen
Huy Nguyen

Towson University, USA
Toyota Technological Institute at Chicago, USA

Kunsoo Park	Seoul National University, South Korea
Desh Ranjan	Old Dominion, USA
Marc Uetz	University of Twente, The Netherlands
Dorothea Wagner	Karlsruhe Institute of Technology (KIT), Germany
Gerhard Woeginger	Eindhoven University of Technology, The Netherlands
Shengyu Zhang	The Chinese University of Hong Kong, Hong Kong, SAR China
Hong-Sheng Zhou	Virginia Commonwealth University, USA

Additional Reviewers

Antonios Antoniadis	Ragesh Jaiswal	Simona E. Rombo
Daniel Apon	Shaofeng Jiang	Anamitra Roy Choudhury
Yuichi Asahiro	Jun Kawahara	Alan Roytman
Moritz Baum	Walter Kern	Ignaz Rutter
Liu Bei	Thomas Kesselheim	Toshiki Saitoh
Rémy Belmonte	Konstantinos Kollias	Kanthi Sarpatwar
Manuel Bodirsky	Dieter Kratsch	Saeed Seddighin
Niv Buchbinder	Fleszar Krzysztof	Shinnosuke Seki
Valentin Buchhold	Nirman Kumar	Igor Shparlinski
Kevin Buchin	Bundit Laekhanukit	Junggab Son
Dimitris Chatzidimitriou	Elmar Langetepe	Manuel Sorge
Rajesh Chitnis	Mun-Kyu Lee	Ben Strasser
Janka Chlebkova	Zengpeng Li	Takeyuki Tamura
Sherman S.M. Chow	Vahid Liaghat	Qiang Tang
Ilan Cohen	Wei-Kai Lin	Junichi Teruyama
Radu Curticapean	Tian Liu	RN Uma
Konrad Dabrowski	Yao Lu	Filippo Utro
Bireswar Das	Spyridon Maniatis	Adi Vardi
Sina Dehghani	Arnaud Mary	Thomas Veale
Tuyet Duong	Tamara Mchedlidze	Wei Wang
Soheil Ehsani	Nicole Megow	Franziska Wegner
Michael Elberfeld	Matthias Mnich	Daniel Wicks
Hossein Esfandiari	Jérôme Monnot	Marcin Wrochna
Ophir Friedler	Benjamin Moseley	Hadi Yami
Takuro Fukunaga	Wolfgang Mulzer	Jie You
Loukas Georgiadis	Atsuki Nagao	Victor Zamaraev
Konstantinos Georgiou	Benjamin Niedermann	Chihao Zhang
Daniel Goncalves	Kenta Ozeki	Stanislav Zivny
Kasper Green Larsen	Ulrich Pferschy	Uri Zwick
Alexander Grigoriev	Roman Prutkin	Tobias Zündorf
Michael Hamann	Zhenzhong Qi	Erik Jan van Leeuwen
Johann Hurink	Marcel Radermacher	Suzanne van der Ster
Falk Hüffner	Felix Reidl	
Sungjin Im	Mohsen Rezapour	

Contents

Game Theory and Algorithms

Clairvoyant Mechanisms for Online Auctions	3
<i>Philipp Brandes, Zengfeng Huang, Hsin-Hao Su, and Roger Wattenhofer</i>	
Truthfulness for the Sum of Weighted Completion Times	15
<i>Eric Angel, Evripidis Bampis, Fanny Pascual, and Nicolas Thibault</i>	
Network Topologies for Weakly Pareto Optimal Nonatomic Selfish Routing	27
<i>Xujin Chen and Zhuo Diao</i>	
New Results for Network Pollution Games	39
<i>Eleftherios Anastasiadis, Xiaotie Deng, Piotr Krysta, Minming Li, Han Qiao, and Jinshan Zhang</i>	

Parameterized Complexity and Algorithms

Polynomial-Time Algorithm for Isomorphism of Graphs with Clique-Width at Most Three	55
<i>Bireswar Das, Murali Krishna Enduri, and I. Vinod Reddy</i>	
Fixed Parameter Complexity of Distance Constrained Labeling and Uniform Channel Assignment Problems (Extended Abstract)	67
<i>Jiří Fiala, Tomáš Gavenčíak, Dušan Knop, Martin Koutecký, and Jan Kratochvíl</i>	
A Parameterized Algorithm for Bounded-Degree Vertex Deletion	79
<i>Mingyu Xiao</i>	
The Monotone Circuit Value Problem with Bounded Genus Is in NC	92
<i>Faisal N. Abu-Khzam, Shouwei Li, Christine Markarian, Friedhelm Meyer auf der Heide, and Pavel Podlipyan</i>	

Database and Data Structures

Locality-Sensitive Hashing Without False Negatives for l_p	105
<i>Andrzej Pacuk, Piotr Sankowski, Karol Wegrzycki, and Piotr Wysocki</i>	
Improved Space Efficient Algorithms for BFS, DFS and Applications	119
<i>Niranka Banerjee, Sankardeep Chakraborty, and Venkatesh Raman</i>	

Metric 1-Median Selection: Query Complexity vs. Approximation Ratio	131
<i>Ching-Lueh Chang</i>	

Frequent-Itemset Mining Using Locality-Sensitive Hashing	143
<i>Debajyoti Bera and Rameshwar Pratap</i>	

Computational Complexity

On the Hardness of Switching to a Small Number of Edges	159
<i>Vít Jelínek, Eva Jelínková, and Jan Kratochvíl</i>	

On Hard Instances of Non-Commutative Permanent	171
<i>Christian Engels and B.V. Raghavendra Rao</i>	

The Effect of Range and Bandwidth on the Round Complexity in the Congested Clique Model	182
<i>Florent Becker, Antonio Fernández Anta, Ivan Rapaport, and Eric Rémila</i>	

Minimum Cost Homomorphisms with Constrained Costs	194
<i>Pavol Hell and Mayssam Mohammadi Nevisi</i>	

Approximation Algorithms

An Improved Constant-Factor Approximation Algorithm for Planar Visibility Counting Problem	209
<i>Sharareh Alipour, Mohammad Ghodsi, and Amir Jafari</i>	

Approximation Algorithms for the Star k -Hub Center Problem in Metric Graphs.	222
<i>Li-Hsuan Chen, Dun-Wei Cheng, Sun-Yuan Hsieh, Ling-Ju Hung, Chia-Wei Lee, and Bang Ye Wu</i>	

Balls and Funnels: Energy Efficient Group-to-Group Anycasts	235
<i>Jennifer Iglesias, Rajmohan Rajaraman, R. Ravi, and Ravi Sundaram</i>	

Assigning Proximity Facilities for Gatherings	247
<i>Shin-ichi Nakano</i>	

Cryptography

Combiners for Chosen-Ciphertext Security	257
<i>Cong Zhang, David Cash, Xiuhua Wang, Xiaoqi Yu, and Sherman S.M. Chow</i>	

Homomorphic Evaluation of Lattice-Based Symmetric Encryption Schemes . . .	269
<i>Pierre-Alain Fouque, Benjamin Hadjibeyli, and Paul Kirchner</i>	

Four-Round Zero-Knowledge Arguments of Knowledge with Strict Polynomial-Time Simulation from Differing-Input Obfuscation for Circuits.	281
<i>Ning Ding, Yanli Ren, and Dawu Gu</i>	

Inferring Sequences Produced by a Linear Congruential Generator on Elliptic Curves Using Coppersmith’s Methods	293
<i>Thierry Mefenza</i>	

Network and Algorithms

The Routing of Complex Contagion in Kleinberg’s Small-World Networks	307
<i>Wei Chen, Qiang Li, Xiaoming Sun, and Jialin Zhang</i>	

The Maximum Disjoint Routing Problem.	319
<i>Farhad Shahmohammadi, Amir Sharif-Zadeh, and Hamid Zarrabi-Zadeh</i>	

Balanced Allocation on Graphs: A Random Walk Approach	330
<i>Ali Pourmiri</i>	

Graph Theory and Algorithms

On the Power of Simple Reductions for the Maximum Independent Set Problem	345
<i>Darren Strash</i>	

Deterministic Algorithms for Unique Sink Orientations of Grids	357
<i>Luis Barba, Malte Milatz, Jerri Nummenpalo, and Antonis Thomas</i>	

From Graph Orientation to the Unweighted Maximum Cut.	370
<i>Walid Ben-Ameur, Antoine Glorieux, and José Neto</i>	

Maximum Weight Independent Sets in $(S_{1,1,3}, \text{bull})$ -free Graphs	385
<i>T. Karthick and Frédéric Maffray</i>	

Decomposing Cubic Graphs into Connected Subgraphs of Size Three	393
<i>Laurent Bulteau, Guillaume Fertin, Anthony Labarre, Romeo Rizzi, and Irena Rusu</i>	

Automorphisms of the Cube n^d	405
<i>Pavel Dvořák and Tomáš Valla</i>	

Hadwiger’s Conjecture and Squares of Chordal Graphs	417
<i>L. Sunil Chandran, Davis Issac, and Sanming Zhou</i>	

Computational Geometry

Minimum Width Color Spanning Annulus	431
<i>Ankush Acharyya, Subhas C. Nandy, and Sasanka Roy</i>	
Computing a Minimum-Width Square or Rectangular Annulus with Outliers [Extended Abstract].	443
<i>Sang Won Bae</i>	
Approximating the Maximum Rectilinear Crossing Number	455
<i>Samuel Bald, Matthew P. Johnson, and Ou Liu</i>	
An Improved Approximation Algorithm for rSPR Distance	468
<i>Zhi-Zhong Chen, Eita Machida, and Lusheng Wang</i>	

Scheduling Algorithms and Circuit Complexity

Online Non-preemptive Scheduling to Optimize Max Stretch on a Single Machine.	483
<i>Pierre-Francois Dutot, Erik Saule, Abhinav Srivastav, and Denis Trystram</i>	
Complex-Demand Scheduling Problem with Application in Smart Grid	496
<i>Majid Khonji, Areg Karapetyan, Khaled Elbassioni, and Chi-Kin Chau</i>	
From Preemptive to Non-preemptive Scheduling Using Rejections	510
<i>Giorgio Lucarelli, Abhinav Srivastav, and Denis Trystram</i>	
Flow Shop for Dual CPUs in Dynamic Voltage Scaling.	520
<i>Vincent Chau, Ken C.K. Fong, Minming Li, and Kai Wang</i>	

Computational Geometry and Computational Biology

Algorithms for k -median Clustering over Distributed Streams	535
<i>Sutanu Gayen and N.V. Vinodchandran</i>	
Polygon Simplification by Minimizing Convex Corners	547
<i>Yeganeh Bahoo, Stephane Durocher, J. Mark Keil, Saeed Mehrabi, Sahar Mehrpour, and Debajyoti Mondal</i>	
Combinatorial Scoring of Phylogenetic Networks	560
<i>Nikita Alexeev and Max A. Alekseyev</i>	
Highly Bi-Connected Subgraphs for Computational Protein Function Annotation	573
<i>Jucheol Moon, Iddo Friedberg, and Oliver Eulenstein</i>	

Logic, Algebra and Automata

Cost Register Automata for Nested Words	587
<i>Andreas Krebs, Nutan Limaye, and Michael Ludwig</i>	
Extending MSVL with Semaphore	599
<i>Xinfeng Shu and Zhenhua Duan</i>	
Satisfiability of Linear Time Mu-Calculus on Finite Traces	611
<i>Yao Liu, Zhenhua Duan, Cong Tian, and Bin Cui</i>	
On the Complexity of Insertion Propagation with Functional Dependency Constraints.	623
<i>Dongjing Miao, Zhipeng Cai, Xianmin Liu, and Jianzhong Li</i>	
Author Index	633