

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, 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, Saarbruecken, Germany

Jon Lee Jens Vygen (Eds.)

Integer Programming and Combinatorial Optimization

17th International Conference, IPCO 2014
Bonn, Germany, June 23-25, 2014
Proceedings



Springer

Preface

This volume contains the 34 extended abstracts presented at IPCO 2014, the 17th Conference on Integer Programming and Combinatorial Optimization, held June 23-25, 2014, in Bonn, Germany.

The IPCO conference is under the auspices of the Mathematical Optimization Society. It is held every year, except for those in which the International Symposium on Mathematical Programming takes place. The conference is a forum for researchers and practitioners working on various aspects of integer programming and combinatorial optimization. The aim is to present recent developments in theory, computation, and applications in these areas. Traditionally, IPCO consists of three days of non-parallel sessions, with no invited talks. More information on IPCO and its history can be found at www.mathopt.org/?nav=ipco.

This year, there were 143 submissions, two of which were withdrawn before the review process started. Each reviewed submission was reviewed by at least three Program Committee members, often with the help of external reviewers. The Program Committee met in Aussois in January 2014 and, after thorough discussions, selected 34 papers to be presented at IPCO 2014 and included in this volume. The record number of submissions, their high quality, and the more or less constant number of papers that can be accepted made this IPCO even more competitive than previous editions, with an acceptance rate of less than 25%.

We would like to thank:

- All authors who submitted extended abstracts to IPCO; it is a pleasure to see how active all areas of integer programming and combinatorial optimization are
- The members of the Program Committee, who graciously gave their time and energy
- The external reviewers, whose expertise was instrumental in guiding our decisions
- The EasyChair developers for their excellent platform making many things so much easier
- Springer for their efficient cooperation in producing this volume
- The members of the Organizing Committee and all people in Bonn who helped to make this conference possible
- The speakers of the summer school preceding IPCO: Gérard Cornuéjols, András Frank, Thomas Rothvoß, and David Shmoys

- The Mathematical Optimization Society and in particular the members of its IPCO Steering Committee: Andreas Schulz, Andrea Lodi, and David Williamson, for their help and advice.

March 2014

Jon Lee
Jens Vygen

Organization

Program Committee

Flavia Bonomo	Universidad de Buenos Aires, Argentina
Sam Burer	University of Iowa, USA
G�rard Cornu�jols	Carnegie Mellon University, USA
Satoru Fujishige	Kyoto University, Japan
Michael J�nger	Universit�t zu K�ln
Matthias K�ppe	University of California, Davis, USA
Jon Lee (chair)	University of Michigan, USA
Jeff Linderoth	University of Wisconsin, USA
Jean-Philippe Richard	University of Florida, USA
Andr�s Seb�	CNRS, Laboratoire G-SCOP, Grenoble, France
Maxim Sviridenko	University of Warwick, UK
Chaitanya Swamy	University of Waterloo, Canada
Jens Vygen	Universit�t Bonn, Germany
David P. Williamson	Cornell University, USA
Laurence Wolsey	Universit� catholique de Louvain, Belgium

Organizing Committee

Stephan Held (co-chair)	Bernhard Korte
Stefan Hougardy	Jens Vygen (chair)

Additional Reviewers

Aardal, Karen	Bornstein, Claudson
Aharoni, Ron	Boyar, Joan
Ahmadian, Sara	Brenner, Ulrich
Albers, Susanne	Bre�ar, Bo�tjan
An, Hyung-Chan	Buchbinder, Niv
Ando, Kazutoshi	Buchheim, Christoph
Argiroffo, Gabriela	Butenko, Sergiy
Badanidiyuru, Ashwinkumar	Byrka, Jaros�aw
Balasundaram, Baski	Chrobak, Marek
Baldacci, Roberto	Cornaz, Denis
Bansal, Nikhil	de Klerk, Etienne
Bhaskar, Umang	Dey, Santanu
B�kler, Fritz	Di Summa, Marco

Dourado, Mitre
 Duarte Pinto, Paulo Eustáquio
 Dvorak, Zdenek
 Ehgott, Matthias
 Ene, Alina
 Faenza, Yuri
 Fanelli, Angelo
 Feuerstein, Esteban
 Fiorini, Samuel
 Frank, András
 Friggstad, Zachary
 Gaspers, Serge
 Gester, Michael
 Gleixner, Ambros
 Goemans, Michel
 Grigoriev, Alex
 Groß, Martin
 Guenin, Bertrand
 Günlük, Oktay
 Gupta, Anupam
 Gyárfás, András
 Hähnle, Nicolai
 Hajjaghayi, Mohammadtaghi
 Harks, Tobias
 Havet, Frédéric
 Held, Stephan
 Hirai, Hiroshi
 Hoefler, Martin
 Hungerländer, Philipp
 Im, Sungjin
 Imai, Hiroshi
 Jansen, Klaus
 Jeronimo, Gabriela
 Jordán, Tibor
 Kakimura, Naonori
 Kamiński, Marcin
 Kamiyama, Naoyuki
 Karakostas, George
 Karpinski, Marek
 Kawahara, Jun
 Kelner, Jonathan
 Király, Tamás
 Kitahara, Tomonari
 Klewinghaus, Niko
 Kobayashi, Yusuke
 Kortsarz, Guy
 Krumke, Sven
 Kumar, Amit
 Letchford, Adam
 Li, Jian
 Li, Shi
 Liers, Frauke
 Lin, Min Chih
 Luedtke, James
 Mađry, Aleksander
 Maffray, Frédéric
 Mallach, Sven
 Manlove, David
 Margot, François
 Martin, Alexander
 Marx, Dániel
 Matuschke, Jannik
 McCormick, S. Thomas
 Megow, Nicole
 Mestre, Julian
 Mirrokni, Vahab
 Miyazaki, Shuichi
 Moldenhauer, Carsten
 Moscardelli, Luca
 Moseley, Ben
 Müller, Dirk
 Murota, Kazuo
 Nagano, Kiyohito
 Nagarajan, Viswanath
 Newman, Alantha
 Niedermeier, Rolf
 Ochsendorf, Philipp
 Olver, Neil
 Oriolo, Gianpaolo
 Ostrowski, Jim
 Pferschy, Ulrich
 Pilipczuk, Marcin
 Pokutta, Sebastian
 Queyranne, Maurice
 Rautenbach, Dieter
 Ravi, R.
 Rinaldi, Giovanni
 Röglin, Heiko
 Rothvoß, Thomas
 Rotter, Daniel

Sanità, Laura
Sassano, Antonio
Sau, Ignasi
Savelsbergh, Martin
Schäfer, Till
Schalekamp, Frans
Scheifele, Rudolf
Schieber, Baruch
Schmidt, Daniel
Schneider, Jan
Schorr, Ulrike
Shepherd, Bruce
Shigeno, Maiko
Shioura, Akiyoshi
Silvanus, Jannik
Silveira, Rodrigo
Sitters, René
Skopalik, Alexander
Skutella, Martin
Smriglio, Stefano
Soto, José
Spirkl, Sophie
Spisla, Christiane
van Stee, Rob
Svensson, Ola

Szigeti, Zoltán
Takazawa, Kenjiro
Tanigawa, Shin-ichi
Trotignon, Nicolas
Tunçel, Levent
Uetz, Marc
Van Vyve, Mathieu
Végh, László
Ventura, Paolo
Verschae, José
Vielma, Juan Pablo
Vishnoi, Nisheeth
Vondrák, Jan
Ward, Justin
Wiese, Andreas
Woeginger, Gerhard J.
Wollan, Paul
Wong, Prudence W.H.
Woods, Kevin
Wotzlaw, Andreas
Young, Neal
Zenklusen, Rico
van Zuylen, Anke
van der Zwaan, Ruben
Zwick, Uri

Table of Contents

The Cycling Property for the Clutter of Odd st -Walks	1
<i>Ahmad Abdi and Bertrand Guenin</i>	
On Simplex Pivoting Rules and Complexity Theory	13
<i>Ilan Adler, Christos Papadimitriou, and Aviad Rubinfeld</i>	
A Strongly Polynomial Time Algorithm for Multicriteria Global Minimum Cuts	25
<i>Hassene Aissi, A. Ridha Mahjoub, S. Thomas McCormick, and Maurice Queyranne</i>	
Integer Programs with Prescribed Number of Solutions and a Weighted Version of Doignon-Bell-Scarf's Theorem	37
<i>Iskander Aliev, Jesús A. De Loera, and Quentin Louveaux</i>	
Centrality of Trees for Capacitated k -Center	52
<i>Hyung-Chan An, Aditya Bhaskara, Chandra Chekuri, Shalmoli Gupta, Vivek Madan, and Ola Svensson</i>	
Sequence Independent, Simultaneous and Multidimensional Lifting of Generalized Flow Covers for the Semi-Continuous Knapsack Problem with Generalized Upper Bounds Constraints	64
<i>Alejandro Angulo, Daniel Espinoza, and Rodrigo Palma</i>	
On the Unique-Lifting Property	76
<i>Gennadiy Averkov and Amitabh Basu</i>	
Maximum Weighted Induced Bipartite Subgraphs and Acyclic Subgraphs of Planar Cubic Graphs	88
<i>Mourad Baiou and Francisco Barahona</i>	
n -Step Cycle Inequalities: Facets for Continuous n -Mixing Set and Strong Cuts for Multi-Module Capacitated Lot-Sizing Problem	102
<i>Manish Bansal and Kiavash Kianfar</i>	
On the Adaptivity Gap of Stochastic Orienteering	114
<i>Nikhil Bansal and Viswanath Nagarajan</i>	
A Utility Equivalence Theorem for Concave Functions	126
<i>Anand Bhalgat and Sanjeev Khanna</i>	

Network Improvement for Equilibrium Routing	138
<i>Umang Bhaskar, Katrina Ligett, and Leonard J. Schulman</i>	
Finding Small Stabilizers for Unstable Graphs	150
<i>Adrian Bock, Karthekeyan Chandrasekaran, Jochen Könemann, Britta Peis, and Laura Sanità</i>	
The Triangle Splitting Method for Biobjective Mixed Integer Programming	162
<i>Natashia Boland, Hadi Charkhgard, and Martin Savelsbergh</i>	
Cut Generation through Binarization	174
<i>Pierre Bonami and François Margot</i>	
A $\frac{5}{4}$ -Approximation for Subcubic 2EC Using Circulations	186
<i>Sylvia Boyd, Yao Fu, and Yu Sun</i>	
Box-Constrained Mixed-Integer Polynomial Optimization Using Separable Underestimators	198
<i>Christoph Buchheim and Claudia D'Ambrosio</i>	
Submodular Maximization Meets Streaming: Matchings, Matroids, and More	210
<i>Amit Chakrabarti and Sagar Kale</i>	
The All-or-Nothing Flow Problem in Directed Graphs with Symmetric Demand Pairs	222
<i>Chandra Chekuri and Alina Ene</i>	
Reverse Split Rank	234
<i>Michele Conforti, Alberto Del Pia, Marco Di Summa, and Yuri Faenza</i>	
Strong LP Formulations for Scheduling Splittable Jobs on Unrelated Machines	249
<i>José R. Correa, Alberto Marchetti-Spaccamela, Jannik Matuschke, Leen Stougie, Ola Svensson, Víctor Verdugo, and José Verschae</i>	
How Good Are Sparse Cutting-Planes?	261
<i>Santanu S. Dey, Marco Molinaro, and Qianyi Wang</i>	
Short Tours through Large Linear Forests	273
<i>Uriel Feige, R. Ravi, and Mohit Singh</i>	
Linear Programming Hierarchies Suffice for Directed Steiner Tree	285
<i>Zachary Friggstad, Jochen Könemann, Young Kun Ko, Anand Louis, Mohammad Shadravan, and Madhur Tulsiani</i>	
An Improved Approximation Algorithm for the Stable Marriage Problem with One-Sided Ties	297
<i>Chien-Chung Huang and Telikepalli Kavitha</i>	

Simple Extensions of Polytopes	309
<i>Volker Kaibel and Matthias Walter</i>	
Lower Bounds on the Sizes of Integer Programs without Additional Variables	321
<i>Volker Kaibel and Stefan Weltge</i>	
On the Configuration LP for Maximum Budgeted Allocation	333
<i>Christos Kalaitzis, Aleksander Mądry, Alantha Newman, Lukáš Poláček, and Ola Svensson</i>	
Two-Term Disjunctions on the Second-Order Cone	345
<i>Fatma Kılınç-Karzan and Sercan Yıldız</i>	
Coupled and k -Sided Placements: Generalizing Generalized Assignment	357
<i>Madhukar Korupolu, Adam Meyerson, Rajmohan Rajaraman, and Brian Tagiku</i>	
A Unified Algorithm for Degree Bounded Survivable Network Design . . .	369
<i>Lap Chi Lau and Hong Zhou</i>	
Scheduling and Fixed-Parameter Tractability	381
<i>Matthias Mnich and Andreas Wiese</i>	
Improved Branch-Cut-and-Price for Capacitated Vehicle Routing	393
<i>Diego Pecin, Artur Pessoa, Marcus Poggi, and Eduardo Uchoa</i>	
Claw-Free t -Perfect Graphs Can Be Recognised in Polynomial Time	404
<i>Henning Bruhn and Oliver Schaudt</i>	
Author Index	417