

# Table of Contents

## Invited Papers

|                                                                                                       |   |
|-------------------------------------------------------------------------------------------------------|---|
| Algorithms and Linear Programming Relaxations for Scheduling<br>Unrelated Parallel Machines . . . . . | 1 |
| <i>Martin Skutella</i>                                                                                |   |
| The Hub Labeling Algorithm . . . . .                                                                  | 4 |
| <i>Andrew V. Goldberg</i>                                                                             |   |
| Design of Practical Succinct Data Structures for Large Data<br>Collections . . . . .                  | 5 |
| <i>Roberto Grossi and Giuseppe Ottaviano</i>                                                          |   |

## Transportation Networks and Graph Algorithms I

|                                                                        |    |
|------------------------------------------------------------------------|----|
| Hub Label Compression . . . . .                                        | 18 |
| <i>Daniel Delling, Andrew V. Goldberg, and Renato F. Werneck</i>       |    |
| Faster Customization of Road Networks . . . . .                        | 30 |
| <i>Daniel Delling and Renato F. Werneck</i>                            |    |
| Intriguingly Simple and Fast Transit Routing . . . . .                 | 43 |
| <i>Julian Dibbelt, Thomas Pajor, Ben Strasser, and Dorothea Wagner</i> |    |
| Transit Node Routing Reconsidered . . . . .                            | 55 |
| <i>Julian Arz, Dennis Luxen, and Peter Sanders</i>                     |    |

## Combinatorics and Enumeration

|                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------|-----|
| A New QEA Computing Near-Optimal Low-Discrepancy Colorings in<br>the Hypergraph of Arithmetic Progressions . . . . . | 67  |
| <i>Lasse Kliemann, Ole Kliemann, C. Patvardhan,<br/>Volkmar Sauerland, and Anand Srivastav</i>                       |     |
| Computational Aspects of Ordered Integer Partition with Upper<br>Bounds . . . . .                                    | 79  |
| <i>Roland Glück, Dominik Köppl, and Günther Wirsching</i>                                                            |     |
| Hypergraph Transversal Computation with Binary Decision<br>Diagrams . . . . .                                        | 91  |
| <i>Takahisa Toda</i>                                                                                                 |     |
| Efficient Counting of Maximal Independent Sets in Sparse Graphs . . . . .                                            | 103 |
| <i>Fredrik Manne and Sadia Sharmin</i>                                                                               |     |

## Data Structures and Compression

|                                                                                                         |     |
|---------------------------------------------------------------------------------------------------------|-----|
| An Edge Quadtree for External Memory . . . . .                                                          | 115 |
| <i>Herman Haverkort, Mark McGranaghan, and Laura Toma</i>                                               |     |
| Branchless Search Programs . . . . .                                                                    | 127 |
| <i>Amr Elmasry and Jyrki Katajainen</i>                                                                 |     |
| Lightweight Lempel-Ziv Parsing . . . . .                                                                | 139 |
| <i>Juha Kärkkäinen, Dominik Kempa, and Simon J. Puglisi</i>                                             |     |
| Space-Efficient, High-Performance Rank and Select Structures on<br>Uncompressed Bit Sequences . . . . . | 151 |
| <i>Dong Zhou, David G. Andersen, and Michael Kaminsky</i>                                               |     |

## Network Partitioning and Bioinformatics

|                                                                                                                              |     |
|------------------------------------------------------------------------------------------------------------------------------|-----|
| Think Locally, Act Globally: Highly Balanced Graph Partitioning . . . . .                                                    | 164 |
| <i>Peter Sanders and Christian Schulz</i>                                                                                    |     |
| Evaluation of ILP-Based Approaches for Partitioning into Colorful<br>Components . . . . .                                    | 176 |
| <i>Sharon Bruckner, Falk Hüffner, Christian Komusiewicz, and<br/>Rolf Niedermeier</i>                                        |     |
| Finding Modules in Networks with Non-modular Regions . . . . .                                                               | 188 |
| <i>Sharon Bruckner, Bastian Kayser, and Tim O.F. Conrad</i>                                                                  |     |
| Telling Stories Fast: Via Linear-Time Delay Pitch Enumeration . . . . .                                                      | 200 |
| <i>Michele Borassi, Pierluigi Crescenzi, Vincent Lacroix,<br/>Andrea Marino, Marie-France Sagot, and Paulo Vieira Milreu</i> |     |

## Mathematical Programming

|                                                                                                |     |
|------------------------------------------------------------------------------------------------|-----|
| Undercover Branching . . . . .                                                                 | 212 |
| <i>Timo Berthold and Ambros M. Gleixner</i>                                                    |     |
| Quadratic Outer Approximation for Convex Integer Programming with<br>Box Constraints . . . . . | 224 |
| <i>Christoph Buchheim and Long Trieu</i>                                                       |     |
| Separable Non-convex Underestimators for Binary Quadratic<br>Programming . . . . .             | 236 |
| <i>Christoph Buchheim and Emiliano Traversi</i>                                                |     |
| Hybrid SDP Bounding Procedure . . . . .                                                        | 248 |
| <i>Fabio Furini and Emiliano Traversi</i>                                                      |     |

## Transportation Networks and Graph Algorithms II

|                                                                                                 |     |
|-------------------------------------------------------------------------------------------------|-----|
| Computing Multimodal Journeys in Practice .....                                                 | 260 |
| <i>Daniel Delling, Julian Dibbelt, Thomas Pajor,<br/>Dorothea Wagner, and Renato F. Werneck</i> |     |
| Efficient Computation of Jogging Routes .....                                                   | 272 |
| <i>Andreas Gemsa, Thomas Pajor, Dorothea Wagner, and<br/>Tobias Zündorf</i>                     |     |
| Dominator Certification and Independent Spanning Trees:<br>An Experimental Study .....          | 284 |
| <i>Loukas Georgiadis, Luigi Laura, Nikos Parotsidis, and<br/>Robert E. Tarjan</i>               |     |
| Novel Techniques for Automorphism Group Computation .....                                       | 296 |
| <i>José Luis López-Presa, Luis Núñez Chiroque, and<br/>Antonio Fernández Anta</i>               |     |

## Geometry and Optimization

|                                                                                                                    |     |
|--------------------------------------------------------------------------------------------------------------------|-----|
| Blinking Molecule Tracking .....                                                                                   | 308 |
| <i>Andreas Karrenbauer and Dominik Wöll</i>                                                                        |     |
| The Quest for Optimal Solutions for the Art Gallery Problem:<br>A Practical Iterative Algorithm .....              | 320 |
| <i>Davi C. Tozoni, Pedro J. de Rezende, and Cid C. de Souza</i>                                                    |     |
| An Improved Branching Algorithm for Two-Layer Planarization<br>Parameterized by the Feedback Edge Set Number ..... | 337 |
| <i>Mathias Weller</i>                                                                                              |     |
| In-Out Separation and Column Generation Stabilization by Dual Price<br>Smoothing .....                             | 354 |
| <i>Artur Pessoa, Ruslan Sadykov, Eduardo Uchoa, and<br/>Francois Vanderbeck</i>                                    |     |

## Scheduling and Local Search

|                                                                                                    |     |
|----------------------------------------------------------------------------------------------------|-----|
| Energy Minimization via a Primal-Dual Algorithm for a Convex<br>Program .....                      | 366 |
| <i>Euripidis Bampis, Vincent Chau, Dimitrios Letsios,<br/>Giorgio Lucarelli, and Ioannis Milis</i> |     |
| Reoptimization in Branch-and-Bound Algorithms with an Application<br>to Elevator Control .....     | 378 |
| <i>Benjamin Hiller, Torsten Klug, and Jakob Witzig</i>                                             |     |

Cluster-Based Heuristics for the Team Orienteering Problem with Time  
Windows ..... 390  
    *Damianos Gavalas, Charalampos Konstantopoulos,*  
    *Konstantinos Mastakas, Grammati Pantziou, and*  
    *Yiannis Tasoulas*

Finding Robust Solutions for the Stochastic Job Shop Scheduling  
Problem by Including Simulation in Local Search ..... 402  
    *Marjan van den Akker, Kevin van Blokland, and Han Hoogeveen*

**Author Index** ..... 415