Lecture Notes in Computer Science

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

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
  University of Dortmund, Germany

Madhu Sudan
  Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos
  New York University, NY, USA

Doug Tygar
  University of California, Berkeley, CA, USA

Moshe Y. Vardi
  Rice University, Houston, TX, USA

Gerhard Weikum
  Max-Planck Institute of Computer Science, Saarbruecken, Germany
Preface

The 2nd Workshop on Approximation and Online Algorithms (WAOA 2004) focused on the design and analysis of algorithms for online and computationally hard problems. Both kinds of problems have a large number of applications arising from a variety of fields. WAOA 2004 took place in Bergen, Norway, from September 14 to September 16, 2004. The workshop was part of the ALGO 2004 event which also hosted ESA, WABI, IWPEC, and ATMOS.

Topics of interests for WAOA 2004 were: applications to game theory, approximation classes, coloring and partitioning, competitive analysis, computational finance, cuts and connectivity, geometric problems, inapproximability results, mechanism design, network design, routing, packing and covering, paradigms, randomization techniques, and scheduling problems. In response to our call we received 47 submissions. Each submission was reviewed by at least 3 referees, who judged the paper on originality, quality, and consistency with the topics of the conference. Based on the reviews, the Program Committee selected 21 papers. This volume contains the 21 selected papers and the two invited talks given by Yossi Azar and Klaus Jansen.

We thank all the authors who submitted papers to the workshop and we also kindly thank the local organizers of ALGO 2004.

November 2004

G. Persiano
R. Solis-Oba
Program Co-chairs

Giuseppe Persiano  Università di Salerno, Italy
Roberto Solis-Oba  University of Western Ontario, Canada

Program Committee

Yossi Azar  Tel Aviv University, Israel
Evripidis Bampis  University of Evry, France
Thomas Erlebach  ETH, Zurich, Switzerland
Klaus Jansen  University of Kiel, Germany
Christos Kaklamanis  University of Patras, Greece
Marek Karpinski  Rheinische Friedrich-Wilhelms Universität, Germany
Claire Kenyon  Ecole Polytechnique, France
Samir Kuller  University of Maryland, USA
David Peleg  Weizmann Institute of Science, Israel
Giuseppe Persiano  Università di Salerno, Italy
Martin Skutella  Max-Planck-Institut für Informatik, Germany
Roberto Solis-Oba  University of Western Ontario, Canada

Sponsoring Institutions

Dipartimento di Informatica ed Applicazioni “R.M. Capocelli”, Università di Salerno, Italy

Referees

Ernst Althaus  Han Hoogeveen  Micha Sharir
Vincenzo Auletta  Alex Kesselman  Maxim Sviridenko
Holger Bast  Yoo Ah Kim  Kavitha Telikepalli
Chandra Chekuri  Stavros Kolliopoulos  Ralf Thöle
Amir Epstein  Martin Loehnertz  Justin Wan
Leah Epstein  Maren Martens  Deshi Ye
Sandor Fekete  Paolo Penna  Hu Zhang
Amos Fiat  Kirk Pruhs
Alexei Fishkin  Dr. Raghavachari
Olga Gerber  Yossi Richter
Table of Contents

Invited Talks

Online Packet Switching
   Yossi Azar .................................................... 1

Approximation Algorithms for Mixed Fractional Packing and Covering Problems
   Klaus Jansen .................................................. 6

Regular Papers

Minimum Sum Multicoloring on the Edges of Planar Graphs and Partial $k$-Trees
   Dániel Marx .................................................. 9

Online Bin Packing with Resource Augmentation
   Leah Epstein, Rob van Stee .................................... 23

A PTAS for Delay Minimization in Establishing Wireless Conference Calls
   Leah Epstein, Asaf Levin ...................................... 36

This Side Up!
   Leah Epstein, Rob van Stee .................................. 48

Approximation Algorithm for Directed Multicuts
   Yana Kortsarts, Guy Kortsarz, and Zeev Nutov ................. 61

Improved Bounds for Sum Multicoloring and Scheduling Dependent Jobs with Minsum Criteria
   Rajiv Gandhi, Magnús M. Halldórsson, Guy Kortsarz, Hadas Shachnai .................................. 68

Approximation Algorithms for Spreading Points
   Sergio Cabello ............................................... 83

More Powerful and Simpler Cost-Sharing Methods
   Paolo Penna, Carmine Ventre ................................ 97
Approximation Schemes for Deal Splitting and Covering Integer Programs with Multiplicity Constraints  
Hadas Shachnai, Oded Shmueli, Robert Sayegh ................................. 111

Priority Algorithms for Graph Optimization Problems  
Allan Borodin, Joan Boyar, Kim S. Larsen ................................. 126

Pricing Network Edges to Cross a River  
Alexander Grigoriev, Stan van Hoesel, Anton F. van der Kraaij,  
Marc Uetz, Mustapha Bouhtou ............................................. 140

Submodular Integer Cover and Its Application to Production Planning  
Toshiro Fujito, Takatoshi Yabuta ........................................ 154

Stochastic Online Scheduling on Parallel Machines  
Nicole Megow, Marc Uetz, Tjark Vredeveld .............................. 167

A 5/4-Approximation Algorithm for Biconnecting a Graph with a Given Hamiltonian Path  
Davide Bilò, Guido Proietti ............................................. 181

Ordering-Preserving Transformations and Greedy-Like Algorithms  
Spyros Angelopoulos .................................................. 197

Off-line Admission Control for Advance Reservations in Star Networks  
Udo Adamy, Thomas Erlebach, Dieter Mitsche, Ingo Schurr,  
Bettina Speckmann, Emo Welzl ........................................ 211

Joint Base Station Scheduling  
Thomas Erlebach, Riko Jacob, Matúš Mihalák, Mark Nunkesser,  
Gábor Szabó, Peter Widmayer ........................................ 225

Universal Bufferless Routing  
Costas Busch, Malik Magdon-Ismail, Marios Mavronicolas .......... 239

Strong Colorings of Hypergraphs  
Geir Agnarsson, Magnús M. Halldórsson ................................ 253

Deterministic Monotone Algorithms for Scheduling on Related Machines  
Pasquale Ambrosio, Vincenzo Auletta.................................. 267

Better Bounds for Minimizing SONET ADMs  
Leah Epstein, Asaf Levin .............................................. 281

Author Index ......................................................... 295