

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

Sotiris E. Nikolettseas (Ed.)

Experimental and Efficient Algorithms

4th International Workshop, WEA 2005
Santorini Island, Greece, May 10-13, 2005
Proceedings



Springer

Volume Editor

Sotiris E. Nikolettseas

University of Patras and Computer Technology Institute (CTI)

61 Riga Fereou Street, 26221 Patras, Greece

E-mail: nikole@cti.gr

Library of Congress Control Number: 2005925473

CR Subject Classification (1998): F.2.1-2, E.1, G.1-2, I.3.5, I.2.8

ISSN 0302-9743

ISBN-10 3-540-25920-1 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-25920-6 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper SPIN: 11427186 06/3142 5 4 3 2 1 0

Preface

This proceedings volume contains the accepted papers and invited talks presented at the 4th International Workshop of Efficient and Experimental Algorithms (WEA 2005), that was held May 10–13, on Santorini Island, Greece.

The WEA events are intended to be an international forum for research on the design, analysis and especially the experimental implementation, evaluation and engineering of algorithms, as well as on combinatorial optimization and its applications.

The first three workshops in this series were held in Riga (2001), Monte Verita (2003) and Rio de Janeiro (2004).

This volume contains 3 invited papers related to corresponding keynote talks: by Prof. Christos Papadimitriou (University of California at Berkeley, USA), Prof. David Bader (University of New Mexico, USA) and Prof. Celso Ribeiro (University of Rio de Janeiro, Brazil).

This proceedings includes 54 papers (47 regular and 7 short), selected out of a record number of 176 submissions. Each paper was reviewed by at least 2 Program Committee members, while many papers got 3 or 4 reviews. A total number of 419 reviews were solicited, with the help of trusted external referees.

In addition to the 54 papers included in this volume, 6 papers were accepted as poster presentations: these papers were published in a separate poster proceedings volume by CTI Press and a major publisher in Greece, “Ellinika Grammata.” The presentation of these posters at the event was expected to create a fruitful discussion on interesting ideas.

The 60 papers accepted to WEA 2005 demonstrate the international character of the event: 33 authors are based in Germany, 20 in the USA, 13 in Italy, 12 in Greece, 9 each in Switzerland, France and Brazil, 6 each in Canada, Poland and Belgium, 5 in the Netherlands, to list just the countries with the largest participations.

Selected papers of WEA 2005 will be considered for a Special Issue of the ACM Journal on Experimental Algorithmics (JEA, <http://www.jea.acm.org/>) dedicated to the event.

We would like to thank all authors who submitted papers to WEA 2005. We especially thank the distinguished invited speakers (whose participation honors the event a lot), and the members of the Program Committee, as well as the external referees and the Organizing Committee members.

We would like to thank the Ministry of National Education and Religious Affairs of Greece for its financial support of the event. Also, we gratefully acknowledge the support from the Research Academic Computer Technology Institute (RACTI, Greece, <http://www.cti.gr>), and the European Union (EU) IST/FET (Future and Emerging Technologies) R&D projects FLAGS (Foundational As-

pects of Global Computing Systems) and DELIS (Dynamically Evolving, Large-Scale Information Systems).

I wish to personally acknowledge the great job of the WEA 2005 Publicity Chair Dr. Ioannis Chatzigiannakis, and Athanasios Kinalis for maintaining the Web page and processing this volume with efficiency and professionalism.

I am grateful to the WEA Steering Committee Chairs Prof. Jose Rolim and Prof. Klaus Jansen for their trust and support.

Finally, we wish to thank Springer Lecture Notes in Computer Science (LNCS), and in particular Alfred Hofmann and his team, for a very nice and efficient co-operation in preparing this volume.

May 2005

Sotiris Nikolettseas

Organization

Program Committee Chair

Sotiris Nikolettseas	University of Patras and CTI, Greece
----------------------	--------------------------------------

Program Committee

Edoardo Amaldi	Politecnico di Milano, Italy
Evripidis Bampis	Université d'Evry, France
David A. Bader	University of New Mexico, USA
Cynthia Barnhart	MIT, USA
Azzedine Boukerche	SITE, University of Ottawa, Canada
Gerth Brodal	University of Aarhus, Denmark
Rainer Burkard	Graz University of Technology, Austria
Giuseppe Di Battista	Universita' degli Studi Roma Tre, Italy
Rudolf Fleischer	Fudan University, Shanghai, China
Pierre Fraigniaud	CNRS, Université Paris-Sud, France
Mark Goldberg	Rensselaer Polytechnic Institute, USA
Juraj Hromkovic	ETH Zurich, Switzerland
Giuseppe Italiano	Universita' di Roma Tor Vergata, Italy
Christos Kaklamanis	University of Patras and CTI, Greece
Helen Karatza	Aristotle University of Thessaloniki, Greece
Ludek Kucera	Charles University, Czech Republic
Shay Kutten	Technion - Israel Institute of Technology, Israel
Catherine McGeoch	Amherst College, USA
Simone Martins	Universidade Federal Fluminense, Brazil
Bernard Moret	University of New Mexico, USA
Ian Munro	University of Waterloo, Canada
Sotiris Nikolettseas	University of Patras and CTI, Greece (Chair)
Andrea Pietracaprina	University of Padova, Italy
Tomasz Radzik	King's College London, UK
Rajeev Raman	University of Leicester, UK
Mauricio Resende	AT&T Labs Research, USA
Maria Serna	T.U. of Catalonia, Spain
Paul Spirakis	University of Patras and CTI, Greece
Eric Taillard	EIVD, Switzerland
Dorothea Wagner	University of Karlsruhe, Germany
Stefan Voss	University of Hamburg, Germany
Christos Zaroliagis	University of Patras and CTI, Greece

Steering Committee Chairs

Klaus Jansen	University of Kiel, Germany
Jose Rolim	University of Geneva, Switzerland

Organizing Committee

Ioannis Chatzigiannakis	CTI, Greece, (Co-chair)
Rozina Efstathiadou	CTI, Greece, (Co-chair)
Lena Gourdoupi	CTI, Greece
Athanasios Kinalis	University of Patras and CTI, Greece

Referees

Nazim Agoulmine	Rolf Fagerberg	Joachim Kupke
Roberto Aringhieri	Carlo Fantozzi	Giovanni Lagorio
Yossi Azar	Antonio Fernández	Giuseppe Lancia
Ricardo Baeza-Yates	Irene Finocchi	Carlile Lavor
Michael Baur	Dimitris Fotakis	Helena Leityo
Amos Beimel	Joaquim Gabarró	Zvi Lotker
Pietro Belotti	Marco Gaertler	Abilio Lucena
Alberto Bertoldo	Giulia Galbiati	Francesco Maffioli
Mauro Bianco	Clemente Galdi	Malik Magdon-Ismael
Maria Blesa	Giovanni Gallo	Christos Makris
Roderick Bloem	Efstratios Gallopoulos	Federico Malucelli
Christian Blum	Fabrizio Grandoni	Carlos Alberto
Maria Cristina Boeres	Peter Greistorfer	Martinhon
Thomas Buchholz	Nir Halman	Constandinos
Costas Busch	Refael Hassin	Mavromoustakis
Sergiy Butenko	Martin Holzer	Steffen Mecke
Roberto Wolfier Calvo	Ja Hoogeveen	John Mitchell
Antonio Capone	Stanislaw Jarecki	Ivone Moh
Ioannis Caragiannis	Jiang Jun	Gabriel Moruz
Massimiliano Caramia	Sam Kamin	Pablo Moscato
Matteo Cesana	Howard Karloff	Matthias
Ioannis Chatzigiannakis	Dukwon Kim	Mueller-Hannemann
Yinong Chen	Athanasios Kinalis	Maurizio Naldi
Francis Chin	Sigrid Knust	Filippo Neri
Pier Francesco Cortese	Elisavet Konstantinou	Sara Nicoloso
Yves Crama	Charalambos	Gaia Nicosia
Cid de Souza	Konstantopoulos	Mustapha Nourelfath
Josep Diaz	Spyros Kontogiannis	Carlos A.S. Oliveira
Tassos Dimitriou	Dimitrios Koukopoulos	Mohamed Ould-Khaoua

Andrea Pacifici	Daniela Pucci de Farias	Stênio Soares
Evi Papaioannou	Naila Rahman	Yannis Stamatiou
Panos M. Pardalos	Massimo Rimondini	Maurizio Strangio
Paolo Penna	Isabel Rosseti	Tami Tamir
Pino Persiano	Harilaos Sandalidis	Leandros Tassiulas
Enoch Peserico	Haroldo Santos	Dimitrios M. Thilikos
Jordi Petit	Thomas Schank	Marco Trubian
Ugo Pietropaoli	Elad Schiller	Manolis Tsagarakis
Mustafa Pinar	Frank Schulz	George Tsaggouris
Evaggelia Pitoura	Sebastian Seibert	Gabriel Wainer
Maurizio Pizzonia	Spyros Sioutas	Renato Werneck
Alexandre Plastino	Spiros Sirmakessis	Igor Zwir
Daniele Pretolani	Riste Skrekovski	

Sponsoring Institutions

- Ministry of National Education and Religious Affairs of Greece
- Research Academic Computer Technology Institute (RACTI), Greece
- EU-FET R&D project “Foundational Aspects of Global Computing Systems” (FLAGS)
- EU-FET R&D project “Dynamically Evolving, Large-Scale Information Systems” (DELIS)

Table of Contents

Invited Talks

<i>Τα Παυδία Παίξει</i> The Interaction Between Algorithms and Game Theory	1
<i>Christos H. Papadimitriou</i>	

Using an Adaptive Memory Strategy to Improve a Multistart Heuristic for Sequencing by Hybridization	
<i>Eraldo R. Fernandes, Celso C. Ribeiro</i>	4

High-Performance Algorithm Engineering for Large-Scale Graph Problems and Computational Biology	
<i>David A. Bader</i>	16

Contributed Regular Papers

The “Real” Approximation Factor of the MST Heuristic for the Minimum Energy Broadcasting	
<i>Michele Flammini, Alfredo Navarra, Stephane Perennes</i>	22

Implementing Minimum Cycle Basis Algorithms	
<i>Kurt Mehlhorn, Dimitrios Michail</i>	32

Rounding to an Integral Program	
<i>Refael Hassin, Danny Segev</i>	44

Rectangle Covers Revisited Computationally	
<i>Laura Heinrich-Litan, Marco E. Lübbecke</i>	55

Don’t Compare Averages	
<i>Holger Bast, Ingmar Weber</i>	67

Experimental Results for Stackelberg Scheduling Strategies	
<i>A.C. Kaporis, L.M. Kirousis, E.I. Politopoulou, P.G. Spirakis</i>	77

An Improved Branch-and-Bound Algorithm for the Test Cover Problem	
<i>Torsten Fahle, Karsten Tiemann</i>	89

Degree-Based Treewidth Lower Bounds	
<i>Arie M.C.A. Koster, Thomas Wolle, Hans L. Bodlaender</i>	101

Inferring AS Relationships: Dead End or Lively Beginning? <i>Xenofontas Dimitropoulos, Dmitri Krioukov, Bradley Huffaker, kc claffy, George Riley</i>	113
Acceleration of Shortest Path and Constrained Shortest Path Computation <i>Ekkehard Köhler, Rolf H. Möhring, Heiko Schilling</i>	126
A General Buffer Scheme for the Windows Scheduling Problem <i>Amotz Bar-Noy, Jacob Christensen, Richard E. Ladner, Tami Tamir</i>	139
Implementation of Approximation Algorithms for the Multicast Congestion Problem <i>Qiang Lu, Hu Zhang</i>	152
Frequency Assignment and Multicoloring Powers of Square and Triangular Meshes <i>Mustapha Kchikech, Olivier Togni</i>	165
From Static Code Distribution to More Shrinkage for the Multiterminal Cut <i>Bram De Wachter, Alexandre Genon, Thierry Massart</i>	177
Partitioning Graphs to Speed Up Dijkstra's Algorithm <i>Rolf H. Möhring, Heiko Schilling, Birk Schütz, Dorothea Wagner, Thomas Willhalm</i>	189
Efficient Convergence to Pure Nash Equilibria in Weighted Network Congestion Games <i>Panagiota N. Panagopoulou, Paul G. Spirakis</i>	203
New Upper Bound Heuristics for Treewidth <i>Emgad H. Bachoore, Hans L. Bodlaender</i>	216
Accelerating Vickrey Payment Computation in Combinatorial Auctions for an Airline Alliance <i>Yvonne Bleischwitz, Georg Kliewer</i>	228
Algorithm Engineering for Optimal Graph Bipartization <i>Falk Hüffner</i>	240
Empirical Analysis of the Connectivity Threshold of Mobile Agents on the Grid <i>Xavier Pérez</i>	253

Multiple-Winners Randomized Tournaments with Consensus for Optimization Problems in Generic Metric Spaces <i>Domenico Cantone, Alfredo Ferro, Rosalba Giugno, Giuseppe Lo Presti, Alfredo Pulvirenti</i>	265
On Symbolic Scheduling Independent Tasks with Restricted Execution Times <i>Daniel Sawitzki</i>	277
A Simple Randomized k -Local Election Algorithm for Local Computations <i>Rodrigue Ossamy</i>	290
Generating and Radiocoloring Families of Perfect Graphs <i>M.I. Andreou, V.G. Papadopoulou, P.G. Spirakis, B. Theodorides, A. Xeros</i>	302
Efficient Implementation of Rank and Select Functions for Succinct Representation <i>Dong Kyue Kim, Joong Chae Na, Ji Eun Kim, Kunsoo Park</i>	315
Comparative Experiments with GRASP and Constraint Programming for the Oil Well Drilling Problem <i>Romulo A. Pereira, Arnaldo V. Moura, Cid C. de Souza</i>	328
A Framework for Probabilistic Numerical Evaluation of Sensor Networks: A Case Study of a Localization Protocol <i>Pierre Leone, Paul Albuquerque, Christian Mazza, Jose Rolim</i>	341
A Cut-Based Heuristic to Produce Almost Feasible Periodic Railway Timetables <i>Christian Liebchen</i>	354
GRASP with Path-Relinking for the Weighted Maximum Satisfiability Problem <i>Paola Festa, Panos M. Pardalos, Leonidas S. Pitsoulis, Mauricio G.C. Resende</i>	367
New Bit-Parallel Indel-Distance Algorithm <i>Heikki Hyvrö, Yoan Pinzon, Ayumi Shinohara</i>	380
Dynamic Application Placement Under Service and Memory Constraints <i>Tracy Kimbrel, Malgorzata Steinder, Maxim Sviridenko, Asser Tantawi</i>	391

Integrating Coordinated Checkpointing and Recovery Mechanisms into DSM Synchronization Barriers <i>Azzedine Boukerche, Jeferson Koch, Alba Cristina Magalhaes Alves de Melo</i>	403
Synchronization Fault Cryptanalysis for Breaking A5/1 <i>Marcin Gomułkiewicz, Mirosław Kutyłowski, Heinrich Theodor Vierhaus, Paweł Wlaz</i>	415
An Efficient Algorithm for δ -Approximate Matching with α -Bounded Gaps in Musical Sequences <i>Domenico Cantone, Salvatore Cristofaro, Simone Faro</i>	428
The Necessity of Timekeeping in Adversarial Queueing <i>Maik Weinard</i>	440
BDDs in a Branch and Cut Framework <i>Bernd Becker, Markus Behle, Friedrich Eisenbrand, Ralf Wimmer</i> ...	452
Parallel Smith-Waterman Algorithm for Local DNA Comparison in a Cluster of Workstations <i>Azzedine Boukerche, Alba Cristina Magalhaes Alves de Melo, Mauricio Ayala-Rincon, Thomas M. Santana</i>	464
Fast Algorithms for Weighted Bipartite Matching <i>Justus Schwartz, Angelika Steger, Andreas Weißl</i>	476
A Practical Minimal Perfect Hashing Method <i>Fabiano C. Botelho, Yoshiharu Kohayakawa, Nivio Ziviani</i>	488
Efficient and Experimental Meta-heuristics for MAX-SAT Problems <i>Dalila Boughaci, Habiba Drias</i>	501
Experimental Evaluation of the Greedy and Random Algorithms for Finding Independent Sets in Random Graphs <i>M. Goldberg, D. Hollinger, M. Magdon-Ismail</i>	513
Local Clustering of Large Graphs by Approximate Fiedler Vectors <i>Pekka Orponen, Satu Elisa Schaeffer</i>	524
Almost FPRAS for Lattice Models of Protein Folding <i>Anna Gambin, Damian Wójtowicz</i>	534
Vertex Cover Approximations: Experiments and Observations <i>Eyjolfur Asgeirsson, Cliff Stein</i>	545

GRASP with Path-Relinking for the Maximum Diversity Problem <i>Marcos R.Q. de Andrade, Paulo M.F. de Andrade, Simone L. Martins, Alexandre Plastino</i>	558
How to Splay for loglogN-Competitiveness <i>George F. Georgakopoulos</i>	570
Distilling Router Data Analysis for Faster and Simpler Dynamic IP Lookup Algorithms <i>Filippo Geraci, Roberto Grossi</i>	580
Contributed Short Papers	
Optimal Competitive Online Ray Search with an Error-Prone Robot <i>Tom Kamphans, Elmar Langetepe</i>	593
An Empirical Study for Inversions-Sensitive Sorting Algorithms <i>Amr Elmasry, Abdelrahman Hammad</i>	597
Approximation Algorithm for Chromatic Index and Edge-Coloring of Multigraphs <i>Martin Kochol, Naďa Krivoňáková, Silvia Smejová</i>	602
Finding, Counting and Listing All Triangles in Large Graphs, an Experimental Study <i>Thomas Schank, Dorothea Wagner</i>	606
Selecting the Roots of a Small System of Polynomial Equations by Tolerance Based Matching <i>H. Bekker, E.P. Braad, B. Goldengorin</i>	610
Developing Novel Statistical Bandwidths for Communication Networks with Incomplete Information <i>Janos Levendovszky, Csego Orosz</i>	614
Dynamic Quality of Service Support in Virtual Private Networks <i>Yuxiao Jia, Dimitrios Makrakis, Nicolas D. Georganas, Dan Ionescu</i>	618
Author Index	623