

Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

2409

Springer

Berlin

Heidelberg

New York

Barcelona

Hong Kong

London

Milan

Paris

Tokyo

David M. Mount Clifford Stein (Eds.)

Algorithm Engineering and Experiments

4th International Workshop, ALENEX 2002
San Francisco, CA, USA, January 4-5, 2002
Revised Papers



Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

David M. Mount
University of Maryland, Department of Computer Science
College Park, MD 20742, USA
E-mail: mount@cs.umd.edu

Clifford Stein
Columbia University, Department of IEOR
500W. 120 St., MC 4704
New York, NY 10027, USA
E-mail: cliff@ieor.columbia.edu

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Algorithm engineering and experimentation : 4th international workshop ;
revised papers / ALENEX 2002, San Francisco, CA, USA, January 4 - 5, 2002.
David M. Mount ; Clifford Stein (ed.). - Berlin ; Heidelberg ; New York ;
Barcelona ; Hong Kong ; London ; Milan ; Paris ; Tokyo : Springer, 2002
(Lecture notes in computer science ; Vol. 2409)
ISBN 3-540-43977-3

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

ISSN 0302-9743

ISBN 3-540-43977-3 Springer-Verlag 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-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York,
a member of BertelsmannSpringer Science+Business Media GmbH

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2002
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Stefan Sossna e.K.
Printed on acid-free paper SPIN: 10873691 06/3142 5 4 3 2 1 0

Preface

The annual workshop on Algorithm Engineering and Experiments (ALENEX) provides a forum for the presentation of original research in the implementation and experimental evaluation of algorithms and data structures. ALENEX 2002 was the fourth workshop in this series. It was held in San Francisco, California on January 4–5, 2002. This volume collects extended versions of the 15 papers that were selected for presentation from a pool of 34 submissions.

We would like to thank the sponsors, authors, and reviewers who helped make ALENEX 2002 a success. We also want to thank the invited speakers, Cynthia Phillips of Sandia National Laboratories, Martin Farach-Colton of Google, and Michael Kass of Pixar. Finally, we would like to thank Springer-Verlag for publishing these papers in their *Lecture Notes in Computer Science* series.

May 2002

David M. Mount
Clifford Stein

ALENEX 2002 Sponsors

The following organizations provided direct financial support, which enabled us to host invited speakers and provide reduced registration fees for students.

- Sandia National Laboratories
- Akami Technologies Inc.
- NEC Research

The following provided in-kind support, facilitating the workshop.

- SIAM, the Society for Industrial and Applied Mathematics
- SIGACT, the ACM SIG on Algorithms and Computation Theory
- Columbia University

ALENEX 2002 Program Committee

Nancy Amato (Texas A&M University)
Marshall Bern (Xerox PARC)
Michael Goodrich (University of California, Irvine)
Tom McCormick (University of British Columbia)
Michael Mitzenmacher (Harvard University)
David Mount (University of Maryland; Co-chair)
Giri Narasimhan (Florida International University)
Rajeev Raman (University of Leicester)
Clifford Stein (Columbia University; Co-chair)

ALENEX 2002 Steering Committee

Michael Goodrich (University of California, Irvine)
Adam Buchsbaum (AT&T Labs)
Roberto Battiti (University of Trento, Italy)
Andrew V. Goldberg (Intertrust STAR Lab)
Michael T. Goodrich (University of California, Irvine)
David S. Johnson (AT&T Bell Laboratories)
Catherine C. McGeoch (Amherst College)
Bernard M.E. Moret (University of New Mexico; chair)
Jack Snoeyink (UNC-Chapel Hill)

Table of Contents

ALENEX 2002

On the Implementation of MST-Based Heuristics for the Steiner Problem in Graphs	1
<i>M. Poggi de Aragão, R.F. Werneck (Catholic University of Rio de Janeiro)</i>	
A Time-Sensitive System for Black-Box Combinatorial Optimization	16
<i>V. Phan, P. Sumazin, S. Skiena (SUNY Stony Brook)</i>	
A Compressed Breadth-First Search for Satisfiability	29
<i>D.B. Motter, I.L. Markov (University of Michigan)</i>	
Using Multi-level Graphs for Timetable Information in Railway Systems . .	43
<i>F. Schulz, D. Wagner (University of Konstanz), C. Zaroliagis (University of Patras)</i>	
Evaluating the Local Ratio Algorithm for Dynamic Storage Allocation . . .	60
<i>K. Pruhs (University of Pittsburgh), E. Wiewiora (University of California, San Diego)</i>	
An Experimental Study of Prefetching and Caching Algorithms for the World Wide Web	71
<i>M. Curcio, S. Leonardi, A. Vitaletti (Università di Roma “La Sapienza”)</i>	
The Treewidth of Java Programs	86
<i>J. Gustedt (LORIA & INRIA Lorraine), O.A. Mæhle, J.A. Telle (University of Bergen)</i>	
Partitioning Planar Graphs with Costs and Weights	98
<i>L. Aleksandrov (Bulgarian Academy of Sciences, Carleton University), H. Djidjev (University of Warwick), H. Guo, A. Maheshwari (Carleton University)</i>	
Maintaining Dynamic Minimum Spanning Trees: An Experimental Study .	111
<i>G. Cattaneo, P. Faruolo, U.F. Petrillo (Università di Salerno), G.F. Italiano (Università di Roma “Tor Vergata”)</i>	
Experimental Evaluation of a New Shortest Path Algorithm	126
<i>S. Pettie, V. Ramachandran, S. Sridhar (University of Texas at Austin)</i>	
Getting More from Out-of-Core Columnsort	143
<i>G. Chaudhry, T.H. Cormen (Dartmouth College)</i>	

Topological Sweep in Degenerate Cases	155
<i>E. Rafalin, D. Souwaine (Tufts University), I. Streinu (Smith College)</i>	
Acceleration of K-Means and Related Clustering Algorithms	166
<i>S.J. Phillips (AT&T Labs-Research)</i>	
STAR-Tree: An Efficient Self-Adjusting Index for Moving Objects	178
<i>C.M. Procopiuc (AT&T Research Lab), P.K. Agarwal (Duke University), S. Har-Peled (University of Illinois)</i>	
An Improvement on Tree Selection Sort	194
<i>J. Chen (Bell Labs Research, Beijing)</i>	
Author Index	207