

Lecture Notes in Computer Science

Edited by G. Goos and J. Hartmanis

824

Advisory Board: W. Brauer D. Gries J. Stoer



Erik M. Schmidt Sven Skyum (Eds.)

Algorithm Theory – SWAT '94

4th Scandinavian Workshop
on Algorithm Theory
Aarhus, Denmark, July 6-8, 1994
Proceedings

Springer-Verlag

Berlin Heidelberg New York
London Paris Tokyo
Hong Kong Barcelona
Budapest

Series Editors

Gerhard Goos
Universität Karlsruhe
Postfach 69 80
Vincenz-Priessnitz-Straße 1
D-76131 Karlsruhe, Germany

Juris Hartmanis
Cornell University
Department of Computer Science
4130 Upson Hall
Ithaca, NY 14853, USA

Volume Editors

Erik M. Schmidt
Sven Skyum
Computer Science Department, Aarhus University
Ny Munkegade, Building 540, DK-8000 Aarhus C, Denmark

CR Subject Classification (1991): F.1-2, E.1-2, G.2, I.3.5

ISBN 3-540-58218-5 Springer-Verlag Berlin Heidelberg New York
ISBN 0-387-58218-5 Springer-Verlag New York Berlin Heidelberg

CIP data applied for

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 1994
Printed in Germany

Typesetting: Camera-ready by author
SPIN: 10472576 45/3140-543210 - Printed on acid-free paper

Foreword

The papers in this volume were presented at SWAT'94, the Fourth Scandinavian Workshop on Algorithm Theory. The workshop, which is really a conference, continues the tradition of SWAT'88, SWAT'90 and SWAT'92, and of the Workshops on Algorithms and Data Structures (WADS'89, WADS'91 and WADS'93), and is intended as an international forum for researchers in the area of design and analysis of algorithms. The SWAT conferences are coordinated by the SWAT steering committee, which consists of B. Aspvall (Bergen), S. Carlsson (Luleå), H. Hafsteinsson (Reykjavík), R. Karlsson (Lund), A. Lingas (Lund), E. M. Schmidt (Aarhus) and E. Ukkonen (Helsinki).

The call for papers sought contributions in algorithms and data structures, in all areas, including combinatorics, computational geometry, data bases, parallel and distributed computing, and graphics. A total of 100 papers were submitted and the program committee selected 31 for presentation. In addition, invited lectures were presented by Michael Fredman (Rutgers), Johan Håstad (Stockholm) and Ketan Mulmuley (Chicago).

SWAT'94 was held in Århus, July 6-8, 1994 and was organized by an organizing committee consisting of L. Arge, G. S. Frandsen, K. Kjær Møller, E. M. Schmidt (chairman) and S. Skyum, all from the Computer Science Department of Aarhus University.

We wish to thank all referees who aided in evaluating the papers. We also wish to thank the Danish Natural Science Research Council (SNF), the Centre for Basic Research in Computer Science of Aarhus University (BRICS), and the Aarhus University for financial support.

Århus, May 1994

Erik M. Schmidt
Sven Skyum

Program Committee

R. Freivalds (University of Latvia)
 H. Hafsteinsson (University of Iceland)
 T. Hagerup (Max-Planck-Institut, Saarbrücken)
 G. F. Italiano (IBM T.J. Watson Research Center, Yorktown Heights)
 M. Jerrum (Edinburgh University)
 R. Karlsson (Lund University)
 R. Klein (Fernuniversität, Hagen)
 D. Kozen (Cornell University)
 I. Munro (University of Waterloo)
 S. Skyum (Aarhus University), chairman
 G. Tel (Utrecht University)
 E. Ukkonen (University of Helsinki)
 E. Welzl (Freie Universität, Berlin)

Referees for SWAT'94

S. Albers	P.G. Franciosa	K. Mehlhorn
P. Alimonti	G. Frandsen	B. Nilsson
F. d'Amore	O. Garrido	S. Nilsson
A. Andersson	T. Herman	M. Nykänen
L. Arge	T. Husfeldt	P. Orponen
E.M. Bakker	J. Håstad	M. Overmars
G. Barnes	C. Icking	O. Petersson
M. de Berg	J. Kärkkäinen	H. La Poutré
P. Binderup	M. Kaufmann	S. Riis
H. Bodlaender	P. Kilpeläinen	M. Sharir
D. Breslauer	M. van Kreveld	S. Sippu
G. Brodal	D. Krznic	M. Smid
A. Brodrik	N.-M. Le	R. Storlind
A. Brüggemann-Klein	H.-P. Lenhof	K. Swanson
M. Cadoli	S. Leonardi	H. Tuuri
A. Cheng	C. Levcopoulos	P. Valtr
D. Clark	A. Lingas	M. Veldhorst
A. Dessmark	G. Liotta	A. Viola
K. Dobrindt	Lihong Ma	L. Vismara
A. Fabri	A. Maheshwari	S. Wohlfeil
E. Feuerstein	H. Mannila	C.D. Zaroliagis
R. Fleischer	A. Marchetti-Spaccamela	
P. Floreen	J. Matousek	

Table of Contents

Computing Depth Orders and Related Problems	1
<i>P.K. Agarwal, M.J. Katz, M. Sharir</i>	
Selection in Monotone Matrices and Computing k^{th} Nearest Neighbors	13
<i>P.K. Agarwal, S. Sen</i>	
New On-Line Algorithms for the Page Replication Problem	25
<i>S. Albers, H. Koga</i>	
Serving Requests with On-line Routing	37
<i>G. Ausiello, E. Feuerstein, S. Leonardi, L. Stougie, M. Talamo</i>	
A New Algorithm for the Construction of Optimal B-Trees	49
<i>P. Becker</i>	
New Results on Binary Space Partitions in the Plane	61
<i>M. de Berg, M. de Groot, M. Overmars</i>	
A Nearly Optimal Parallel Algorithm for the Voronoi Diagram of a Convex Polygon	73
<i>P. Berman, A. Lingas</i>	
On Triangulating Planar Graphs under the Four-Connectivity Constraint	83
<i>T. Biedl, G. Kant, M. Kaufmann</i>	
Parallel and Sequential Approximation of Shortest Superstrings	95
<i>A. Czumaj, L. Gąsieniec, M. Piotrów, W. Rytter</i>	
Separating Translates in the Plane: Combinatorial Bounds and an Algorithm	107
<i>J. Czyżowicz, H. Everett, J.-M. Robert</i>	
Finding All Weakly-Visible Chords of a Polygon in Linear Time	119
<i>G. Das, P.J. Heffernan, G. Narasimhan</i>	
A Tight Lower Bound for On-line Monotonic List Labeling	131
<i>P.F. Dietz, J.I. Seiferas, J. Zhang</i>	
Trapezoid Graphs and Generalizations, Geometry and Algorithms ...	143
<i>S. Felsner, R. Müller, L. Wernisch</i>	
Optimal Parametric Search on Graphs of Bounded Tree-Width	155
<i>D. Fernández-Baca, G. Slutzki</i>	
Lower Bounds for Dynamic Algorithms (Invited Lecture)	167
<i>M.L. Fredman</i>	

Sequential and Parallel Algorithms for Embedding Problems on Classes of Partial k -Trees	172
<i>A. Gupta, N. Nishimura</i>	
On Intersection Searching Problems Involving Curved Objects	183
<i>P. Gupta, R. Janardan, M. Smid</i>	
Improved Approximations of Independent Sets in Bounded-Degree Graphs	195
<i>M.M. Halldórsson, J. Radhakrishnan</i>	
Asymptotically Optimal Election on Weighted Rings	207
<i>L. Higham, T. Przytycka</i>	
Optimal Algorithms for Broadcast and Gossip in the Edge-Disjoint Path Modes	219
<i>J. Hromkovič, R. Klasing, W. Unger, H. Wagener</i>	
Recent Results in Hardness of Approximation (Invited Lecture)	231
<i>J. Håstad</i>	
The Parallel Hierarchical Memory Model	240
<i>B.H.H. Juurlink, H.A.G. Wijshoff</i>	
Randomized Geometric Algorithms (Invited Lecture)	252
<i>K. Mulmuley</i>	
Connecting the Maximum Number of Grid Nodes to the Boundary with Non-Intersecting Line Segments	255
<i>L. Palios</i>	
On Self-Stabilizing Wait-Free Clock Synchronization	267
<i>M. Papatriantafilou, P. Tsigas</i>	
Hard Graphs for Randomized Subgraph Exclusion Algorithms	278
<i>M. Peinado</i>	
Task Scheduling in Networks	290
<i>C. Phillips, C. Stein, J. Wein</i>	
Parallel Dynamic Lowest Common Ancestors	302
<i>E. Schenk</i>	
An $O(\log \log n)$ Algorithm to Compute the Kernel of a Polygon	314
<i>S. Schuierer</i>	
Computing the L_1 -Diameter and Center of a Simple Rectilinear Polygon in Parallel	326
<i>S. Schuierer</i>	
Exploiting Locality in LT-RAM Computations	338
<i>J.F. Sibeyn, T. Harris</i>	

Efficient Preprocessing of Simple Binary Pattern Forests	350
<i>M. Thorup</i>	
A Parallel Algorithm for Edge-Coloring Partial k -Trees	359
<i>X. Zhou, S.-i. Nakano, T. Nishizeki</i>	
Dominating Cliques in Distance-Hereditary Graphs	370
<i>F.F. Dragan</i>	
Author Index	383