

Lecture Notes in Computer Science 1928
Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Springer

*Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Singapore
Tokyo*

Ulrik Brandes Dorothea Wagner (Eds.)

Graph-Theoretic Concepts in Computer Science

26th International Workshop, WG 2000
Konstanz, Germany, June 15-17, 2000
Proceedings



Springer

Series Editors

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

Volume Editors

Ulrik Brandes
Dorothea Wagner
University of Konstanz
Department of Computer and Information Science
Box D 188, 78457 Konstanz, Germany
E-mail: {ulrik.brandes,dorothea.wagner}@uni-konstanz.de

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Graph theoretic concepts in computer science : 26th international
workshop ; proceedings / WG 2000, Konstanz, Germany, June 15 - 17,
2000. Ulrik Brandes ; Dorothea Wagner (ed.). - Berlin ; Heidelberg ;
New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Singapore ;
Tokyo : Springer, 2000
(Lecture notes in computer science ; Vol. 1928)
ISBN 3-540-41183-6

CR Subject Classification (1998): F.2, G.1.2, G.1.6, G.2, G.3, E.1, I.3.5

ISSN 0302-9743

ISBN 3-540-41183-6 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
© Springer-Verlag Berlin Heidelberg 2000
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Stefan Sossna
Printed on acid-free paper SPIN: 10722890 06/3142 5 4 3 2 1 0

Preface

The 26th International Workshop on Graph-Theoretic Concepts in Computer Science (WG 2000) was held at Waldhaus Jakob, in Konstanz, Germany, on 15–17 June 2000. It was organized by the Algorithms and Data Structures Group of the Department of Computer and Information Science, University of Konstanz, and sponsored by Deutsche Forschungsgemeinschaft (DFG) and Universitätsgesellschaft Konstanz.

The workshop aims at uniting theory and practice by demonstrating how graph-theoretic concepts can be applied to various areas in computer science, or by extracting new problems from applications. The goal is to present recent research results and to identify and explore directions for future research. The workshop looks back on a remarkable tradition of more than a quarter of a century. Previous Workshops have been organized in various places in Europe, and submissions come from all over the world.

This year, 57 attendees from 13 different countries gathered in the relaxing atmosphere of Lake Constance, also known as the Bodensee. Out of 51 submissions, the program committee carefully selected 26 papers for presentation at the workshop. This selection reflects current research directions, among them graph and network algorithms and their complexity, algorithms for special graph classes, communication networks, and distributed algorithms. The present volume contains these papers together with the survey presented in an invited lecture by Ingo Wegener (University of Dortmund) and an extended abstract of the invited lecture given by Emo Welzl (ETH Zürich).

It is my pleasure to thank all the people whose contributions made WG 2000 a successful event: the authors of papers for submitting their work and presenting accepted papers at the workshop; the invited speakers for their remarkable lectures; all reviewers for their careful reports; the members of the program committee for their timely evaluations and intensive discussion during the selection process, and in particular Peter Widmayer for coming to Konstanz for the final discussion; the DFG, the Universitätsgesellschaft Konstanz, and Springer-Verlag for financial support; the Friedrich-Naumann-Stiftung for funding the organization of the workshop at Waldhaus Jakob and Andrea Stern for supporting us during the workshop.

Special thanks go to Sabine Cornelsen, Dagmar Handke, Annegret Liebers, Barbara Lüthke, and Thomas Willhalm. They were responsible for the excellent preparation and perfect organization of the workshop. Furthermore, I would like to express my gratitude to Ulrik Brandes. While I had only to make decisions about insignificant details, he had “a finger in every pie,” including the organization of the workshop, the electronic submission and discussion, and the preparation of this volume.

Konstanz, August 2000

Dorothea Wagner

The Tradition of WG

Hosts – Location

1975	U. Pape – Berlin
1976	H. Noltemeier – Göttingen
1977	J. Mühlbacher – Linz
1978	M. Nagl, H.J. Schneider – Schloß Feuerstein, near Erlangen
1979	U. Pape – Berlin
1980	H. Noltemeier – Bad Honnef
1981	J. Mühlbacher – Linz
1982	H.J. Schneider, H. Göttler – Neunkirchen, near Erlangen
1983	M. Nagl, J. Perl – Haus Ohrbeck, near Osnabrück
1984	U. Pape – Berlin
1985	H. Noltemeier – Schloß Schwanenberg, near Würzburg
1986	G. Tinhofer, G. Schmidt – Stift Bernried, near München
1987	H. Göttler, H.J. Schneider – Schloß Banz, near Bamberg
1988	J. van Leeuwen – Amsterdam
1989	M. Nagl – Schloß Rolduc, near Aachen
1990	R.H. Möhring – Johannesstift Berlin
1991	G. Schmidt, R. Berghammer – Richterheim Fischbachau, München
1992	E.W. Mayr – Wilhelm-Kempf-Haus, Wiesbaden-Naurod
1993	J. van Leeuwen – Sports Center Papendal, near Utrecht
1994	G. Tinhofer, E.W. Mayr, G. Schmidt – Herrsching, near München
1995	M. Nagl – Haus Eich, Aachen
1996	G. Ausiello, A. Marchetti-Spaccamela – Cadenabbia
1997	R.H. Möhring – Bildungszentrum am Müggelsee, Berlin
1998	J. Hromkovič, O. Sýkora – Smolenice-Castle, near Bratislava
1999	P. Widmayer – Centro Stefano Franscini, Monte Verità, Ascona
2000	D. Wagner – Waldhaus Jakob, Konstanz

Program Committee

Hans Bodlaender	Utrecht University, The Netherlands
Andreas Brandstädt	University of Rostock, Germany
Michel Habib	LIRMM Montpellier, France
Juraj Hromkovič	RWTH Aachen, Germany
Michael Kaufmann	University of Tübingen, Germany
Luděk Kučera	Charles University, Prague, Czech Republic
Alberto Marchetti-Spaccamela	Università di Roma “La Sapienza,” Italy
Ernst W. Mayr	TU München, Germany
Rolf H. Möhring	TU Berlin, Germany
Manfred Nagl	RWTH Aachen, Germany
Hartmut Noltemeier	University of Würzburg, Germany
Ondrej Sýkora	Loughborough University, United Kingdom
Gottfried Tinhofer	TU München, Germany
Dorothea Wagner	University of Konstanz, Germany (chair)
Peter Widmayer	ETH Zürich, Switzerland
Christos Zaroliagis	University of Patras, Greece

Additional Reviewers

Luca Becchetti	Yubao Guo	Thomas Schickinger
Sergei Bezrukov	Dagmar Handke	Konrad Schlude
Hans-J. Boeckenhauer	Arne Hoffmann	Sebastian Seibert
Jean-Paul Bordat	Klaus Jansen	Jop Sibeyn
Vincent Bouchitté	Ekkehard Köhler	Martin Skutella
Ulrik Brandes	Ralf Klasing	Ladislav Stacho
Bogdan Chlebus	Ton Kloks	Yannis C. Stamatiou
Mark Cieliebak	Dieter Kratsch	Elias C. Stavropoulos
Andrea Clementi	Van Bang Le	László A. Székely
Sabine Cornelsen	Annegret Liebers	Wolfgang Thomas
Peter Damaschke	Zsuzsanna Lipták	Eberhard Triesch
Miriam Di Ianni	Haiko Müller	Marc Uetz
Feodor F. Dragan	Michael Naatz	Walter Unger
Jürgen Ebert	Gabriele Neyer	Marián Vajteršic
Pavlos Efrimidis	Ulrich Quernheim	Imrich Vrto
Stephan Eidenbenz	Dieter Rautenbach	Karsten Weihe
Jens Ernst	Mark Scharbrodt	Thomas Willhalm

Sponsoring Institutions

Deutsche Forschungsgemeinschaft (DFG)
 Universitätsgesellschaft Konstanz

Table of Contents

Invited Lecture: On the Expected Runtime and the Success Probability of Evolutionary Algorithms.....	1
<i>Ingo Wegener</i>	
Invited Lecture: n Points and One Line: Analysis of Randomized Games	11
<i>Emo Welzl</i>	
Approximating Call-Scheduling Makespan in All-Optical Networks	13
<i>Luca Becchetti, Miriam Di Ianni, and Alberto Marchetti-Spaccamela</i>	
New Spectral Lower Bounds on the Bisection Width of Graphs	23
<i>Sergei L. Bezrukov, Robert Elsässer, Burkhard Monien, Robert Preis, and Jean-Pierre Tillich</i>	
Traversing Directed Eulerian Mazes	35
<i>Sandeep Bhatt, Shimon Even, David Greenberg, and Rafi Tayar</i>	
On the Space and Access Complexity of Computation DAGs	47
<i>Gianfranco Bilardi, Andrea Pietracaprina, and Paolo D'Alberto</i>	
Approximating the Treewidth of AT-Free Graphs	59
<i>Vincent Bouchitté and Ioan Todinca</i>	
Split-Perfect Graphs: Characterizations and Algorithmic Use	71
<i>Andreas Brandstädt and Van Bang Le</i>	
Coarse Grained Parallel Algorithms for Detecting Convex Bipartite Graphs	83
<i>Edson Cáceres, Albert Chan, Frank Dehne, and Giuseppe Prencipe</i>	
Networks with Small Stretch Number	95
<i>Serafino Cicerone and Gabriele Di Stefano</i>	
Efficient Dispersion Algorithms for Geometric Intersection Graphs	107
<i>Peter Damaschke</i>	
Optimizing Cost Flows by Modifying Arc Costs and Capacities	116
<i>Ingo Demgensky, Hartmut Noltemeier, and Hans-Christoph Wirth</i>	
Update Networks and Their Routing Strategies	127
<i>Michael J. Dinneen and Bakhadyr Khoussainov</i>	
Computing Input Multiplicity in Anonymous Synchronous Networks with Dynamic Faults.....	137
<i>Stefan Dobrev</i>	

X Table of Contents

Diameter of the Knödel Graph	149
<i>Guillaume Fertin, André Raspaud, Heiko Schröder, Ondrej Sýkora, and Imrich Vrto</i>	
On the Domination Search Number	161
<i>Fedor Fomin, Dieter Kratsch, and Haiko Müller</i>	
Efficient Communication in Unknown Networks	172
<i>Luisa Gargano, Andrzej Pelc, Stephane Perennes, and Ugo Vaccaro</i>	
Graph Coloring on a Coarse Grained Multiprocessor	184
<i>Assefaw Hadish Gebremedhin, Isabelle Guérin Lassous, Jens Gustedt, and Jan Arne Telle</i>	
The Tree-Width of Clique-Width Bounded Graphs Without $K_{n,n}$	196
<i>Frank Gurski and Egon Wanke</i>	
Tree Spanners for Subgraphs and Related Tree Covering Problems	206
<i>Dagmar Handke and Guy Kortsarz</i>	
Minimal Size of Piggybacked Information for Tracking Causality: A Graph-Based Characterization	218
<i>Jean Michel Hélarý and Giovanna Melideo</i>	
The Expressive Power and Complexity of Dynamic Process Graphs	230
<i>Andreas Jakoby, Maciej Liškiewicz, and Rüdiger Reischuk</i>	
Bandwidth of Split and Circular Permutation Graphs	243
<i>Ton Kloks, Dieter Kratsch, Yvan Le Borgne, and Haiko Müller</i>	
Recognizing Graphs without Asteroidal Triples	255
<i>Ekkehard Köhler</i>	
Budget Constrained Minimum Cost Connected Medians	267
<i>Goran Konjevod, Sven O. Krumke, and Madhav Marathe</i>	
Coloring Mixed Hypertrees	279
<i>Daniel Král', Jan Kratochvíl, Andrzej Proskurowski, and Heinz-Jürgen Voss</i>	
A Linear-Time Algorithm to Find Independent Spanning Trees in Maximal Planar Graphs	290
<i>Sayaka Nagai and Shin-ichi Nakano</i>	
Optimal Fault-Tolerant Routings for k -Connected Graphs with Smaller Routing Tables	302
<i>Koichi Wada and Wei Chen</i>	
Author Index	315