

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

University of California, Los Angeles, CA, 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

Symeon Bozapalidis George Rahonis (Eds.)

Algebraic Informatics

Second International Conference, CAI 2007
Thessaloniki, Greece, May 21-25, 2007
Revised Selected and Invited Papers

Volume Editors

Symeon Bozapalidis
George Rahonis
Aristotle University of Thessaloniki
54124 Thessaloniki, Greece
E-mail: {bozapali, grahonis}@math.auth.gr

Library of Congress Control Number: Applied for

CR Subject Classification (1998): F.3.1-2, F.4, D.2.1, I.1

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743
ISBN-10 3-540-75413-X Springer Berlin Heidelberg New York
ISBN-13 978-3-540-75413-8 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

springer.com

© Springer-Verlag Berlin Heidelberg 2007
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12168668 06/3180 5 4 3 2 1 0

Preface

CAI 2007 was the 2nd International Conference on Algebraic Informatics. It was intended to cover the topics of algebraic semantics on graphs and trees, formal power series, syntactic objects, algebraic picture processing, infinite computation, acceptors and transducers for strings, trees, graphs, arrays, etc., and decision problems.

CAI 2007 was held during May 21–25, 2007 in Thessaloniki, Greece hosted by the Department of Mathematics of Aristotle University of Thessaloniki. The opening lecture was given by Jean Berstel and the other eight invited lectures by Jürgen Albert, Frank Drewes, Dora Giammarresi, Jozef Gruska, Jarkko Kari, Oliver Matz, Ulrike Prange (on behalf of Hartmut Ehrig), and Guo-Qiang Zhang. This volume contains eighth papers of the nine invited lectures and the accepted papers. We received 29 submissions, the contributors being from 14 countries. The Program Committee selected ten papers.

We are grateful to the members of the Program Committee for the evaluation of the submissions and the numerous referees who assisted in this work. We should like to thank all the contributors of CAI 2007 and especially the honorary guest and the invited speakers who kindly accepted our invitation to present their important work. Special thanks are due to Alfred Hofmann, the Editorial Director of LNCS, who gave us the opportunity to publish the proceedings of our conference in the LNCS series, as well as to Anna Kramer from Springer for the excellent cooperation. We are also grateful to the members of the Organizing Committee and a group of students who helped us with several organizing jobs. Last but not least we want to express our gratitude to Arto Salomaa for his constant interest in CAI and his support in Springer.

July 2007

Symeon Bozapalidis

Organization

CAI 2007 was organized by the Department of Mathematics, Aristotle University of Thessaloniki.

Program Committee

Symeon Bozapalidis, Thessaloniki (Chair)
Manfred Droste, Leipzig
Zoltan Ésik, Szeged/Tarragona
Werner Kuich, Vienna
Antonio Restivo, Palermo
Paul Spirakis, Patras
Heiko Vogler, Dresden

Organizing Committee

Symeon Bozapalidis (Chair)
Archontia Grammatikopoulou
Antonios Kalampakas
Costas Lolas
George Rahonis (Co-chair)

Referees

M. Bartha	D. Kuske	P. Pournara
S. Bozapalidis	C. Lutz	I. Petre
R. Diaconescu	A. Maletti	G. Rahonis
F. Drewes	C. Mathissen	A. Restivo
M. Droste	O. Matz	L. Rosaz
Z. Ésik	I. Maeurer	A. Sifaleras
P. Fiser	I. Meinecke	P. Spirakis
Z. Gazdag	D. Mitsche	Gh. Stefanescu
R. Gentilini	T. Mossakowski	S. Vagvolgyi
A. Grammatikopoulou	F. Z. Nardelli	H. Vogler
A. Kalampakas	K. Ogata	C. Umans
D. Kirsten	A. Pluhar	
W. Kuich	A. Papistas	

Table of Contents

Invited Papers

On Generalizations of Weighted Finite Automata and Graphics Applications.....	1
<i>Jürgen Albert and German Tischler</i>	
Sturmian and Episturmian Words: A Survey of Some Recent Results ...	23
<i>Jean Berstel</i>	
From Tree-Based Generators to Delegation Networks	48
<i>Frank Drewes</i>	
Bifinite Chu Spaces	73
<i>Manfred Droste and Guo-Qiang Zhang</i>	
Tiling Recognizable Two-Dimensional Languages.....	75
<i>Dora Giammarresi</i>	
Algebraic Methods in Quantum Informatics	87
<i>Jozef Gruska</i>	
Recognizable vs. Regular Picture Languages	112
<i>Oliver Matz</i>	
From Algebraic Graph Transformation to Adhesive HLR Categories and Systems.....	122
<i>Ulrike Prange and Hartmut Ehrig</i>	

Contributed Papers

Deterministic Two-Dimensional Languages over One-Letter Alphabet ...	147
<i>Marcella Anselmo and Maria Madonia</i>	
Recognizable Picture Languages and Polyominoes	160
<i>Giuseppe Castiglione and Roberto Vaglica</i>	
An Algebra for Tree-Based Music Generation	172
<i>Frank Drewes and Johanna Högberg</i>	
Aperiodicity in Tree Automata	189
<i>Zoltan Ésik and Szabolcs Iván</i>	
The Syntactic Complexity of Eulerian Graphs	208
<i>Antonios Kalampakas</i>	

Learning Deterministically Recognizable Tree Series—Revisited	218
<i>Andreas Maletti</i>	
The Second Eigenvalue of Random Walks On Symmetric Random Intersection Graphs	236
<i>Sotiris Nikolettseas, Christoforos Raptopoulos, and Paul G. Spirakis</i>	
Verifying Security Protocols for Sensor Networks Using Algebraic Specification Techniques	247
<i>Iakovos Ouranos and Petros Stefaneas</i>	
Nonassociativity à la Kleene	260
<i>Jean-Marcel Pallo</i>	
Restarting Tree Automata and Linear Context-Free Tree Languages	275
<i>Heiko Stamer and Friedrich Otto</i>	
Author Index	291