

2018 20th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC 2018)

**Timisoara, Romania
20-23 September 2018**



**IEEE Catalog Number: CFP18387-POD
ISBN: 978-1-7281-0626-7**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18387-POD
ISBN (Print-On-Demand):	978-1-7281-0626-7
ISBN (Online):	978-1-7281-0625-0

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2018 20th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC) **SYNASC 2018**

Table of Contents

Preface .xiii.....	
Conference Organization .xv.....	
Program Committee .xvii.....	
Reviewers .xx.....	
Steering Committee .xxi.....	
In Memoriam - Professor Stefan Maruster .xxii.....	

Invited Papers

Ordinary Differential Equations & Computability .3.....	
<i>Olivier Bournez (Ecole Polytechnique)</i>	
Proving Reachability Properties by Coinduction (Extended Abstract) .6.....	
<i>Dorel Lucanu (Alexandru Ioan Cuza)</i>	
Self-Adaptive Forecast Models in Predictive Maintenance Systems .8.....	
<i>Edwin Lughofer (Johannes Kepler University)</i>	
The Verified Polyhedron Library: an Overview .9.....	
<i>Sylvain Boulmé (Université Grenoble Alpes), Alexandre Maréchal (Sorbonnes Universités), David Monniaux (Université Grenoble Alpes), Michaël Périn (Université Grenoble Alpes), and Hang Yu (Université Grenoble Alpes)</i>	
Reasoning with Quantifiers and Theories Using Saturation-Based Reasoning .18.....	
<i>Andrei Voronkov (The University of Manchester and EasyChair)</i>	
Incremental Linearization: A Practical Approach to Satisfiability Modulo Nonlinear Arithmetic and Transcendental Functions .19.....	
<i>Alessandro Cimatti (Fondazione Bruno Kessler (FBK)), Alberto Griggio (Fondazione Bruno Kessler (FBK)), Ahmed Irfan (Fondazione Bruno Kessler (FBK)), Marco Roveri (Fondazione Bruno Kessler (FBK)), and Roberto Sebastiani (University of Trento)</i>	

Inferring, Learning and Modelling Complex Systems with Bayesian Networks. A Tutorial .27.....	
<i>Enachescu Denis (Institute for Mathematical Statistics and Applied Mathematics, ISMMA Bucharest) and Enachescu Cornelia (Institute for Mathematical Statistics and Applied Mathematics, ISMMA Bucharest)</i>	
A Set-Based Approach to Model Checking of Nonlinear Systems .34.....	
<i>Maria Prandini (Politecnico di Milano)</i>	

Symbolic Computation: #1

Regular Papers

Computing the Lowest-Order Element of a Multivariate Elimination Ideal by Using Remainder Sequences .37.....	
<i>Tateaki Sasaki (University of Tsukuba) and Daiju Inaba (The Mathematics Certification Institute of Japan)</i>	
Compositional Taylor Model Based Validated Integration .45.....	
<i>Kristjan Liiva (University of Edinburgh), Paul B. Jackson (University of Edinburgh), Grant O. Passmore (Aesthetic Integration), and Christoph M. Wintersteiger (Microsoft Research Cambridge)</i>	
GPaR: A Parallel Graph Rewriting Tool .53.....	
<i>Stéphane Despréaux (Laboratoire Jean Kuntzmann) and Aude Maignan (Laboratoire Jean Kuntzmann)</i>	

Work in Progress Papers

Rational Householder Transformations .61.....	
<i>Ana Carolina Camargos Couto (Western University) and David Jeffrey (Western University)</i>	

Numerical Computing: #2

Regular Papers

Real-Time Computation of Legendre-Sobolev Approximations .67.....	
<i>Parisa Alvandi (University of Waterloo) and Stephen M. Watt (University of Waterloo)</i>	
Computation Results of the Riemann Zeta Search Project .75.....	
<i>Norbert Tihanyi (Eötvös Loránd University) and Attila Kovács (Eötvös Loránd University)</i>	
An Axis Symmetric 2D Description of the Growth Process of a Single Crystal Hollow Tube Grown from the Melt by Pulling Down Method .80.....	
<i>Agneta M. Balint (West University of Timisoara), Stefan Balint (West University of Timisoara), and Loredana Tanasie (West University of Timisoara)</i>	

Lax-Like Stability for the Discretization of Pseudodifferential Operators through Gabor Multipliers and Spline-Type Spaces .88.....
Darian M. Onchis (University of Vienna and West University of Timisoara) and Simone Zappalá (University of Vienna)

Work in Progress Papers

An Image Inpainting Technique Based on Parallel Projection Methods .95.....
Irina Maria Artinescu (West University of Timisoara) and Costin Radu Boldea (University of Craiova)

Logic and Programming: #3

Regular Papers

Towards Compiling Region Types Into RTSJ-Compliant Java Code .101.....
Florin Craciun (Babes-Bolyai University) and Gabriel Glodean (Babes-Bolyai University)

SAT-Based Big-Step Local Search .109.....
Morad Muslimany (Ben-Gurion University of the Negev) and Michael Codish (Ben-Gurion University of the Negev)

Order Relations Over Finitely Supported Structures .117.....
Andrei Alexandru (Romanian Academy, Iasi) and Gabriel Ciobanu (Romanian Academy, Iasi)

Papers on Tools/Experimental Results

Experimental Evaluation of Acacia-K: A Tool for Synthesis of Reactive Systems from KLTL+ Specifications .125.....
Rodica Condurache (Alexandru Ioan Cuza University)

Advances in the Theory of Computing: #4

Regular Papers

The Polylog-Time Hierarchy Captured by Restricted Second-Order Logic .133.....
Flavio Ferrarotti (Software Competence Center Hagenberg), Senen Gonzalez (Software Competence Center Hagenberg), Klaus-Dieter Schewe (Christian-Doppler Laboratory for Client-Centric Cloud Computing), and Jose Maria Turull-Torres (Universidad Nacional de La Matanza)

Extremal Graphs with Respect to the Modified First Zagreb Connection Index .141.....
Guillaume Ducoffe (University of Bucharest), Ruxandra Marinescu-Ghemeci (University of Bucharest), Camelia Obreja (University of Bucharest), Alexandru Popa (University of Bucharest), and Rozica Maria Tache (University of Bucharest)

Cheap Non-Standard Analysis and Computability: Some Applications .149.....	
	<i>Olivier Bournez (Ecole Polytechnique) and Sabrina Ouazzani (LACL, Université Paris-Est Créteil)</i>
A Terminating and Confluent Term Rewriting System for the Pure Equational Theory of Quandles .157.....	
	<i>Robert W. McGrail (Bard College), Thuy Trang Nguyen (Bard College), Thanh Thuy Trang Tran (Bard College), and Atri Tripathi (Bard College)</i>

Distributed Computing: #5

Regular Papers

On the Abstractness of Continuation Semantics .167.....	
	<i>Gabriel Ciobanu (Institute of Computer Science, Romanian Academy) and Eneia Nicolae Todoran (Technical University of Cluj-Napoca)</i>
Scalable Task Deployment System Inspired from Virus Propagation Models for Large Distributed Workflow Based Systems .175.....	
	<i>Mihai Bica (Technical University of Cluj-Napoca) and Dorian Gorgan (Technical University of Cluj-Napoca)</i>
A Symmetric Nets Emulator for Adaptive P/T Nets .183.....	
	<i>Lorenzo Capra (Università degli Studi di Milano) and Matteo Camilli (Università degli Studi di Milano)</i>
Parallel Acceleration of Subgraph Enumeration in the Process of Network Motif Detection .191.....	
	<i>Bogdan-Eduard-Madalin Mursa (University Babes-Bolyai), Anca Andreica (University Babes-Bolyai), and Laura Diosan (University Babes-Bolyai)</i>

Artificial Intelligence: #6

Regular Papers

Dual Criteria Determination of the Number of Clusters in Data .201.....	
	<i>Kaixun Hua (Univ. of Massachusetts Boston) and Dan A. Simovici (University of Massachusetts Boston)</i>
Optimizing the Trade-Off between Single-Stage and Two-Stage Deep Object Detectors using Image Difficulty Prediction .209.....	
	<i>Petru Soviany (University of Bucharest) and Radu Tudor Ionescu (University of Bucharest)</i>
Modeling Real Estate Dynamics Using Survival Analysis .215.....	
	<i>Diana Minzat (Alexandru Ioan Cuza University), Mihaela Breaban (Alexandru Ioan Cuza University), and Henri Luchian (Alexandru Ioan Cuza University)</i>
Adjusting SVMs for Large Data Sets using Balanced Decision Trees .223.....	
	<i>Cristina Vatamanu (Alexandru Ioan Cuza University), Dragos Teodor Gavrilut (Alexandru Ioan Cuza University), and George Popoiu (Alexandru Ioan Cuza University)</i>

A CiteSeerX-Based Dataset for Record Linkage and Metadata Extraction .230.....	
	<i>Zalán Bodó (Babes-Bolyai University)</i>
Integrating Deep Learning for NLP in Romanian Psychology .237.....	
	<i>Ioan Cristian Schuszter (West University of Timisoara)</i>
Using Recommender Systems to Support Navigation in Concept Lattices .245.....	
	<i>Flaviu Berbecariu (Babes-Bolyai University), Christian Sacarea (Babes-Bolyai University), and Diana Florina Sotropa (Babes-Bolyai University)</i>
Genetic Operators in Evolutionary Music Composition .253.....	
	<i>Csaba Sulyok (Babes-Bolyai University)</i>

Papers on Tools/Experimental Results

Toward on-Line Predictive Models for Forecasting Workload in Clouds .260.....	
	<i>Dong Nguyen Doan (West University of Timisoara)</i>

Work in Progress Papers

Formal Concept Analysis Grounded Knowledge Discovery in Electronic Health Record Systems .266	
	<i>Christian Sacarea (Babes-Bolyai University), Diana Florina Sotropa (Babes-Bolyai University), and Diana Troanca (Babes-Bolyai University)</i>

Position Papers: #7

The Rôle of Benchmarking in Symbolic Computation (Position Paper) .275.....	
	<i>James H. Davenport (University of Bath)</i>
An Overview of Obfuscation Techniques used by Malware in Visual Basic for Application Scripts .280.....	
	<i>Marilena Lupascu (Alexandru Ioan Cuza University), Dragos Teodor Gavrilit (Alexandru Ioan Cuza University), and Dorel Lucanu (Alexandru Ioan Cuza University)</i>
An Architecture for a Management Agency for Cloud Resources .288.....	
	<i>Madalina Erascu (West University of Timisoara and Institute e-Austria Timisoara), Gabriel Iuhasz (West University of Timisoara and Institute e-Austria Timisoara), and Flavia Micota (West University of Timisoara and Institute e-Austria Timisoara)</i>
MES Specific Data Analysis. Case Study with the Baxter Robot .296.....	
	<i>Delia Mitrea (Technical University of Cluj-Napoca) and Levente Tamas (Technical University of Cluj-Napoca)</i>
Towards Performance Evaluation Programming .302.....	
	<i>Eneia Nicolae Todoran (Technical University of Cluj-Napoca)</i>
A Different Approach to Maximum Clique Search .310.....	
	<i>Sándor Szabó (Institute of Mathematics and Informatics; University of Pecs) and Bogdán Zaválnij (Hungarian Academy of Sciences)</i>

Workshop on Agents for Complex Systems: #8

- An Adaptive Recommender System for Human Resource Allocation in Software Projects - Initial Results on an Agent-Based Simulation .319.....
Mihaela Ilie (UCV), Sorin Ilie (UCV), and Ionut Muraretu (UCV)
- Application of Meaningful Text Analytics to Online Product Reviews .327.....
Costin Badica (Automation, Computers and Electronics) and Georgian Vladutu (Universitatea din Craiova)
- A Self Developing System for Medical Data Analysis .335.....
Adriana Dinis (West University of Timisoara), Todor Ivascu (West University of Timisoara), and Viorel Negru (West University of Timisoara)

Workshop on Digital Image Processing in Medicine and Automotive Industry: #9

- Back to Front Architecture for Diagnosis as a Service .343.....
Carles Sanchez (Universitat Autnoma de Barcelona), Meiguel-Angel Viñas (Universitat Autnoma de Barcelona), Coen Atens (Universitat Autnoma de Barcelona), Agnès Borràs (Universitat Autnoma de Barcelona), and Debora Gil (Universitat Autnoma de Barcelona)
- Face Detection and Recognition Methods using Deep Learning in Autonomous Driving .347.....
Sebastian-Aurelian Stefaniga (West University of Timisoara) and Mihail Gaianu (West University of Timisoara)
- Face Recognition in Automotive Applications .355.....
Danut Rotar (Continental Automotive Romania SRL) and Horia Popa Andreescu (West University of Timisoara)

Workshop on HPC for Science and Technology: #10

- Parallelizations of an Inpainting Algorithm Based on Convex Feasibility .363.....
Liviu Octavian Maftciu-Scai (West University of Timisoara), Irina Maria Artinescu (West University of Timisoara), and Vlad Maftciu-Scai (VIA University College Herring)
- Survey on Feasibility of Pattern Matching Techniques In Heterogeneous Architectures for Bioinformatics .368.....
Ciprian Pungila (West University of Timioara), Darius Galis (Politehnica University of Timisoara), and Viorel Negru (West University of Timisoara)

Workshop on Natural Computing and Applications: #11

- A Tool for Fake News Detection .379.....
Bashar Al Asaad (West University of Timisoara) and Madalina Erascu (West University of Timisoara and Institute e-Austria Timisoara)

Deep Learning for Metal Corrosion Control: Can Convolutional Neural Networks Measure Inhibitor Efficiency? .387.....	
	<i>Ruxandra Stoean (University of Craiova; Universidad de Malaga), Catalin Stoean (University of Craiova; University of Illinois at Urbana-Champaign), and Adriana Samide (University of Craiova)</i>
A four-Phase Meta-Heuristic Algorithm for Solving Large Scale Instances of the Shift Minimization Personnel Task Scheduling Problem .394.....	
	<i>Sebastian Nechita (Babes-Bolyai University) and Laura Diosan (Babes-Bolyai University)</i>
Unsupervised and Fully Autonomous 3D Medical Image Segmentation Based on Grow Cut .401.....	
	<i>Alexandru-Ion Marinescu (Babes-Bolyai University), Zoltan Balint (Babes-Bolyai University), Laura-Silvia Diosan (Babes-Bolyai University), and Anca-Mirela Andreica (Babes-Bolyai University)</i>
Evolving Mathematical Formulas using LINQ Expression Trees and Direct Applications to Credit Scoring .409.....	
	<i>Alexandru-Ion Marinescu (Babes-Bolyai University) and Anca-Mirela Andreica (Babes-Bolyai University)</i>
Evolving Cellular Automata for Two-Stage Edge Detection .417.....	
	<i>Alina Enescu (Babes-Bolyai University), Anca Andreica (Babes-Bolyai University), and Laura Diosan (Babes-Bolyai University)</i>
Optimizing Cleanset Growth by Using Multi-Class Neural Networks .425.....	
	<i>Adrian Ioan Pîrîu (Alexandru Ioan Cuza University), Mihai Leonte (Alexandru Ioan Cuza University), Nicolae Postolachi (Alexandru Ioan Cuza University), and Dragos Teodor Gavrilit (Alexandru Ioan Cuza University)</i>
Increasing Protection Against Internet Attacks through Contextual Feature Pairing .430.....	
	<i>Georgiana Ingrid Stoleru (Alexandru Ioan Cuza University), Adrian Stefan Popescu (Alexandru Ioan Cuza University), and Dragos Teodor Gavrilit (Alexandru Ioan Cuza University)</i>
Detecting Java Compiled Malware using Machine Learning Techniques .435.....	
	<i>Gheorghe Balan (Alexandru Ioan Cuza University) and Adrian Stefan Popescu (Alexandru Ioan Cuza University)</i>

PhD Colloquium Session: #12

An Improved Approach to Software Defect Prediction using a Hybrid Machine Learning Model .443...	
	<i>Diana-Lucia Mihalca (Babes-Bolyai University)</i>
Heuristic Algorithms for the Longest Filled Common Subsequence Problem .449.....	
	<i>Radu Stefan Mincu (University of Bucharest) and Alexandru Popa (University of Bucharest)</i>
Improving ACSTL Iris Segmentation Method .454.....	
	<i>Cristina-Madalina Noaica (University of Bucharest)</i>
The Blockchain, Today and Tomorrow .458.....	
	<i>Ometita Radu Adrian (Alexandru Ioan Cuza University)</i>
Estimation of Prediction Intervals in Neural Network-Based Regression Models .463.....	
	<i>Kristian Miok (West University of Timisoara)</i>

Author Index 469