2009 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing

(SYNASC 2009)

Timisoara, Romania
26-29 September 2009

Editors:

Stephen Watt
Tetsuo Ida
Dana Petcu

Viorel Negru
Tudor Jebelean
Daniela Zaharie

IEEE Catalog Number: CFP09387-PRT
ISBN: 978-1-4244-5910-0
2009 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing

SYNASC 2009

Table of Contents

Preface .............................................................. x
Conference Committees .......................................... xii
Reviewers .......................................................... xv

Invited Talks

The Sparsity Challenges ........................................ 3

James Harold Davenport and Jacques Carette

Coloring Random Graphs: A Short Survey .................. 8

Lefteris Kirousis

A Compiler for Origami Construction and Verification ..... 9

Tetsuo Ida

Finding Loop Invariants for Programs over Arrays Using a Theorem Prover .................................. 10

Laura Kovacs and Andrei Voronkov

Embedding Formal Methods into Systems Engineering .... 11

Helmut Veith

Tutorials

SMT Solvers for Testing, Program Analysis and Verification at Microsoft ............................................. 15

Nikolaj Bjorner

Satisfiability and Theories ....................................... 16

Andrei Voronkov

Automated Methods for Proving Program Termination and Liveness ................................................. 17

Andrey Rybalchenko

Automated Software Analysis .................................. 18

Helmut Veith
Symbolic Computation

m-Hilbert Polynomial and Arbitrariness of the General Solution of Partial Differential Equations .................................................................21
Qi Ding and Hongqing Zhang

Computing Self-intersection Loci of Parametrized Surfaces Using Regular Systems and Groebner Bases ..........................................................28
Yanli Huang and Dongming Wang

A Hybrid Algorithm for Solving 7 Parameters Transformation ..................................................................................................................37
Amir Hashemi and Mahzad Kalantari

Superfluous S-polynomials in Strategy-Independent Groebner Bases ...........................................................................................................45
Grant Olney Passmore and Leonardo de Moura

Toom-Cook 8-way for Long Integers Multiplication .................................................................................................................................54
Alberto Zanoni

Logic and Programming

A Hierarchy of Tractable Subclasses for SAT and Counting SAT Problems ..................................................................................................61
Stefan Andrei, Gheorghe Grigoras, Martin Rinard, and Roland Hock Chuan Yap

Formal Proof of Theorems on Genetic Regulatory Networks ....................................................................................................................69
Maxime Dénès, Binjamin Lesage, Yves Bertot, and Adrien Richard

A Calculus for Imperative Programs: Formalization and Implementation ..................................................................................................77
Madalina Erascu and Tudor Jebelean

Simplification and Generalization in CIRC ......................................................................................................................................................85
Eugen-loan Goriac, Georgiana Caltais, and Dorel Lucanu

Using a fUML Action Language to Construct UML Models .....................................................................................................................93
Codrut Lucian Lazar, Ioan Lazar, Basil Parv, Simona Motogna, and Istvan Gergely Czibula

On Herbrand-like Theorems for Cut-free Modal Sequent Logics .............................................................................................................102
Alexander Lyaletski

Numerical Computing

The Lucas Optimal Growth Model on Finite Horizon ...............................................................................................................................113
Nadia Bonchis

Hybrid Modelling of an Audio Signal Based on 1-D Wold Decomposition ............................................................................................118
Iuliana Borza, Flavius Turcu, and Mohamed Najim

Finding the Solutions of Nonlinear Equation Systems from an Interval ..................................................................................................124
Cristian Clira Mihai

A Numerical Solution of the Semi Linear Singularly Perturbed Boundary Value Problem Using Multi Region Finite Difference Method ..................................................................................130
David Edwards Jr.

Monte Carlo Variance Reduction. Importance Sampling Techniques ...................................................................................................137
Olariu Emanuel Florentin
Solving Nonsmooth Interval Equations with Slopes .........................................................142
Rongfen Lin, Hao Jiang, and Lizhi Cheng

On a Functional-Differential Equation from Price Theory .............................................150
Anton S. Muresan

An Algorithm for the Approximation of the Solution of a Functional-Integral
Equation ...............................................................................................................................157
Viorica Muresan

Cancer Prediction Modeling from Volumetric Data .........................................................162
Marius Paltanea, Sabin Tabirca, Mark Tangney, and Yin Jie Chen

Sparse Matrix Computations Using the Quadtree Storage Format ................................168
Ivan Simecek

MATLAB Package for Laguerre Spectral Method .........................................................174
Damian Trif

Parallel and Distributed Computing

Fairness and QoS Enhancement Models and Techniques for Peer-to-Peer
Content Sharing Systems .........................................................................................181
Mugurel Ionut Andreica, Irina Borozan, Lucian-Ionut Balaceanu, and Nicolae Tapus

A Grid Enabled Quantum Computer Simulator .......................................................189
Simona Caraiman, Alexandru Archip, and Vasile Manta

Description and Execution of Patterns for Symbolic Computations ..........................197
Alexandru Carstea, Georgiana Macariu, Marc Frincu, and Dana Petcu

Distributed Scheduling Policy in Service Oriented Environments ...............................205
Marc Eduard Frincu

Dynamic Resources Allocation in Grid Environments ..................................................213
Marius Ion, Florin Pop, Ciprian Dobre, and Valentin Cristea

Performance Improvement of Genetic Algorithms by Adaptive Grid
Workflows .......................................................................................................................221
Boro Jakimovski, Dragan Sahpaski, and Goran Velinov

Fault Tolerance Using a Front-End Service for Large Scale Distributed
Systems .........................................................................................................................229
Marieta Nastase, Ciprian Dobre, Florin Pop, and Valentin Cristea

Bounded Parallelism in PowerList and ParList Theories ...........................................237
Virginia Niculescu and Adriana Guran

Semantic Annotation Based Service Composition for Grid Workflow
Description and Execution ............................................................................................245
Denisa Rodila, Victor Bacu, and Dorian Gorgan

Dynamic Scheduling Algorithms for Workflow Applications in Grid
Environment ...................................................................................................................254
Alina Simion, Dragos Sbirlea, Florin Pop, and Valentin Cristea
Advances in the Theory of Computing

Algorithms for Identifying Sequence Patterns with Several Types of Occurrence Constraints ................................. 265
Mugurel Ionut Andreica, Andrei Grigorean, and Nicolae Tapus

A Depth-first Algorithm to Reduce Graphs in Linear Time ......................................................... 273
Miklos Bartha and Miklos Kresz

On the Existence of Complete Disjoint NP-Pairs .............................................................. 282
Olaf Beyersdorff

A Methodology for Concurrent Languages Development Based on Denotational Semantics .............................................. 290
Gabriel Ciobanu and Ioana Nicolae Todoran

Classes of Szilard Languages in NCA^1 ............................................................... 299
Liliana Cojocaru, Erkki Makinen, and Ferucio Laurentiu Tiplea

Factorizations of Regular Hedge Languages .............................................................. 307
Mircea Marin and Adrian Craciun

Artificial Intelligence

Matching Semantic Web Services Using Learning Accuracy ................................................ 317
Viorica R. Chifu, Ioan Salomie, Emil St. Chifu, Roland Vachter, and Alpár Kövér

Semantic Web Service Composition Method Based on Fluent Calculus ........................................ 325
Viorica R. Chifu, Ioan Salomie, Ioana Harsa, and Marius Gherga

A Policy-Based Context Aware Self-Management Model ................................................ 333
Tudor Cioara, Ionut Anghel, Ioan Salomie, and Mihaela Dinsoreanu

Dynamic Customization of Data Structures Instances Using an Agent Based Approach .................................................. 341
Istvan Gergely Czibula, Gabriela Czibula, and Adriana Mihaela Gurau

Beliefs and Communication, The Basis of Collaborative Agents ........................................... 348
Ion Mircea Diaconescu and Gerd Wagner

Approximating and Combining Equilibria in Non-cooperative Games ........................................ 356
D. Dumitrescu, Rodica Ioana Lung, and Tudor Dan Mihoc

Alleviating Urban Traffic Congestion by Means of Adaptive Routing ........................................... 361
Cristian Gratie and Adina Magda Florea

Mamdani FLC with Various Implications ........................................................................ 368
Ion Iancu and Mihaela Colhon

Immune-inspired Web Service Composition Framework .................................................................. 376
Cristina Bianca Pop, Viorica R. Chifu, Ioan Salomie, Mihaela Dinsoreanu, Iulia Vartic, and Monica Vlad

Exploring New Directions in Iris Recognition ........................................................................ 384
Nicolaie Popescu-Bodorin
A Bray-Curtis Weighted Automaton for Detecting Malicious Code Through System-Call Analysis ................................................................. 392
  Ciprian-Petrisor Pungila
Enhanced Rule-Based Phonetic Transcription for the Romanian Language ......................................................... 401
  Mihai Alexandru Ordean, Andrei Saupe, Mihaela Ordean, Melania Duma,
  and Gheorghe Cosmin Silaghi
Relational Operators in Heterogeneous Random Databases ......................................................................................... 407
  Letitia Velcescu and Laurentiu Vasile
Unified Strategy for Feature Selection and Data Imputation ......................................................................................... 413
  Camelia Vidrighin Bratu and Rodica Potolea
On Sensor Data Simulation ........................................................................................................................................ 420
  Alexandru-Ciprian Zavoianu and Ciprian-Dorin Craciun

Author Index ......................................................................................................................................................... 426