

# Lecture Notes in Artificial Intelligence 7589

## Subseries of Lecture Notes in Computer Science

### LNAI Series Editors

Randy Goebel

*University of Alberta, Edmonton, Canada*

Yuzuru Tanaka

*Hokkaido University, Sapporo, Japan*

Wolfgang Wahlster

*DFKI and Saarland University, Saarbrücken, Germany*

### LNAI Founding Series Editor

Joerg Siekmann

*DFKI and Saarland University, Saarbrücken, Germany*

Leliane N. Barros  
Marcelo Finger  
Aurora T. R. Pozo  
Gustavo A. Giménez-Lugo  
Marcos Castilho (Eds.)

# Advances in Artificial Intelligence - SBIA 2012

21th Brazilian Symposium on Artificial Intelligence  
Curitiba, Brazil, October 20-25, 2012  
Proceedings

## Series Editors

Randy Goebel, University of Alberta, Edmonton, Canada  
Jörg Siekmann, University of Saarland, Saarbrücken, Germany  
Wolfgang Wahlster, DFKI and University of Saarland, Saarbrücken, Germany

## Volume Editors

Leliane N. Barros  
Marcelo Finger  
University of São Paulo  
IME, Department of Computer Science, São Paulo, Brazil  
E-mail: {leliane, mfinger}@ime.usp.br

Aurora T. R. Pozo  
Marcos Castilho  
Federal University of Paraná  
Department of Informatics, Curitiba, Brazil  
E-mail: aurora@inf.ufpr.br castilho@ufpr.br

Gustavo A. Giménez-Lugo  
Federal University of Technology, Paraná, Curitiba, Brazil  
E-mail: gustavo@dainf.ct.utfpr.edu.br

ISSN 0302-9743 e-ISSN 1611-3349  
ISBN 978-3-642-34458-9 e-ISBN 978-3-642-34459-6  
DOI 10.1007/978-3-642-34459-6  
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012949764

CR Subject Classification (1998): I.2, H.3, H.4, I.4, I.5, H.5

LNCS Sublibrary: SL 7 – Artificial Intelligence

© Springer-Verlag Berlin Heidelberg 2012

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.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

*Typesetting:* Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

# Preface

After 16 years, the biannual Brazilian Symposium on Artificial Intelligence (SBIA) returned to Curitiba, Paraná, which also hosted its 13th edition in 1996.

Already in its 21st edition, SBIA has been consolidated as the central event on artificial intelligence (AI) in Brazil and an important international forum for discussion of new ideas and current projects for researchers, students, and practitioners in all areas of AI. This edition was held jointly with sister events SBRN, ENIA, and CTDIA under the umbrella of the Brazilian Conference of Intelligent Systems (BRACIS 2012).

These proceedings contain the 23 full papers selected for publication and oral presentation at SBIA 2012. There were 81 papers submitted from nine countries. The papers cover the following areas of AI with the corresponding number of accepted contributions:

- Knowledge representation: 5
- Machine learning: 7
- Machine learning and computer vision: 2
- Agent-based and multi-agent systems: 4
- Robotics and languages: 3
- Constraints: 2

We would like to thank all authors that submitted their work to SBIA 2012. We are also very grateful to the 134 members of our international Program Committee, who contributed with their knowledge, expertise, and time in doing an excellent job in reviewing the papers.

We are very thankful for all the support we received from the organization crew, in particular Aurora Pozo, BRACIS 2012 General Chair, and SBIA 2012 Local Chairs Gustavo Alberto Giménez Lugo and Marcos Castilho. A special thanks to the local universities that hosted and supported the organization of the event: UFPR, UTFPR, and PUCPR.

We thank the keynote speakers for accepting our invitation: Kenneth A. De Jong, Thomas G. Dietterich, Anthony Hunter, and Scott Sunner.

Finally, we thank SBIA 2012 sponsors CAPES, CNPq, Fapesp, and SBC for their support.

July 2012

Leliane Nunes Barros  
Marcelo Finger

# Organization

## Organizing Committee

### General Chair

|                  |                                        |
|------------------|----------------------------------------|
| Aurora T.R. Pozo | Universidade Federal do Paraná, Brazil |
|------------------|----------------------------------------|

### Local Chairs

|                                 |                                                       |
|---------------------------------|-------------------------------------------------------|
| Gustavo Alberto<br>Giménez-Lugo | Universidade Tecnológica Federal do Paraná,<br>Brazil |
| Marcos Castilho                 | Universidade Federal do Paraná, Brazil                |

### Local Committee

|                           |                                                       |
|---------------------------|-------------------------------------------------------|
| Emerson Cabrera Paraiso   | Pontifícia Universidade Católica do Paraná,<br>Brazil |
| Júlio Cesar Nievola       | Pontifícia Universidade Católica do Paraná,<br>Brazil |
| Myriam Regattieri Delgado | Universidade Tecnológica Federal do Paraná,<br>Brazil |

### Workshop Chair

|                   |                                                       |
|-------------------|-------------------------------------------------------|
| Fabício Enembreck | Pontifícia Universidade Católica do Paraná,<br>Brazil |
|-------------------|-------------------------------------------------------|

### Tutorial Chairs

|                         |                                   |
|-------------------------|-----------------------------------|
| Alneu de Andrade Lopes  | Universidade de São Paulo, Brazil |
| Roseli Aparecida Romero | Universidade de São Paulo, Brazil |

### Program Chairs

|                         |                                   |
|-------------------------|-----------------------------------|
| Leliane Nunes de Barros | Universidade de São Paulo, Brazil |
| Marcelo Finger          | Universidade de São Paulo, Brazil |

## Steering Committee (CEIA)

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| Fabio Gagliardi Cozman            | Universidade de São Paulo, Brazil          |
| Augusto C.P. Loureiro<br>da Costa | Universidade Federal da Bahia, Brazil      |
| Antônio Carlos da Rocha<br>Costa  | Universidade Federal do Rio Grande, Brazil |

|                    |                                            |
|--------------------|--------------------------------------------|
| Flavio Tonidandel  | Centro Universitário da FEI, Brazil        |
| Francisco Carvalho | Universidade Federal de Pernambuco, Brazil |
| Heloísa Camargo    | Universidade Federal de São Carlos, Brazil |
| Jacques Wainer     | Universidade Estadual de Campinas, Brazil  |

## Program Committee

|                           |                                                                   |
|---------------------------|-------------------------------------------------------------------|
| Adolfo Neto               | Universidade Tecnológica Federal do Paraná,<br>Brazil             |
| Aline Villavicencio       | Universidade Federal do Rio Grande do Sul,<br>Brazil              |
| Alipio Jorge              | Universidade do Porto, Portugal                                   |
| Alneu Lopes               | Universidade de São Paulo, Brazil                                 |
| Alvaro Moreira            | Universidade Federal do Rio Grande do Sul,<br>Brazil              |
| Ana Bazzan                | Universidade Federal do Rio Grande do Sul,<br>Brazil              |
| Ana Casali                | Universidad Nacional de Rosario, Argentina                        |
| Ana Teresa Martins        | Universidade Federal do Ceara, Brazil                             |
| Anarosa Brandão           | Universidade de São Paulo, Brazil                                 |
| Anderson de Araújo        | Universidade de São Paulo, Brazil                                 |
| André P. L. F de Carvalho | Universidade de São Paulo, Brazil                                 |
| Andrea Omicini            | Alma Mater Studiorum, Università di Bologna,<br>Italy             |
| Andreas Herzig            | Institut de Recherche en Informatique de<br>Toulouse, France      |
| Anna Costa                | Universidade de São Paulo, Brazil                                 |
| Anne Canuto               | Universidade Federal do Rio Grande do Norte,<br>Brazil            |
| Antônio Braga             | Universidade Federal de Minas Gerais, Brazil                      |
| Antonio C. da Rocha Costa | Universidade Federal do Rio Grande, Brazil                        |
| Artur Garcez              | City University of London, UK                                     |
| Aurora Pozo               | Universidade Federal do Paraná, Brazil                            |
| Benjamin Bedregal         | Universidade Federal do Rio Grande do Norte,<br>Brazil            |
| Bianca Zadrozny           | IBM Research, Brazil                                              |
| Carlos Areces             | Universidad Nacional de Córdoba, Argentina                        |
| Carlos Menezes            | Universidade de São Paulo, Brazil                                 |
| Carlos Ribeiro            | Instituto Tecnológico da Aeronáutica, Brazil                      |
| Cassio de Campos          | Dalle Molle Institute for Artificial Intelligence,<br>Switzerland |
| Celso Kaestner            | Universidade Tecnológica Federal do Paraná,<br>Brazil             |
| Christian Lemaitre        | Universidad Autónoma Metropolitana, Mexico                        |
| Daniel Berrar             | Tokyo Institute of Technology, Japan                              |
| Diana Adamatti            | Universidade Federal do Rio Grande, Brazil                        |

|                         |                                                               |
|-------------------------|---------------------------------------------------------------|
| Donato Malerba          | Università degli Studi di Bari, Italy                         |
| Edson Matsubara         | Universidade Federal de Mato Grosso do Sul,<br>Brazil         |
| Edward Hermann Haeusler | Pontificia Universidade Católica do Rio<br>de Janeiro, Brazil |
| Eric Matson             | Purdue University, USA                                        |
| Eugenio Oliveira        | Universidade do Porto, Portugal                               |
| Evandro Costa           | Universidade Federal de Alagoas, Brazil                       |
| Fabiano Silva           | Universidade Federal do paran , Brazil                        |
| Fariba Sadri            | Imperial College, UK                                          |
| F bio Cozman            | Universidade de S o Paulo, Brazil                             |
| Federico Barber         | Universidad Politecnica de Valencia, Spain                    |
| Fernando Gomide         | Universidade Estadual de Campinas, Brazil                     |
| Fernando Osorio         | Universidade de S o Paulo, Brazil                             |
| Filip Zelezny           | Czech Technical University in Prague,<br>Czech Republic       |
| Flavio Tonidandel       | Centro Universitario da FEI, Brazil                           |
| Fl vio S. C. da Silva   | Universidade de S o Paulo, Brazil                             |
| Francesco Belardinelli  | Imperial College of Science and Technology, UK                |
| Francisco De Carvalho   | Universidade Federal de Pernambuco, Brazil                    |
| Fred Freitas            | Universidade Federal de Pernambuco, Brazil                    |
| Gabriel Lopes           | Universidade Nova de Lisboa, Portugal                         |
| Geber Ramalho           | Universidade Federal de Pernambuco, Brazil                    |
| Gerardo Schneider       | University of Gothenburg, Sweden                              |
| Gra a Gaspar            | Universidade de Lisboa, Portugal                              |
| Gracaliz Dimuro         | Universidade Federal do Rio Grande, Brazil                    |
| Guillermo Simari        | Universidad Nacional del Sur in Bahia Blanca,<br>Argentina    |
| Gustavo A. Gim nez-Lugo | Universidade Tecnol gica Federal do Paran ,<br>Brazil         |
| Hector Geffner          | Universitat Pompeu Fabra, Spain                               |
| Helder Coelho           | Universidade de Lisboa, Portugal                              |
| Heloisa Camargo         | Universidade Federal de s o Carlos, Brazil                    |
| Ines Dutra              | Universidade do Porto, Portugal                               |
| Ivand re Paraboni       | Universidade de S o Paulo, Brazil                             |
| Jaime Sichman           | Universidade de S o Paulo, Brazil                             |
| Jan Ramon               | Katholieke Universiteit Leuven, Belgium                       |
| Joao Marcos             | Universidade Federal do Rio Grande do Norte,<br>Brazil        |
| Jo o Balsa              | Universidade de Lisboa, Portugal                              |
| Jomi H bner             | Universidade Federal de Santa Catarina, Brazil                |
| Juliana Bueno-Soler     | Universidade Federal do ABC, Brazil                           |
| Julie Dugdale           | MAGMA-Grenoble Informatics Laboratory,<br>France              |
| Karina Valdivia-Delgado | Universidade de S o Paulo, Brazil                             |

|                         |                                                                  |
|-------------------------|------------------------------------------------------------------|
| Kate Revoredo           | Universidade Federal do Rio de Janeiro, Brazil                   |
| Krysia Broda            | Imperial College, UK                                             |
| Laurent Perrussel       | Université Toulouse, France                                      |
| Leliane Nunes de Barros | Universidade de São Paulo, Brazil                                |
| Leonardo Emmendorfer    | Universidade Federal do Rio Grande, Brazil                       |
| Li Weigang              | Universidade de Brasília, Brazil                                 |
| Luis Antunes            | Universidade de Lisboa, Portugal                                 |
| Luis Fariñas del Cerro  | Université Paul Sabatier, France                                 |
| Luis Lamb               | Universidade Federal do Rio Grande do Sul,<br>Brazil             |
| Luis Otávio Alvares     | Universidade Federal de Santa Catarina, Brazil                   |
| Luiz Satoru Ochi        | Universidade Federal Fluminense, Brazil                          |
| Luiza Mourelle          | Universidade do Estado do Rio de Janeiro,<br>Brazil              |
| Mara Abel               | Universidade Federal do Rio Grande do Sul,<br>Brazil             |
| Marcelo Finger          | Universidade de São Paulo, Brazil                                |
| Marcilio de Souto       | Universidade Federal de Pernambuco, Brazil                       |
| Marcos Castilho         | Universidade Federal do Paraná, Brazil                           |
| Maria Monard            | Universidade de São Paulo, Brazil                                |
| Marilton Aguiar         | Universidade Federal de Pelotas, Brazil                          |
| Mario Fernando Campos   | Universidade Federal de Minas Gerais, Brazil                     |
| Marley M.B.R. Vellasco  | Pontifícia Universidade Católica do Rio<br>de Janeiro, Brazil    |
| Márcio Ribeiro          | Universidade Estadual de Campinas, Brazil                        |
| Mário Benevides         | Universidade Federal do Rio de Janeiro, Brazil                   |
| Michael Thielscher      | University of New South Wales, Australia                         |
| Nuno David              | Instituto Universitário de Lisboa, Portugal                      |
| Olivier Boissier        | ENS Mines Saint-Etienne, France                                  |
| Patrícia Tedesco        | Universidade Federal de Pernambuco, Brazil                       |
| Patricia Jaques         | UNISINOS, Brazil                                                 |
| Patricia Oliveira       | Universidade de São Paulo, Brazil                                |
| Paulo Ferreira Jr.      | Universidade Federal de Pelotas, Brazil                          |
| Paulo Quaresma          | Universidade de Évora, Portugal                                  |
| Paulo Santos            | Centro Universitário da FEI, Brazil                              |
| Paulo Trigo             | Instituto Superior de Engenharia de Lisboa,<br>Portugal          |
| Petrucio Viana          | Universidade Federal Fluminense, Brazil                          |
| Ramon de Mantaras       | IIIA-CSIC, Spain                                                 |
| Reinaldo Bianchi        | Centro Universitário da FEI, Brazil                              |
| Rejane Frozza           | Universidade de Santa Cruz do Sul, Brazil                        |
| Renata de Freitas       | Universidade Federal Fluminense, Brazil                          |
| Renata Vieira           | Pontifícia Universidade Católica do Rio Grande<br>do Sul, Brazil |
| Renata Wassermann       | Universidade de São Paulo, Brazil                                |

|                         |                                                       |
|-------------------------|-------------------------------------------------------|
| Ricardo Rabelo          | Federal University of Santa Catarina, Brazil          |
| Ricardo Silveira        | Universidade Federal de Santa Catarina, Brazil        |
| Rodrigo Braz            | SRI International, USA                                |
| Ronaldo Prati           | Universidade Federal do ABC, Brazil                   |
| Rosa Viccari            | Universidade Federal do Rio Grande do Sul,<br>Brazil  |
| Rui Camacho             | University of Porto, Portugal                         |
| Sandra Aluisio          | Universidade de São Paulo, Brazil                     |
| Sandra Sandri           | Instituto Nacional de Pesquisas Espaciais,<br>Brazil  |
| Sheila Veloso           | Universidade do Estado do Rio de Janeiro,<br>Brazil   |
| Silvia Botelho          | Universidade Federal do Rio Grande, Brazil            |
| Silvia Schiaffino       | Universidad Nacional de Buenos Aires,<br>Argentina    |
| Silvio Pereira          | Faculdade Tecnológica de São Paulo, Brazil            |
| Solange Rezende         | Universidade de São Paulo, Brazil                     |
| Stefano Ferilli         | Università di Bari, Italy                             |
| Teresa Ludermir         | Universidade Federal de Pernambuco, Brazil            |
| Thiago Pardo            | Universidade de São Paulo, Brazil                     |
| Tiago de Lima           | University of Lille Nord, France                      |
| Toby Walsh              | NICTA and University of New South Wales,<br>Australia |
| Torsten Schaub          | University of Potsdam, Germany                        |
| Valerie Camps           | Paul Sabatier University, France                      |
| Vania Bogorny           | Universidade Federal de Santa Catarina, Brazil        |
| Vítor Santos Costa      | Universidade do Porto, Brazil                         |
| Viviane Torres da Silva | Federal University Fluminense, Brazil                 |
| Wagner Meira Jr.        | Federal University of Minas Gerais, Brazil            |
| Walter Carnielli        | Universidade Estadual de Campinas, Brazil             |
| Wamberto Vasconcelos    | University of Aberdeen, UK                            |
| Yves Demazeau           | Domaine Universitaire de Saint-Martin, France         |
| Zhao Liang              | University of São Paulo, Brazil                       |

## Supporting Scientific Society

SBC - Sociedade Brasileira de Computação

## Sponsoring Institutions

CNPq - Conselho Nacional de Desenvolvimento Científico e Tecnológico

UFPR - Universidade Federal do Paraná

UTFPR - Universidade Tecnológica Federal do Paraná

PUCPR - Pontifícia Universidade Católica do Paraná

# Table of Contents

## Chapter 1: Knowledge Representation

|                                                                                                                   |    |
|-------------------------------------------------------------------------------------------------------------------|----|
| On the Development of a Formal Methodology for Knowledge Representation in Defeasible Logic Programming . . . . . | 1  |
| <i>Alejandro G. Stankevicius and Marcela Capobianco</i>                                                           |    |
| A Framework for Empirical Evaluation of Belief Change Operators . . . . .                                         | 12 |
| <i>Renato U. Lundberg, Márcio M. Ribeiro, and Renata Wassermann</i>                                               |    |
| Sensorimotor Domain Approach for Artificial Autonomous Cognitive Development . . . . .                            | 22 |
| <i>Mauro E.S. Muñoz and Márcio Lobo Netto</i>                                                                     |    |
| A Service-Oriented Architecture for Assisting the Authoring of Semantic Crowd Maps . . . . .                      | 32 |
| <i>Henrique Santos and Vasco Furtado</i>                                                                          |    |
| User-Centric Principles in Automated Decision Making . . . . .                                                    | 42 |
| <i>Ingrid Nunes, Simon Miles, Michael Luck, and Carlos J.P. de Lucena</i>                                         |    |

## Chapter 2: Machine Learning

|                                                                                                                           |    |
|---------------------------------------------------------------------------------------------------------------------------|----|
| Wearable Computing: Accelerometers' Data Classification of Body Postures and Movements . . . . .                          | 52 |
| <i>Wallace Ugulino, Débora Cardador, Katia Vega, Eduardo Velloso, Ruy Milidiú, and Hugo Fuks</i>                          |    |
| Density-Based Pattern Discovery in Distributed Time Series . . . . .                                                      | 62 |
| <i>Josenildo C. da Silva, Gustavo H.B. Oliveira, Omar A.C. Cortes, and Matthias Klusch</i>                                |    |
| Filter Approach Feature Selection Methods to Support Multi-label Learning Based on ReliefF and Information Gain . . . . . | 72 |
| <i>Newton Spolaôr, Everton Alvares Cherman, Maria Carolina Monard, and Huei Diana Lee</i>                                 |    |
| Automatic Analysis of Leishmania Infected Microscopy Images via Gaussian Mixture Models . . . . .                         | 82 |
| <i>Pedro A. Nogueira and Luís Filipe Teófilo</i>                                                                          |    |
| Link Prediction in Complex Networks Based on Cluster Information . . . .                                                  | 92 |
| <i>Jorge Carlos Valverde-Rebaza and Alneu de Andrade Lopes</i>                                                            |    |

|                                                                          |     |
|--------------------------------------------------------------------------|-----|
| A Parallel Approach to Clustering with Ant Colony Optimization . . . . . | 102 |
| <i>Guilherme N. Ramos</i>                                                |     |

|                                                                                            |     |
|--------------------------------------------------------------------------------------------|-----|
| On the Use of Consensus Clustering for Incremental Learning of Topic Hierarchies . . . . . | 112 |
| <i>Ricardo M. Marcacini, Eduardo R. Hruschka, and Solange O. Rezende</i>                   |     |

## Chapter 3: Machine Learning and Computer Vision

|                                                                                               |     |
|-----------------------------------------------------------------------------------------------|-----|
| Image Retrieval by Content Based on a Visual Attention Model and Genetic Algorithms . . . . . | 122 |
| <i>Milton Roberto Heinen and Paulo Martins Engel</i>                                          |     |

|                                                                                                   |     |
|---------------------------------------------------------------------------------------------------|-----|
| A Symbolic Representation Method to Preserve the Characteristic Slope of Time Series . . . . .    | 132 |
| <i>Willian Zalewski, Fabiano Silva, Feng Chung Wu, Hwei Diana Lee, and André Gustavo Maletzke</i> |     |

## Chapter 4: Multi Agent Systems

|                                                              |     |
|--------------------------------------------------------------|-----|
| Orchestrating Multiagent Learning of Penalty Games . . . . . | 142 |
| <i>Ana L.C. Bazzan</i>                                       |     |

|                                                                                        |     |
|----------------------------------------------------------------------------------------|-----|
| An Architectural Model for Autonomous Normative Agents . . . . .                       | 152 |
| <i>Baldoino F. dos Santos Neto, Viviane Torres da Silva, and Carlos J.P. de Lucena</i> |     |

|                                                                                              |     |
|----------------------------------------------------------------------------------------------|-----|
| A Coalition Formation Mechanism for Trust and Reputation-Aware Multi-Agent Systems . . . . . | 162 |
| <i>Bruno W.P. Hoelz and Célia Ghedini Ralha</i>                                              |     |

|                                                                                         |     |
|-----------------------------------------------------------------------------------------|-----|
| Profile Recommendation in Communities of Practice Based on Multiagent Systems . . . . . | 172 |
| <i>João Luis Tavares da Silva, Sidinei D. Lubenow, and Alexandre M. Ribeiro</i>         |     |

## Chapter 5: Robotic and Language

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Knowledge-Intensive Word Disambiguation via Common-Sense and Wikipedia . . . . . | 182 |
| <i>Vládia Pinheiro, Vasco Furtado, Lívio Melo Freire, and Caio Ferreira</i>      |     |

|                                                                                 |     |
|---------------------------------------------------------------------------------|-----|
| Context-Sensitive ASR for Controlling the Navigation of Mobile Robots . . . . . | 192 |
| <i>Gabriel Ferreira Araújo and Hendrik Teixeira Macedo</i>                      |     |

|                                                                                            |     |
|--------------------------------------------------------------------------------------------|-----|
| An Evaluation of the Model of Stigmergy in a RoboCup Rescue<br>Multiagent System . . . . . | 202 |
| <i>Gabriel Rigo da Cruz Jacobsen, Carlos A. Barth, and<br/>Fernando dos Santos</i>         |     |

## Chapter 6: Constraints

|                                                                                                                                                                                               |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| An Ecology-Based Heterogeneous Approach for Cooperative Search . . . .                                                                                                                        | 212 |
| <i>Rafael Stubs Parpinelli and Heitor Silvério Lopes</i>                                                                                                                                      |     |
| Providing Trade-Off Techniques Subsets to Improve Software Testing<br>Effectiveness: Using Evolutionary Algorithm to Support Software<br>Testing Techniques Selection by a Web Tool . . . . . | 222 |
| <i>Aurélio da Silva Grande, Arilo Claudio Dias Neto, and<br/>Rosiane de Freitas Rodrigues</i>                                                                                                 |     |

|                               |     |
|-------------------------------|-----|
| <b>Author Index</b> . . . . . | 233 |
|-------------------------------|-----|