Preface

The Mexican International Conference on Artificial Intelligence (MICAI) is a yearly international conference series that has been organized by the Mexican Society of Artificial Intelligence (SMIA) since 2000. MICAI is a major international AI forum and the main event in the academic life of the country’s growing AI community.

MICAI conferences publish high-quality papers in all areas of AI and its applications. The proceedings of the previous MICAI events have been published by Springer in its *Lecture Notes in Artificial Intelligence* (LNAI) series, vol. 1793, 2313, 2972, 3789, 4293, 4827, 5317, 5845, 6437, 6438, 7094, and 7095. Since its foundation in 2000, the conference has been growing in popularity and improving in quality.

The proceedings of MICAI 2012 are published in two volumes. The first volume, *Advances in Artificial Intelligence*, contains 40 papers structured into five sections:

- Machine Learning and Pattern Recognition
- Computer Vision and Image Processing
- Robotics
- Knowledge Representation, Reasoning, and Scheduling
- Medical Applications of Artificial Intelligence

The second volume, *Advances in Computational Intelligence*, contains 40 papers structured into four sections:

- Natural Language Processing
- Evolutionary and Nature-Inspired Metaheuristic Algorithms
- Neural Networks and Hybrid Intelligent Systems
- Fuzzy Systems and Probabilistic Models in Decision Making

Both books will be of interest for researchers in all fields of AI, students specializing in related topics, and for the general public interested in recent developments in AI.

The conference received for evaluation 224 submissions by 461 authors from 28 countries: Algeria, Austria, Belgium, Brazil, Canada, China, Colombia, Cuba, Czech Republic, France, Hungary, India, Iran, Israel, Japan, Luxembourg, Mexico, The Netherlands, New Zealand, Pakistan, Paraguay, Peru, Poland, Russia, Spain, Tunisia, UK, and USA. Of these submissions, 77 papers were selected for publication in these two volumes after a peer-reviewing process carried out by the international Program Committee. The acceptance rate was 34.3%.

MICAI 2012 was honored by the presence of such renowned experts as Ulises Cortés of the Universitat Politècnica de Catalunya, Spain; Joydeep Ghosh of the University of Texas, USA; Jixin Ma of Greenwich College, UK; Roy A. Maxion of
Carnegie Mellon University, USA; Grigori Sidorov of the Instituto Politécnico Nacional, Mexico; and Ian Witten of the University of Waikato, New Zealand, who gave excellent keynote lectures. The technical program of the conference also featured nine tutorials presented by Ulises Cortes, Alexander Gelbukh, Jean Bernard Hayet, Sergio Ledezma, Jixin Ma, Roy A. Maxion, Horacio Rostro González, Grigori Sidorov, and Ian Witten. Two workshops were held jointly with the conference: the 5th Workshop on Intelligent Learning Environments and the 5th Workshop on Hybrid Intelligent Systems.

In particular, in addition to regular papers, the volumes contain three invited papers by keynote speakers and their collaborators:

- “AI-Based Fall Management Services. The Role of the i-Walker in I-DONTFALL,” by Ulises Cortés, Antonio Martínez-Velasco, Cristian Barrué, and Roberta Annicchiarico
- “Syntactic Dependency-Based N-grams as Classification Features,” by Grigori Sidorov, Francisco Velasquez, Efstatios Stamatatos, Alexander Gelbukh, and Liliana Chanona-Hernández

The authors of the following papers received the Best Paper Award on the basis of the paper’s overall quality, significance, and originality of the reported results:

1st place: “Toward the Creation of Semantic Models Based on Computer-Aided Designs,” by Nestor Velasco Bermeo, Miguel González Mendoza, Alexander García Castro, and Irais Heras Dueñas (Mexico, USA)

2nd place: “A New Branch and Bound Algorithm for the Cyclic Bandwidth Problem,” by Hillel Romero-Monsivais, Eduardo Rodriguez-Tello, and Gabriel Ramírez (Mexico)

3rd place: “Modelling, Aggregation, and Simulation of a Dynamic Biological System Through Fuzzy Cognitive Maps,” by Gonzalo Nápoles, Isel Grau, Maikel León, and Ricardo Grau (Cuba)

The authors of the following paper selected among all papers of which the first author was a full-time student, excluding the papers listed above, received the Best Student Paper Award:

In addition, the attendees of the Special Session voted for the following works to receive the Best Poster Award (these papers are included in a separate Special Session proceedings volume):

1st place: “EMG Pattern Recognition System Based on Neural Networks,” by Juan Carlos Gonzalez-Ibarra, Carlos Soubervielle-Montalvo, Omar Vital-Ochoa, and Hector Gerardo Perez-Gonzalez (Mexico)


3rd place: “Conception and Implementation of a Supermarket Shopping Assistant System,” by Antonio Marin-Hernandez, Guillermo de Jesús Hoyos-Rivera, Marlon García-Arroyo, and Luis Felipe Marin-Urias (Mexico)

We want to thank all the people involved in the organization of this conference. In the first place, these are the authors of the papers published in this book: it is their research work that gives value to the book and to the work of the organizers. We thank the Track Chairs for their hard work, the Program Committee members and additional reviewers for their great effort spent on reviewing the submissions.

We would like to express our sincere gratitude to the Coordinación para la Innovación y Aplicación de la Ciencia y la Tecnología (CIACyT) of the Universidad Autónoma de San Luis Potosí, CONSYS TELECOM, ACOMEE, Magnetica FM, Faragauss System, Fundación Nikola Tesla, Panadería Penny, and Universidad Politécnica de San Luis Potosí (UPSLP) for their generous support, and in particular to UPSLP for providing the infrastructure for the keynote talks, tutorials, workshops, and technical presentations. We also thank the Oficina de Congresos y Convenciones de San Luis Potosí (OCCSLP) for its valuable effort in organizing the cultural program as well as other logistics activities.

We are deeply grateful to the conference staff and to all members of the Local Committee headed by Omar Montaño Rivas. In particular, we thank Rafael Llamas Contreras, the Logistics Chair, and Gabriela Zárate Rasillo, the OCCSLP representative, for their great effort in resolving logistics issues. Very special thanks go to Liliana Gámez Zavala and Ana María González Ávila for their help in advertising MICAI and handling all publicity-related issues.

We are indebted to José Antonio Loyola Alarcón, the Rector of the Universidad Politécnica de San Luis Potosí, for giving us the wonderful opportunity of organizing the conference at this university and for his unconditional support in the organization of the conference in all its stages. We would also like to express our sincere gratitude to the Vice Rector’s Office of the UPSLP headed by Francisco Javier Delgado Rojas; to Igor León O’Farrill, Treasurer General of the UPSLP, and Francisco Cruz Oradaz Salazar, Head of the Facultad de Tecnologías de Información y Telemática, for their warm hospitality.

We gratefully acknowledge support received from the following projects: WIQ-EI (Web Information Quality Evaluation Initiative, European project 269180),
PICCO10-120 (ICYT, Mexico City Government), and CONACYT 122030-DST India project “Answer Validation Through Textual Entailment.” The entire submission, reviewing, and selection process, as well as preparation of the proceedings, was supported for free by the EasyChair system (www.easychair.org). Last but not least, we are grateful to Springer for their patience and help in the preparation of this volume.

November 2012

Ildar Batyrshin

Miguel González Mendoza
Organization

Conference Organization

MICAI 2012 was organized by the Mexican Society of Artificial Intelligence (SMIA, Sociedad Mexicana de Inteligencia Artificial) in collaboration with the Universidad Politécnica de San Luis Potosí (UPSLP), Centro de Investigación en Computación del Instituto Politécnico Nacional (CIC-IPN), Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE), Universidad Nacional Autónoma de México (UNAM), Universidad Autónoma de México (UAM), Instituto Tecnológico de Estudios Superiores de Monterrey (ITESM), Universidad Autónoma de Estado de Hidalgo (UAEH), and Instituto Mexicano de Petroleo (IMP).

The MICAI series website is: www.MICAI.org. The website of the Mexican Society of Artificial Intelligence, SMIA, is: www.SMIA.mx. Contact options and additional information can be found on these websites.

Conference Committee

General Chairs
- Raúl Monroy
- Alexander Gelbukh

Program Chairs
- Miguel González Mendoza
- Ildar Batyrshin

Workshop Chair
- Alexander Gelbukh

Tutorials Chairs
- Felix Castro Espinoza

Keynote Talks Chair
- Jesus A. González

Financial Chair
- Grigori Sidorov

Grant Chairs
- Grigori Sidorov
- Miguel González Mendoza
- Ildar Batyrshin

Best Thesis Awards Chair
- Miguel González Mendoza

Doctoral Consortium Chairs
- Oscar Herrera alcántara
- Miguel González Mendoza

Organizing Committee Chair
- Omar Montañó Rivas

Supervising Ex-President of the SMIA
- Carlos Alberto Reyes García

Track Chairs

Natural Language Processing
- Sofia Natalia Galicia Haro

Machine Learning and Pattern Recognition
- Johan van Horebeek

Data Mining
- Felix Castro Espinoza
Intelligent Tutoring Systems  Alexander Gelbukh
Evolutionary and  Nareli Cruz Cortés
Nature-Inspired  Oliver Schütze
Metaheuristic Algorithms  Oscar Herrera Alcántara
Computer Vision and Image Processing
Robotics, Planning and  Fernando M. MontesGonzalez
Scheduling
Neural Networks and Hybrid  Sergio Ledesma Orozco
Intelligent Systems
Logic, Knowledge-Based  Mauricio Osorio
Systems
Multi-Agent Systems, and  Claudia Zepeda Cortés
Distributed AI
Fuzzy Systems and  Alexander Tulupyev
Probabilistic Models
in Decision Making
Bioinformatics and Medical  Jesús A. González
Applications

Program Committee

Charan Kumari Achanta  Hiram Calvo
Carlos Acosta  Nicoletta Calzolari
Hector-Gabriel Acosta-Mesa  Oscar Camacho Nieto
Ruth Aguilar  Jose Luis Carballido
Carlos Aguilar Ibáñez  Mario Castelán
Teresa Alarcón  Oscar Castillo
Alfonso Alba  Felix Castro Espinoza
Raúl Aliev  Martine Ceberio
Leopoldo Altamirano  Gustavo Cerda-Villafana
Gustavo Arroyo  Mario Chacon
Serge Autexier  Niladri Chatterjee
J. Gabriel Avina-Cervantes  Edgar Chavez
Victor Ayala-Ramirez  Zhe Chen
Bogdan Babych  Stefania Costantini
Sivaji Bandyopadhyay  Broderick Crawford
Maria Lucia Barrón-Estrada  Nareli Cruz Cortés
Ildar Batyrshin  Rolando Cruz Ramírez
Hector Becerra  Heriberto Cuayahuitl
Mokhtar Beldjehem  Iria da Cunha
Leopoldo Bertossi  Oscar Dalmau
Albert Bifet  Enrique de La Rosa Miranda
Leticia Cagnina  Carlos Delgado-Mata
Félix Calderon  Bernabe Dorronsoro
Victor Muñiz
Masaki Murata
Juan Antonio Navarro Perez
Jesús Emeterio Navarro-Barrientos
Juan Carlos Nieves
Sergey Nikolenko
Juan Arturo Nolazco Flores
Leszek Nowak
Iván Olier
Ivan Olmos
Fernando Orduña Cabrera
Felipe Orihuela-Espina
Eber Orozco
Magdalena Ortiz
Mauricio Osorio
Elvia Palacios
Ted Pedersen
Héctor Manuel Pérez
Thierry Peynot
David Pinto
Eunice E. Ponce-de-Leon
Natalia Ponomareva
Volodymyr Ponomaryov
Edgar Alfredo Portilla-Flores
Joel Quintanilla
Julio Cesar Ramos
Carolina Reta
Alberto Reyes
Orion Fausto Reyes-Galaviz
Carlos A. Reyes-Garcia
Jean-Michel Richer
Mariano Rivera
Antonio Robles-Kelly
Erik Rodner
Arles Rodriguez
Eduardo Rodriguez-Tello
Katya Rodriguez-Vazquez
Leandro Fermín Rojas Peña
Paolo Rosso
Horacio Rostro Gonzalez
Jianhua Ruan
Imre Rudas
Salvador Ruiz Correa
Jose Ruiz-Pinales
Leszek Rutkowski
Andriy Sadovnychy
Carolina Salto
Gustavo Sanchez
Guillermo Sanchez-Diaz
Abraham Sánchez López
Raul E. Sanchez-Yanez
Jose Santos
Oliver Schütze
Nikolay Semenov
Pinar Senkul
Shahnaz N. Shahbazova
Grigori Sidorov
Gerardo Sierra
Alexander Sirotkin
Peter Sosnin
Humberto Sossa Azuela
Marta Rosa Soto
Ramon Soto
Ricardo Soto
Juan-Manuel Torres-Moreno
Heike Trautmann
Leonardo Trujillo
Alexander Tulupyev
Johan van Horebeek
Massimiliano Vasile
Francois Vialatte
Javier Viguera
Manuel Vilares Ferro
Andrea Villagra
Toby Walsh
Cornelio Yáñez-Márquez
Ramon Zatarain
Claudia Zepeda Cortes
**Additional Reviewers**

Mehran Ahmadlou  
Israel Becerra  
Eduardo Cabal  
Nina Dethlefs  
Elva Diaz  
Christian Domínguez Medina  
Milagros Fernández Gavilanes  
Benjamin Hernandez  
Md. Jamiul Jahid  
Rafael Murrieta

José Carlos Ortíz-Bayliss  
Partha Pakray  
Obdulía Pichardo  
Soujanya Poria  
Francisco José Ribadas-Pena  
Edgar Rodríguez  
José Rodríguez  
Octavio Augusto Sánchez Velázquez  
José Arturo Tejeda-Gómez

**Organizing Committee**

Local Chair  
Logistics Chairs  
Registration Chairs  
Sponsorship Chair  
Publicity Chair  
Financial Chair

Omar Montaño Rivas  
Rafael Llamas Contreras  
César Guerra  
Hugo González  
Victor Fernández  
Jorge Simón  
Liliana Gámez  
Mario Alberto Martínez
Natural Language Processing

Invited paper

Syntactic Dependency-Based N-grams as Classification Features  
Grigori Sidorov, Francisco Velasquez, Efstathios Stamatatos, Alexander Gelbukh, and Liliana Chanona-Hernández

Semantic Annotation for Textual Entailment Recognition  
Assaf Toledo, Sophia Katrenko, Stavroula Alexandropoulou, Heidi Klockmann, Asher Stern, Ido Dagan, and Yoad Winter

Recognizing Textual Entailment in Non-english Text via Automatic Translation into English  
Partha Pakray, Snehasis Neogi, Sivaji Bandyopadhyay, and Alexander Gelbukh

SMSFR: SMS-Based FAQ Retrieval System  
Partha Pakray, Santanu Pal, Soujanya Poria, Sivaji Bandyopadhyay, and Alexander Gelbukh

Carlos-Francisco Méndez-Cruz, Juan-Manuel Torres-Moreno, Alfonso Medina-Urrea, and Gerardo Sierra

Extracting Domain-Specific Opinion Words for Sentiment Analysis  
Ivan Shamshurin

Measuring Feature Distributions in Sentiment Classification  
Diego Uribe

Identification of the Minimal Set of Attributes That Maximizes the Information towards the Author of a Political Discourse: The Case of the Candidates in the Mexican Presidential Elections  
Antonio Neme, Sergio Hernández, and Vicente Carrión

Document Categorization Based on Minimum Loss of Reconstruction Information  
Juan Carlos Gomez and Marie-Francine Moens
Semantic Classification of Posts in Social Networks by Means of Concept Hierarchies

Karina Ruiz-Mireles, Ivan Lopez-Arevalo, and Victor Sosa-Sosa

104

Evolutionary and Nature-Inspired Metaheuristic Algorithms

A Simple Adaptive Algorithm for Numerical Optimization

Francisco Viveros-Jiménez, Jose A. León-Borges, and Nareli Cruz-Cortés

115

A Post-optimization Strategy for Combinatorial Testing: Test Suite Reduction through the Identification of Wild Cards and Merge of Rows

Loreto Gonzalez-Hernandez, Jose Torres-Jimenez, Nelson Rangel-Valdez, and Josue Bracho-Rios

127

A New Branch and Bound Algorithm for the Cyclic Bandwidth Problem

Hillel Romero-Monsivais, Eduardo Rodriguez-Tello, and Gabriel Ramírez

139

The Evolution of Cooperation in File Sharing P2P Systems: First Steps

María Esther Sosa-Rodríguez and Elizabeth Pérez-Cortés

151

Optimal Joint Selection for Skeletal Data from RGB-D Devices Using a Genetic Algorithm

Pau Climent-Pérez, Alexandros Andre Chaaraoui, Jose Ramón Padilla-López, and Francisco Flórez-Revuelta

163

Dynamic Estimation of Phoneme Confusion Patterns with a Genetic Algorithm to Improve the Performance of Metamodels for Recognition of Disordered Speech

Santiago Omar Caballero-Morales and Felipe Trujillo-Romero

175

Modelling, Aggregation and Simulation of a Dynamic Biological System through Fuzzy Cognitive Maps

Gonzalo Nápoles, Isel Grau, Maikel León, and Ricardo Grau

188

Neural Networks and Hybrid Intelligent Systems

Artificial Neural Network for Optimization of a Synthesis Process of $\gamma$-Bi$_2$MoO$_6$ Using Surface Response Methodology

Guillermo González-Campos, Edith Luévano-Hipólito, Luis Martin Torres-Treviño, and Azael Martinez-De La Cruz

200
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent Neural Control of a Continuous Bioprocess Using First and Second Order Learning</td>
<td>211</td>
</tr>
<tr>
<td>Carlos-Román Mariaca-Gaspar, Julio-César Tovar Rodríguez, and Floriberto Ortiz-Rodríguez</td>
<td></td>
</tr>
<tr>
<td>A Conic Higher Order Neuron Based on Geometric Algebra and Its Implementation</td>
<td>223</td>
</tr>
<tr>
<td>Juan Pablo Serrano Rubio, Arturo Hernández Aguirre, and Rafael Herrera Guzmán</td>
<td></td>
</tr>
<tr>
<td>Vehicle Lateral Dynamics Fault Diagnosis Using an Autoassociative Neural Network and a Fuzzy System</td>
<td>236</td>
</tr>
<tr>
<td>Juan Pablo Nieto González and Pedro Pérez Villanueva</td>
<td></td>
</tr>
<tr>
<td>Modular Neural Networks Optimization with Hierarchical Genetic Algorithms with Fuzzy Response Integration for Pattern Recognition</td>
<td>247</td>
</tr>
<tr>
<td>Daniela Sánchez, Patricia Melin, Oscar Castillo, and Fevrier Valdez</td>
<td></td>
</tr>
<tr>
<td>Neural Network with Type-2 Fuzzy Weights Adjustment for Pattern Recognition of the Human Iris Biometrics</td>
<td>259</td>
</tr>
<tr>
<td>Fernando Gaxiola, Patricia Melin, Fevrier Valdez, and Oscar Castillo</td>
<td></td>
</tr>
<tr>
<td>Model Reference Adaptive Position Controller with Smith Predictor for a Shaking-Table in Two Axes</td>
<td>271</td>
</tr>
<tr>
<td>Carlos Esparza, Rafael Núñez, and Fabio González</td>
<td></td>
</tr>
<tr>
<td>Implementation of a Single Chaotic Neuron Using an Embedded System</td>
<td>283</td>
</tr>
<tr>
<td>Luis González-Estrada, Gustavo González-Sanmiguel, Luis Martín Torres-Treviño, and Angel Rodríguez</td>
<td></td>
</tr>
<tr>
<td>Application of a Method Based on Computational Intelligence for the Optimization of Resources Determined from Multivariate Phenomena</td>
<td>292</td>
</tr>
<tr>
<td>Angel Kuri-Morales</td>
<td></td>
</tr>
<tr>
<td>Recurrent Neural Identification and I-Term Sliding Mode Control of a Vehicle System Using Levenberg-Marquardt Learning</td>
<td>304</td>
</tr>
<tr>
<td>Ieroham Baruch, Sergio-Miguel Hernandez-Manzano, and Jacob Moreno-Cruz</td>
<td></td>
</tr>
<tr>
<td>Multiple Fault Diagnosis in Electrical Power Systems with Dynamic Load Changes Using Soft Computing</td>
<td>317</td>
</tr>
<tr>
<td>Juan Pablo Nieto González</td>
<td></td>
</tr>
<tr>
<td>A Hybrid Algorithm for Crustal Velocity Modeling</td>
<td>329</td>
</tr>
<tr>
<td>José Federico Ramírez Cruz, Olac Fuentes, Rodrigo Romero, and Aaron Velasco</td>
<td></td>
</tr>
</tbody>
</table>
## Table of Contents – Part II

### Relationship between Petri Nets and Cellular Automata for the Analysis of Flexible Manufacturing Systems
---

Irving Barragán, Juan Carlos Seck-Tuoh, and Joselito Medina

338

### An Integrated Strategy for Analyzing Flow Conductivity of Fractures in a Naturally Fractured Reservoir Using a Complex Network Metric
---


350

### Fuzzy Systems and Probabilistic Models in Decision Making

#### Comparative Study of Type-1 and Type-2 Fuzzy Systems for the Three-Tank Water Control Problem
---

Leticia Cervantes, Oscar Castillo, Patricia Melin, and Fevrier Valdez

362

#### Parallel Particle Swarm Optimization with Parameters Adaptation Using Fuzzy Logic
---

Fevrier Valdez, Patricia Melin, and Oscar Castillo

374

#### Indirect Adaptive Control with Fuzzy Neural Networks via Kernel Smoothing
---

Israel Cruz Vega, Luis Moreno-Ahedo, and Wen Yu Liu

386

#### Search and Detection of Failed Components in Repairable Complex Systems under Imperfect Inspections
---

Boris Kriheli and Eugene Levner

399

#### Distance Aproximator Using IEEE 802.11 Received Signal Strength and Fuzzy Logic
---

Carlos Fco Álvarez Salgado, Luis E. Palafox Maestre, Leocundo Aguilar Noriega, and Juan R. Castro

411

#### Towards Automated Extraction of Expert System Rules from Sales Data for the Semiconductor Market
---

Jesús Emeterio Navarro-Barrientos, Dieter Armbruster, Hongmin Li, Morgan Dempsey, and Karl G. Kempf

421

#### Bayesian Networks for Micromanagement Decision Imitation in the RTS Game Starcraft
---

Ricardo Parra and Leonardo Garrido

433

#### Designing and Implementing Affective and Intelligent Tutoring Systems in a Learning Social Network
---

Ramón Zatarain-Cabada, María Lucía Barrón-Estrada, Yasmín Hernández Pérez, and Carlos Alberto Reyes-García

444
Towards a Personality Fuzzy Model Based on Big Five Patterns for Engineers Using an ANFIS Learning Approach .................. 456

Luis G. Martínez, Juan R. Castro, Guillermo Licea,
Antonio Rodríguez-Díaz, and Reynaldo Salas

Author Index .......................................................... 467
# Table of Contents – Part I

## Machine Learning and Pattern Recognition

### Invited Paper

**Empirical Study of Machine Learning Based Approach for Opinion Mining in Tweets** ........................................... 1  
*Grigori Sidorov, Sabino Miranda-Jiménez, Francisco Viveros-Jiménez, Alexander Gelbukh, Noé Castro-Sánchez, Francisco Velásquez, Ismael Díaz-Rangel, Sergio Suárez-Guerra, Alejandro Treviño, and Juan Gordon*

**An Empirical Evaluation of Different Initializations on the Number of K-Means Iterations** ........................................ 15  
*Renato Cordeiro de Amorim*

**Intelligent Feature and Instance Selection to Improve Nearest Neighbor Classifiers** .................................................... 27  
*Yenny Villuendas-Rey, Yailé Caballero-Mota, and María Matilde García-Lorenzo*

**A Method for Building Prototypes in the Nearest Prototype Approach Based on Similarity Relations for Problems of Function Approximation** .................................................. 39  
*Marilyn Bello-García, María Matilde García-Lorenzo, and Rafael Bello*

**A Diversity Production Approach in Ensemble of Base Classifiers** ...... 51  
*Hamid Parvin, Sara Ansari, and Sajad Parvin*

**A New Overlapping Clustering Algorithm Based on Graph Theory** ...... 61  
*Airel Pérez-Suárez, José Fco. Martínez-Trinidad, Jesús A. Carrasco-Ochoa, and José E. Medina-Pagola*

**Fuzzy Clustering for Semi-supervised Learning – Case Study: Construction of an Emotion Lexicon** ............................... 73  
*Sowjanya Poria, Alexander Gelbukh, Dipankar Das, and Sivaji Bandyopadhyay*

**Statistical Framework for Facial Pose Classification** .................... 87  
*Ajay Jaiswal, Nitin Kumar, and R.K. Agrawal*
## Table of Contents – Part I

Forecast of Air Quality Based on Ozone by Decision Trees and Neural Networks ................................. 97
   *Nahun Loya, Iván Olmos Pineda, David Pinto, Helena Gómez-Adorno, and Yuridiana Alemán*

Automatic Discovery of Web Content Related to IT in the Mexican Internet Based on Supervised Classifiers ........ 107
   *José-Lázaro Martínez-Rodríguez, Víctor-Jesús Sosa-Sosa, and Iván López-Arévalo*

Automatic Monitoring the Content of Audio Broadcasted by Internet Radio Stations .......................... 119
   *Omar Nuñez and Antonio Camarena-Ibarrola*

### Computer Vision and Image Processing

Using Hidden Markov Model and Dempster-Shafer Theory for Evaluating and Detecting Dangerous Situations in Level Crossing Environments .......................... 131
   *Houssam Salmane, Yassine Ruichek, and Louahdi Khoudour*

Local Features Classification for Adaptive Tracking .................................. 146
   *Alan I. Torres-Nogales, Santiago E. Conant-Pablos, and Hugo Terashima-Marín*

Two Adaptive Methods Based on Edge Analysis for Improved Concealing Damaged Coded Images in Critical Error Situations .......... 158
   *Alejandro Alvaro Ramírez-Acosta and Mireya S. García-Vázquez*

Phase Correlation Based Image Alignment with Subpixel Accuracy .......... 171
   *Alfonso Alba, Ruth M. Aguilar-Ponce, Javier Flavio Viguera-Gómez, and Edgar Arce-Santana*

A Novel Encryption Method with Associative Approach for Gray-Scale Images ......................................... 183
   *Federico Felipe, Ángel Martínez, Elena Acevedo, and Marco Antonio Acevedo*

FPGA-Based Architecture for Extended Associative Memories and Its Application in Image Recognition .......... 194
   *Guzmán-Ramírez Enrique, Arroyo-Fernández Ignacio, González-Rojas Carlos, Linares-Flores Jesús, and Pogrebnyak Oleksiy*

Salient Features Selection for Multiclass Texture Classification ........ 205
   *Bharti Rana and R.K. Agrawal*
Robotic Behavior Implementation Using Two Different Differential Evolution Variants ............................................. 216
Víctor Ricardo Cruz-Álvarez, Fernando Montes-Gonzalez, Efrén Mezura-Montes, and José Santos

Robust Visual Localization of a Humanoid Robot in a Symmetric Space .......................................................... 227
Mauricio J. García Vázquez, Jorge Francisco Madrigal, Oscar Mar, Claudia Esteves, and Jean-Bernard Hayet

DeWaLoP In-Pipe Robot Position from Visual Patterns .................. 239
Luis A. Mateos and Markus Vincze

Electric Vehicle Automation through a Distributed Control System for Search and Rescue Operations .................. 249
Marco Polo Cruz-Ramos, Christian Hassard, and J.L. Gordillo

Determination of the Instantaneous Initial Contact Point on a Parallel Gripper Using a Multi Input Fuzzy Rules Emulated Network Controller with Feedback from Ultrasonic and Force Sensors .................. 261
César Navarro, Chidentree Treesatayapun, and Arturo Baltazar

Integration of Directional Smell Sense on an UGV ......................... 273
B. Lorena Villarreal, Christian Hassard, and J.L. Gordillo

Automatic 3D City Reconstruction Platform Using a LIDAR and DGPS .......................................................... 285
Angel-Iván García-Moreno, José-Joel González-Barbosa, Francisco-Javier Ornelas-Rodríguez, Juan-Bautista Hurtado-Ramos, Alfonso Ramírez-Pedraza, and Erick-Alejandro González-Barbosa

Knowledge Representation, Reasoning, and Scheduling

Towards the Creation of Semantic Models Based on Computer-Aided Designs .......................................................... 298
Nestor Velasco Bermeo, Miguel González Mendoza, Alexander García Castro, and Irais Heras Dueñas

Process of Concept Alignment for Interoperability between Heterogeneous Sources ...................................... 311
María de Lourdes Guadalupe Martínez-Villaseñor and Miguel González-Mendoza

A Defeasible Logic of Intention ............................................. 321
José Martín Castro-Manzano
Towards Computational Political Philosophy .......................... 334
José Martín Castro-Manzano

Exploring the Solution of Course Timetabling Problems through
Heuristic Segmentation ....................................................... 347
Dulce J. Magaña-Lozano, Santiago E. Conant-Pablos, and
Hugo Terashima-Marín

Verifying Nested Workflows with Extra Constraints .................. 359
Roman Barták and Vladimír Rovenský

Shortest Stochastic Path with Risk Sensitive Evaluation ............... 371
Renato Minami and Valdinei Freire da Silva

Forward and Backward Feature Selection in Gradient-Based MDP
Algorithms ................................................................. 383
Karina Olga Maizman Bogdan and Valdinei Freire da Silva

Medical Applications of Artificial Intelligence

Invited Paper

AI Based Fall Management Services – The Role of the i-Walker
in I-DONTFALL .............................................................. 395
Ulises Cortés, Antonio Martínez-Velasco, Cristian Barrué, and
Roberta Annicchiarico

Performance Evaluation of Ranking Methods for Relevant Gene
Selection in Cancer Microarray Datasets ............................... 407
Manju Sardana, Baljeet Kaur, and R.K. Agrawal

Assessment of Bayesian Network Classifiers as Tools for Discriminating
Breast Cancer Pre-diagnosis Based on Three Diagnostic Methods .... 419
Ameca-Alducin María Yaneli, Cruz-Ramírez Nicandro,
Mezura-Montes Efrén, Martín-Del-Campo-Mena Enrique,
Pérez-Castro Nancy, and Acosta-Mesa Héctor Gabriel

Identification of Risk Factors for TRALI Using a Hybrid Algorithm .... 432
María Dolores Torres, Aurora Torres, Felipe Cuellar,
María de la Luz Torres, Eunice Ponce de León, and Francisco Pinales

Generation and Exploitation of Semantic Information Using
an Epidemiological Relational Database as a Primary Source
of Information .............................................................. 446
David González-Marrón, Miguel González-Mendoza, and
Neil Hernández-Gress
A Graph Cellular Automata Model to Study the Spreading of an Infectious Disease ................................................ 458
  Maria Jose Fresnadillo Martínez, Enrique García Merino,
  Enrique García Sánchez, Jose Elias García Sánchez,
  Angel Martín del Rey, and Gerardo Rodríguez Sánchez

Modelling Interpersonal Relations in Surgical Teams with Fuzzy Logic ........................................................... 469
  Andrzej Romanowski, Pawel Wozniak, Tomasz Jaworski,
  Pawel Fiderek, and Jacek Kucharski

Author Index .................................................................................................................. 481