The Second International Afro-European Conference for Industrial Advancement

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International Conference on Prediction, Modeling and Analysis of Complex Systems

AECIA — Nostradamus 2015

CONFERENCE PROGRAMME

Paris-Villejuif, France

September 09 – 11, 2015
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1 Invited talks

1.1 Plenary talks

Andries P. Engelbrecht,
University of Pretoria, Pretoria, South Africa
Wednesday, September 9, 9:00-10:00, Amphithéâtre bleu (building H, ground floor),
chair: Adel Alimi

Dynamic Multi-Objective Optimization using Particle Swarm Optimization
Most real-world optimization problems have more than one objective, with at least
two objectives that are in conflict with one another. The conflicting objectives of the
optimization problem lead to an optimization problem where a single solution does
not exist, as is the case with single-objective optimization problems (SOOPs). In stead
of a single solution, a set of optimal trade-off solutions exists, referred to as the Pareto-
optimal front (POF) or Pareto front. This kind of optimization problems are referred
to as multi-objective optimization problems (MOOPs).

In many real-world situations the environment does not remain static, but is dy-
namic and changes over time. However, in recent years most research focused on
either static MOOPs or dynamic SOOPs. When solving dynamic multi-objective opti-
mization problems (DMOOPs) an algorithm has to track the changing POF over time,
while finding solutions as close as possible to the true POF and maintaining a diverse
set of solutions.

This talk will present recent research on the development of an efficient particle
swarm optimization (PSO) algorithm to solve DMOO. The approach used multiple
swarms, where each swarm optimizes a single objective, and information about the
different objectives is transferred among the different swarms using a knowledge trans-
fer strategy. Different variants of this PSO DMOO algorithm will be discussed and
compared with other DMOO algorithms. The talk will also introduce a heterogeneous
version of the PSO DMOO algorithm, where the algorithm also finds the optimal PSO
strategy to solve the DMOOP in parallel to finding the POF

Mohammed Chadli,
Université de Picardie Jules Verne, Amiens, France
Thursday, September 10, 9:00-10:00, Amphithéâtre bleu (building H, ground floor),
chair: Václav Snášel

Observers for Polynomial Polytopic Systems: from LMI to SOS Design
Design of observers for polytopic systems, such as Takagi-Sugeno models, LPV sys-
tems, switched systems,..., are extensively studied in the literature these last decades.
Design conditions have been given based on Lyapunov functions and Linear Matrix
Inequalities (LMI) terms. Indeed, systems subject to unknown inputs, uncertainties,
saturation and delay are studied for measurable and immeasurable decision variables. The derived results depend on the kinds of Lyapunov functions and numerical tools used. Recently, polynomial polytopic systems are introduced and design conditions are derived. Furthermore, Sum Of Square (SOS) techniques are applied for more of relaxation of design problems. Moreover, some results have been successfully exploited for fault diagnosis and fault tolerant Control in different industrial applications (vehicle dynamic, renewable energy,...).

1.2 Tutorials

Miloš Kudělka,
VSB-Technical University of Ostrava, Ostrava, Czech Republic
Wednesday, September 9, 13:30-14:30, Amphithéâtre bleu (building H, ground floor), chair: Katarzyna Wegrzyn-Wolska

Analysis of Significance and Evolution of Co-authorship Networks
Nowadays, one of the most popular research sources is called, co-authorship networks. In this research area, we may find many interesting tasks. The goals of co-authorship networks are: studying network structure, detecting communities and their evolution over time, identifying significant authors, relations, etc. This tutorial will be focused on analytical approaches applicable on analysis of co-authorship networks. Mainly three different directions will be presented: weighting authors and relations over time -based on forgetting function-, detection and evolution of small communities, and analysis of research topics of individual authors and their evolution.

Zeineb Chelly,
High Institute of Management of Tunis (ISG), Le Bardo, Tunisia
Thursday, September 10, 13:30-14:30, Amphithéâtre bleu (building H, ground floor), chair: Elizabeth Colin

Data pre-processing based on Rough Sets and the link to other theories
Data reduction is a main point of interest across a wide variety of fields. In fact, focusing on this step is crucial as it often presents a source of significant data loss. Many techniques were proposed in literature to achieve the task of data reduction. However, most of them tend to destroy the underlying semantics of the features after reduction or require additional information about the given data set for thresholding. Thus, this tutorial will be focused on presenting Rough Set Theory (RST) as a technique that can on the one hand reduce data dimensionality using information contained within the data set and on the other hand capable of preserving the meaning of the features. RST can be used as such tool to discover data dependencies and to reduce the number of attributes contained in a data set using the data alone, requiring no additional infor-
mation. Basically, two main points will be discussed. First, presenting RST as a data pre-processing technique and, second, the link of RST to other theories; mainly to Fuzzy Set Theory.
## 2 Conference schedule

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<th>Wednesday, September 9</th>
<th>Thursday, September 10</th>
<th>Friday, September 11</th>
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<tr>
<td>9:00 - 10:00</td>
<td>Conference opening</td>
<td>Keynote: M. Chadli</td>
<td>Parallel sessions</td>
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<td>Keynote: A. Engelbrecht</td>
<td>Chair: V. Snášel</td>
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<td>Chair: A. Alimi</td>
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<td>10:00 - 10:15</td>
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<td>CB until 10:45</td>
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<td>10:15 - 12:00</td>
<td>Parallel sessions:</td>
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<td>A7 (6), A8 (6)</td>
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<tr>
<td>12:00 - 13:30</td>
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<td>Conference closing</td>
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<tr>
<td>13:30 - 14:30</td>
<td>Tutorial 1: M. Kudělka</td>
<td>Tutorial 2: Z. Chelly</td>
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<td>14:30 - 14:45</td>
<td>Coffee break</td>
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<td>14:45 - 16:30</td>
<td>Parallel sessions:</td>
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<td>17:00</td>
<td>Conference reception</td>
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### 2.1 Detailed schedule

**Session N1 (Nostradamus 1), room 1 (building H, 2nd floor), chair: Katarzyna Wegryn-Wolska**

**Wednesday, September 9, 10:15 - 12:00**

1. Better Spectra manipulation in SPLAT-VO - *Petr Šaloun, David Andrešič, Petr Škoda, and Ivan Zelinka*
2. Optimization of Closed-Loop Poles for Limited Control Action and Robustness - *Frantisek Gazdos*
4. Modeling Lexicon Emergence as Concept Emergence in Networks - *Juan Galan-Paéz, Joaquín Borrego-Díaz, and Gonzalo A. Aranda-Corra*
Session A1 (AECIA 1), room 2 (building H, 2nd floor), chair: Ajith Abraham

Wednesday, September 9, 10:15 - 12:00
1. Checking the Compliance of Business Processes and Business Rules Using OWL 2 Ontology and SWRL - Tuan Anh Pham and Nhan Le Thanh
2. Integration of the Process Mining to the Knowledge Framework for Software Processes - Jakub Stolfa, Svatopluk Stolfa, Michael Alexander Kosinar and Vaclav Snasel
3. Software process resource utilization simulation using CPN - Jan Czopik, Jakub Stolfa, Svatopluk Stolfa, Michael Alexander Kosinar, and Ivo Vondrak
4. Scenario-Based Evolutionary Approach for Robust RCPSP - Hayet Mogaadi and Besma Fayech Chaar
5. Internet of Things: Overview, sources, applications and challenges - Nour Oweis, Claudio Aracenay, Waseem Oweis, Mona Oweis, Hussein Soori, and Vaclav Snasel

Session N2 (Nostradamus 2), room 1 (building H, 2nd floor), chair: Petr Šaloun

Wednesday, September 9, 14:45 - 16:30
1. An Optimization Approach for the Inverse Kinematics of a Highly Redundant Robot - Paulo Costa, José Lima, Ana I. Pereira, Pedro Costa, and Andry Pinto
2. Using Unsupervised Deep Learning for Human Age Estimation Problem - Klim Drobnyh
3. Two Methods of Hybrid Adaptive Control Applied on Nonlinear Plant - Jiri Vojtesek and Petr Dostal
4. PREDICTION OF NOx CONCENTRATION TIME SERIES USING THE CHAOS THEORY - Radko Kříž and Petra Lešáková
5. Predicting The Direction of Movement for Stock Price Index Using Machine Learning Methods - Pinar Tüfekci

Session A2 (AECIA 2 - Special Session on Advances in Image Processing and Colorization), room 2 (building H, 2nd floor), chairs: Tarek Gaber, Takahiko Horiuchi
Wednesday, September 9, 14:45 - 16:30
2. Watermarking 3D Triangular Mesh Models Using Intelligent Vertex Selection - Mona M.Soliman, Aboul Ella Hassanien, and Hoda M.Onsi
4. Level-Set Segmentation with Local Thresholding For CT Liver Images - Abdalla Mostafa, Mohamed Abd Elfattah, Ahmed Fouad, Aboul Ella Hassanien, and Hesham Hefny
5. Semi-automated system for Cup to Disc measurement for Diagnosing Glaucoma using Classification Paradigm - Taras Kotyk, Sayan Chakraborty, Nilanjan Dey, Tarek Gaber, Aboul Ella Hassanien, and Vaclav Snasel

Session N3 (Nostradamus 3), room 1 (building H, 2nd floor), chair: Marek Lampart

Thursday, September 10, 10:15 - 12:00
1. The Directed Inference for the Kosinski’s Fuzzy Numbers Model - Piotr Prokopowicz
2. Application of a double-impact-element for vibrations attenuation of a machine mounted on nonlinear support - Marek Lampart and Jaroslav Zapomel
3. Prediction of Football Match Results in Turkish Super League Games - Pinar Tufekci

Session A3 (AECIA 3), room 2 (building H, 2nd floor), chair: Jan Platoš
Thursday, September 10, 10:15 - 12:00
2. Towards A Model-Based Development Methodology For Evolvable Production Systems: A Domain-Specific Modeling Approach - Afifa Rahatulain, Tahir Naseer Qureshi, and Mauro Onori
3. The Using of Petri nets For Controlling of the Embedded Device - Jan Kožusznik and David Ježek
4. Cattle Identification using Muzzle Images - Lukas Zaoralek, Michal Prilepok and Vaclav Snasel
5. Semantic and Similarity Measure Methods for Plagiarism Detection of Students’ Assignments - Hussein Soori, Michal Prílepok, Jan Platos and Vaclav Snasel

Session N4 (Nostradamus 4), room 1 (building H, 2nd floor), chair: Roman Šenkeřík

Thursday, September 10, 14:45 - 16:30
1. PSO as Complex Network - Capturing the Inner Dynamics – Initial Study - Michal Pluhacek, Jakub Janostik, Roman Senkerik, Ivan Želinka
2. Particle Swarm Optimizer with Diversity Measure based on Swarm Representation in Complex Network - Jakub Janostik, Michal Pluhacek, Roman Senkerik and Ivan Želinka
3. Capturing Inner Dynamics of Firefly Algorithm in Complex Network – Initial Study - Jakub Janostik, Michal Pluhacek, Roman Senkerik, Ivan Želinka, and Frantisek Spacek
5. Preliminary Study on the Randomization and Sequencing for the Chaos Embedded Heuristic - Roman Senkerik, Michal Pluhacek, Ivan Želinka, Donald Davenport, and Jakub Janostik

Session A4 (AECIA 4), room 2 (building H, 2nd floor), chair: Miloš Kudělka
Thursday, September 10, 14:45 - 16:30
1. Neuro-Fuzzy Risk Prediction Model for Computational Grids - Sara Abdelwahab, Ajith Abraham, and Varun Kumar
3. The EC Sequences on Points of an Elliptic Curve Realization Using Neural Networks - Nikolay Chervyakov, Mikhail Babenko, Maxim Deryabin, Nikolay Kucherov, and Nataliya Kuchukova
4. Ensemble of Heterogeneous Flexible Neural Tree for the approximation and feature-selection of poly (lactic-co-glycolic acid) micro- and nanoparticle - Varun Ojha, Ajith Abraham, and Vaclav Snasel
5. Researches of Algorithm of PRNG on the Basis of Bilinear Pairing on Points of an Elliptic Curve with Use of a Neural Network - Nikolay Chervyakov, Mikhail Babenko, Nikolay Kucherov, Viktor Kuchukov, and Maria Shabalina

Session A5 (AECIA 5), room 1 (building H, 2nd floor), chair: Layth Sliman

Friday, September 11, 9:00 - 10:30
1. A decentralized Management Approach for on-demand Transit Transportation System - Olfa Chebbi and Jouhaina Chaouachi
2. Hybrid metaheuristic to solve the selective multi-compartment vehicle routing problem with time windows - Hadhami Kaabi
3. Solar Power Production Forecasting based on Recurrent Neural Network - Tomas Burianek, Jindrich Stuchly, Stanislav Misak
4. An ICT Solution for Shared Mobility in Universities - Carlo Giglio and Roberto Palmieri
5. Simulated Annealing Approach For solving the Fleet sizing problem in on-demand transit system - Olfa Chebbi and Jouhaina Chaouachi

Session A6 (AECIA 6), room 2 (building H, 2nd floor), chair: Adel Alimi
Friday, September 11, 9:00 - 10:30
1. A human activity analysis system for patient safety in health institutions - Slim Abdelhedi, Ali Wali, and Adel M. Alimi
2. Application of Bio-inspired Methods within Cluster Forest Algorithm - Jan Janoušek, Petr Gajdoš, Michal Radecký and Václav Snášel
3. Modelling of fetal hypoxic conditions based on virtual instrumentation - Radek Martinek, Adam Sincl, Jan Vanus, Michal Kelnar, Petr Bilik, Zdenek Machacek and Jan Zidek
4. A new hybrid weighted optimization model for multi criteria ABC inventory classification - Hadhami Kaabi and Khaled Jabeur
5. Proposition of a Protocol for E-voting Systems that Breaks the Link Between the Voter and his Vote - Dunja Majstorović

Session A7 (Special Session on Data Processing, Protocols, and Applications in Wireless Sensor Networks / AECIA 7), room 1 (building H, 2nd floor), chair: Mohamed Mostafa Fouad

Friday, September 11, 10:45 - 12:30
1. Big Data Pre-processing Techniques within the Wireless Sensors Networks - Mohamed Mostafa Fouad, Tarek Gaber, Maamoun Ahmed, Nour E. Oweis, and Vaclav Snasel
5. Multi-level Significant Bit (MLSB) Embedding Based on Weighted Container Model and Weighted F5 Concept - Natalia Voloshina, Sergey Bezzateev and Konstantin Zhidanov
6. An Extended Kalman Filter as an Observer in a Sliding Mode Controller for a Metal-Polymer Composite Actuator - M. Schimmack and P. Mercorelli

Session A8 (AECIA 8), room 2 (building H, 2nd floor), chair: Nicolas Sicard
Friday, September 11, 10:45 - 12:30
1. Algebraic Identification Approach of Multiple Unknown Time-Delays of Continuous-Time Linear Systems - Asma Karoui, Kaouther Ibn Taarit and Moufida Ksouri
2. Fetal Risk Classification Based on Cardiotocography Data: A Kernel-Based Approach - Theljani Foued and Keddachi Khaoula
3. A Bag of Words Model for Improving Automatic Stress Classification - Aurelia Ciupe, Camelia Florea, Bogdan Orza, Aurel Vlaicu, and Bogdan Petrovan
4. Ranking Information Credibility in Twitter Based on Petri Net Model - Mohamed Torky, Ramadan Baberse, Ragia A. Ibrahim, and Aboul Ella Hassanien
5. Using Kazakh Morphology Information to Improve Word Alignment for SMT - Amandyk Kartbayev
6. Application of Naïve Bayes in Classification of Use Cases - Radoslav Štrba, Radim Briš, Ivo Vondrák, and Svatopluk Štolfa