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# ABSTRACTS of ICCCC PAPERS

Volume 3 (2012)

*Workshop on  
Intelligent Decision Support Systems  
for Crisis Management*

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## EDITORIAL CONFIRMATION NOTE

All presented papers at  
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International Conference on Computers,  
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*Workshop on  
Intelligent Decision Support Systems for Crisis Management*

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**Abstract**

International Conference of Computers, Communications & Control (ICCCC) and International Journal of Computers, Communications & Control (IJCCC) were founded by authors of this foreword in 2006. ICCCC is organized in every even year. This edition of ICCCC is limited to an *Exploratory Workshop on Intelligent Decision Support Systems for Crisis Management* only. The goal of this workshop is to bring together researchers interested in Intelligent Computing, Knowledge Discovery in Databases, Decision Support Systems for Crisis Management, in order to exchange ideas, problems, solutions, and to work together in a friendly environment. After this interaction meeting we intend make some teams for design of intelligent decision support systems for management of crisis: economic, financial, energy, food, healthcare, military, manufacturing etc. With every edition of the conference the evaluation process is more demanding. Due to the certain number of submissions that can be published in IJCCC we could accept just a small number of submitted papers. Therefore many good works had to be rejected. In this foreword we presents a description of the scope and topics of workshop's sessions and a short description of IJCCC.

## 1 Intelligent Computing

**Chair:** Prof. Răzvan Andonie, Central Washington University, USA.

**Session scope:** Conflict and management involves implementing strategies to limit the negative aspects of conflict and to increase the positive aspects of conflict. It is not concerned with eliminating all conflict or avoiding conflict. Conflict can be valuable when managed properly. In order to manage a conflict effectively and to minimize the anticipated adverse impacts, imminent decisions must be made on the necessary actions and on the most effective use of the available resources in different managerial levels. The main topic of this section is machine intelligence and intelligent computing applied to conflict management. All areas of conflict management are considered: risk management, military and political conflicts, crises management, conflict resolution, conflict prediction, early warning, etc. In this perspective, Artificial and Computational Intelligence provide the background for the development of intelligent conflict management systems. Today, such intelligent systems take many forms, encompass a variety of approaches and include many design challenges.

**Session topics:** We seek original and high-quality contributions on the general theme of Intelligent Systems for Conflict Management. The following is a non-exhaustive list with topics of special interest: Artificial and computational intelligence methods in conflict management; Conflict resolution in multi - agent based intelligent environments; Data fusion for resolving data conflicts; Decision making using computer-supported conflict management methodology; Conflict detection algorithms; Data mining in terrorism informatics; Web mining and social network analysis applied to conflict early warning; Mobile and P2P technologies in conflict management; Adaptive management approaches for conflict resolution; Self-organizing conflict prevention / resolution techniques; Decision making with missing and/or uncertain data; Machine learning for intelligent support of conflict resolution; Computational intelligence techniques for crisis prediction; Risk assessment and evaluation of predictions.

## 2 Knowledge Discovery in Databases

**Chair:** Prof. Gang Kou, University of Electronic Science and Technology of China.

**Session scope:** Today's crisis management involves heterogeneous types of information that are stored in different computer systems, platforms, data types, and so on. How to integrate incident data sources and help decision makers make immediate and effective responses under pressure and uncertainties is an essential issue that requires cross-disciplinary collaboration. Data mining and knowledge discovery (DMKD), which develops methods, algorithms, and techniques to extract useful information from huge amounts of data, emerged in 1990s and grew rapidly since then. Data mining techniques, such as classification, association, and clustering, can be used to analyze different types of data to assist substantially in crisis management. Data mining for crisis management has been an active research area in the past decade. Many data mining methods, techniques,

and tools have been developed to support various aspects of crisis management. Although there are successful cases, the complexity in building efficient crisis management system requires specialized data mining methods and techniques.

**Session topics:** Data mining and knowledge discovery in crisis management; Analyzing and evaluating of critical decision elements under different crisis situations (e.g., earthquake, terrorist attacks, hurricane); Modeling different types of emergency problems using the data mining algorithms and tools; Developing data mining-based hazard planning and emergency management systems; Applying the data mining methods and techniques in developing crisis response plans or policies.

### 3 Decision Support Systems

**Chair:** Prof. Yong Shi, Research Center on Fictitious Economy & Data Science, Chinese Academy of Sciences and College of Information Science & Technology University of Nebraska at Omaha, USA.

**Session scope:** Decision support system (DSS) generally refers to a computer-based information systems which supports business decision making activities. DSSs utilizes organizational database to serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance. The current extensions of DSS related organizational systems are data warehousing (DW), data mining (DM) and business intelligence (BI). In many situations, DW, DM and DSS focus on structured data, BI incorporates both structured and unstructured data as inputs. Research on interactions of DSS with DW, DM and BI can speed up the development of technologies to effectively transform data into information, and then into knowledge. Extended DSS can allow the decision analysts combine the results of DM based a DW with human knowledge to produce intelligent knowledge to enhance the power of BI. This section encourages various research topics that address DSS as well as the extensions of DSS, such as DW, DM and BI.

**Session topics:** All original and high-quality research papers related to, but not limited to the following are welcome: Decision support system; Data warehousing; Data mining or knowledge discovery from large-scale databases; Business intelligence.

### 4 Crisis Management

**Chair:** Prof. Misu-Jan Manolescu, Agora University, Romania.

**Session scope:** To present and discuss latest research on ideas, problems, solutions and methods for management of crisis and conflicts: economic, financial, energy, food, healthcare, military, manufacturing etc.

**Session topics:** Emergency management; Knowledge management in crisis and conflicts; Managing IT e-commerce; Supply chain management systems modeling; Semantic web applications in conflict management; Conflict preventing; Crisis management.



## 5 Short Description of INT J COMPUT COMMUN

**Title of journal:** International Journal of Computers, Communications and Control.

**Acronym:** IJCCC

**Short name of journal:** INT J COMPUT COMMUN.

**International Standard Serial Numbers:** ISSN 1841-9836, E-ISSN 1841-9844.

**Publisher:** CCC Publications - Agora University

**Starting year of IJCCC:** 2006

**Founders of IJCCC:** I. Dzitac (**A. Editor in Chief**), F.G. Filip (**Editor in Chief**) and M.J. Manolescu (**Managing Editor**)

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**Number of issues/year:** IJCCC has 4 issues/odd year (March, June, September, December) and 5 issues/ even year (March, September, June, November, December). Every even year IJCCC will publish a supplementary issue with selected papers from the International Conference on Computers, Communications and Control.

**Scope:** IJCCC is directed to the international communities of scientific researchers in universities, research units and industry. IJCCC publishes original and recent scientific contributions in the following fields: Computing & Computational Mathematics; Information Technology & Communications; Computer-based Control.

**Unique features distinguishing IJCCC:** To differentiate from other similar journals, the editorial policy of IJCCC encourages especially the publishing of scientific papers that focus on the convergence of the 3 "C" (Computing, Communication, Control).

**Policy:** The articles submitted to IJCCC must be original and previously unpublished in other journals. The submissions will be revised independently by at least two reviewers and will be published only after completion of the editorial workflow.

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### Coverage:

- Beginning with Vol. 1 (2006), Supplementary issue: S, IJCCC is covered by Thomson Reuters - Science Citation Index Expanded and is indexed in ISI Web of Science (we received letter of acceptance only in 2008).

**Thomson Reuters Subject Category of IJCCC:**

1. AUTOMATION & CONTROL SYSTEMS Category Description: Automation & Control Systems covers resources on the design and development of processes and systems that minimize the necessity of human intervention. Resources in this category cover control theory, control engineering, and laboratory and manufacturing automation.

2.COMPUTER SCIENCE, INFORMATION SYSTEMS Category Description: Computer Science, Information Systems covers resources that focus on the acquisition, processing, storage, management, and dissemination of electronic information that can be read by humans, machines, or both. This category also includes resources for telecommunications systems and discipline-specific subjects such as medical informatics, chemical information processing systems, geographical information systems, and some library science.

- Beginning with Vol. 2 (2007), No.1, IJCCC is covered in EBSCO.
- Beginning with Vol. 3 (2008), No.1, IJCCC is covered in SCOPUS.

IJCCC is also listed/indexed/covered in DOAJ, CCSB, Open J-Gate, Ulrich's etc.

**Impact Factor of INT J COMPUT COMMUN**

The computation of impact factor for 3 years has been started in 2009:

-Impact Factor in JCR 2009: 0.373.

-Impact factor in JCR 2010: 0.650.

Oradea, May-3-2012

## Least Squares Support Vector Machine Regression and Neural Networks for the Forecasting of Process Variables in a Chaotic Manufacturing System: a Comparative Performance Analysis

*M.D. Alfaro, J.M. Sepulveda, J.A. Ulloa*

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### **Abstract**

Currently, it is recognized that manufacturing systems are complex in their structure and dynamics. Management, control and forecasting of such systems are very difficult tasks due to complexity. Numerous variables and signals vary in time with different patterns so that decision makers must be able to predict the behavior of the system. This is a necessary capability in order to keep the system under a safe operation. This also helps to prevent emergencies and the occurrence of critical events that may put in danger human beings and capital resources, such as expensive equipment and valuable production. When dealing with chaotic systems, the management, control, and forecasting are very difficult tasks. In this article an application of neural networks and vector support machines for the forecasting of the time varying average number of parts in a waiting line of a manufacturing system having a chaotic behavior, is presented. The best results were obtained with least square support vector machines and for the neural networks case, the best forecasts, are those with models employing the invariants characterizing the system's dynamics.

**Keywords:** chaos; forecast; neural networks; vector support machines; manufacturing systems

## An Approach to Building a Framework that uses Temporal Logic and Fuzzy Representation for Crisis Management

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### **Abstract**

Crisis management involves a lot of factors and variables that have to be monitored and considered. Human judgment becomes far from optimal as these variables and factors increase in number. Thus, in these situations, we need the help of decision support system to help the decision making process. In this paper we observe the main decision making factors that should be considered in crisis management situation, we define the crisis as a substantial change in the value of regular environment variables and factors, as the environment is uncertain we propose to use a fuzzy set theory to represent the variables of the system, we show how we can use temporal logic to represent the temporal nature of crises, we present a combination of fuzzy and temporal inference techniques, and propose an algorithm to support the decision making, the algorithm is based on temporal simulation which make use of temporal relations represented by temporal statements, we finally show that the proposed model and algorithm can suite a lot of crisis management situations.

**Keywords:** crisis management, fuzzy logic, temporal logic.

## Multi-period Customer Service Level Maximization under Limited Production Capacity

*S. Babarogić, D. Makajić-Nikolić, D. Lečić-Cvetković, N. Atanasov*

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### Abstract

This paper will focus on a make-to-stock multi-period order fulfilment system with random orders from different classes of customers under limited production circumstances. For this purpose a heuristic algorithm has been developed aimed at maximizing the customer service level in any cycle and in the entire multi-period. In this paper, in order to validate the results obtained with this algorithm, a mixed integer programming model was developed that is based on the same assumptions as the algorithm. The model takes into account the priorities of customer groups and the balanced customer service level within the same group. The presented approaches are applied to a real example of Fast Moving Consumer Goods. Their comparison was carried out in several scenarios.

**Keywords:** limited production capacity, customer service level, heuristic algorithm, mixed integer programming.

## IT Outsourcing. A Management-Marketing Decision

*R.E. Brandabur*

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### **Abstract**

Survival of an organization in an environment increasingly requires a more aggressive constant study it, followed by careful planning of its activities on the market like in accordance with the organization's mission. In this context targets and specific modality for achieving them are expressed by developing and implementing management-marking strategies.

Critical economic environment (recession) demand now well thinking strategic movement providing a satisfactory market share, constant cash-flow and customer loyalty.

The evolution of the Information Technology (IT) allowed for several years the developing of IT solutions based on Cloud Computing.

The decision of outsourcing IT using cloud solutions is bounded from benefits in terms of reduced costs for the infrastructure, remove the burden of the infrastructure and networking management for the companies, offers the chance to use multi-tenant applications that are easy to be updated by the application developers and so on.

**Keywords:** cloud computing, outsourcing IT, marketing-management decisions, solution for economic crisis.

## Outlier Detection with Nonlinear Projection Pursuit

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### Abstract

Anomaly/outlier detection is a central piece in a crises management system: it can signal unexpected behavior if a monitoring system is present in order to prevent disasters, or it can provide crises management actors with relevant information on the source of the problems. The current work proposes and investigates a new method to identify outliers in multivariate data, driving its roots in projection pursuit. Projection pursuit is basically a method to deliver meaningful linear combinations of attributes. The novelty of our approach resides in introducing nonlinear combinations, able to model more complex interactions among attributes. The exponential increase of the search space with the increase of the polynomial degree is tackled with a genetic algorithm that performs monomial selection. Synthetic test cases highlight the benefits of the new approach over classical linear projection pursuit.

**Keywords:** outlier detection, nonlinear projections, genetic algorithms.

## Memetic Engineering for Permanent Education in line with Sustainable Growth

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### **Abstract**

Given the recent outcomes of the European Commission on behalf on implementing a new economic strategy for sustainable growth and jobs, this paper emphasis the opportunity and urgency of the new strategy, providing an appropriate education tool for knowledge society. The main objectives are: a) adapting memetic engineering expressed in terms of General System Theory to the teaching component of permanent education based on Bounded Rationality and "Just-in-Time" as key tools for fighting cognitive chaoplexity in post-industrial era; b) facilitating the use of memetic engineering based on his double faceted nature: as negative feedback and positive feedback; c) extending the applicability of memetic engineering from myths and metaphors, including (paleo)linguistics, to ecolinguistic as source of memes in the general field of ecology; d) exemplifying the above in some primitive metamodels with effect of memetic engineering in ecology and highlighting the relevant design-space dimensions. Among the conclusions: a) permanent education must be modelled in line with learner bounded rationality to be sustainable in the long run since, bounded rationality is a psychological lasting feature; b) sustainable development depends on affordable permanent education; as a result, e-teaching should be systematically revisited through intense transdisciplinary research.

**Keywords:** sustainable development, permanent education, bounded rationality, chaoplexity, memetic engineering.



## Bio-Inspired Sensory Systems in Automata for Hazardous Environments

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### **Abstract**

Every automaton in dynamic and complex environments requires sensory systems with an appropriate level of attention on the hazardous environment. This property in any efficient automaton is analogous to that observed in animal sensory systems. In this context, it is noted that to ensure its viability, the sensory systems of animals must maintain a continuous state of alertness or attention to the environment. However, the state consumes energy so it is impossible to keep a constant level over time. In this regard, biologists have designed models for explaining the variation in the level of surveillance in two vital activities of animals: Work and Rest. In an alternating pattern between Work and Rest, the Attention Level  $V(t)$  declines and increases as the animal works and rests respectively along the time. For each of the two states, there is one relation:  $dV/dt = -\alpha * V$  while working and  $dV/dt = \beta*(1-V)$  while resting. In this model  $\alpha$  is the loss rate of surveillance that depends on the difficulty of the work and  $\beta$  is the recovery rate which depends on the quality of rest. In the case of automata, this phenomenon is analogous to that observed in the Animal Kingdom. Even if the automatic machines have relief structures to monitor their environments, they always require that its sensory system recovers the alertness after being hit by the inexorable entropy. If the task is hard ( $\alpha$  is large), the Attention Level decreases rapidly. Once the level has dropped below a threshold of tolerance, it must be recovered. If rest is poor, the automaton will take a lot of time to achieve the desired level. Obviously, machines do not rest, but in analogous terms, this phenomenon is emulated in the way of maintenance activities. Parameter  $\beta$  represents the quality of these maintenances. This model has been tested with computer simulations to study the performance of automatic machines in hostile environments. After tests, it was possible to quantify  $\alpha$  and  $\beta$  for each kind of task-environment and each kind of maintenance. The bio-inspired model showed to have explicative and predictive applications to the conquest of hostile scenarios by means of automata. Indeed it is an interesting conceptual tool for increasing the performance of machines.

**Keywords:** attention level, model, performance, emulation, automata.

## Research on Retail Customer Segmentation of Commercial Bank Based on Lifestyle

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### **Abstract**

As foreign banks are entering because of our countrys joining WTO, the pressure of our financial industry facing is becoming bigger and bigger, and customer segmentation is so important to commercial bank. Taking the current shortage of customer segmentation into consideration, a retail customer segmentation model for commercial bank from the perspective of lifestyle has been put forward. And then it conducts an empirical analysis by the retail customer data collected by self-constructed questionnaire which takes AIO scale as a research tool. Factor analysis and cluster analysis on lifestyle of bank customers is presented by applying SPSS, and association rules are analyzed of behaviors on retail banking formed by different types of customers. At last, some marketing proposals are advanced according to the research results.

**Keywords:** Customer Segmentation, Commercial Bank, Lifestyle, Cluster Analysis, Association Rules.

## Disaster Prevention Integrated into Commonly Used Web Rendered Systems with GIS Capabilities

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### **Abstract**

The end of the 20th century brought a remarkable increase in the field of positioning techniques and communications, making them visible and available to the public, which led to an unprecedented interconnectivity. At the same time, disasters are part of our life. Regardless of their nature, measures can be taken, in order to prevent and mitigate their effects, by anticipative preparation or by avoiding the calamity area (if possible). To this end, this paper presents an integrated system, composed of a software component, a hardware component, and a decision-making human element, all having the declared role of diminishing or eliminating human and material losses.

**Keywords:** : DSS, Disaster, Open Layers, Apache

## Datastores in Cloud Governance

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### **Abstract**

The Small and Medium Enterprises benefit now, due to the scale adoption of Cloud Computing, from an emerging market where they can associate and collaborate to form virtual enterprises or virtual clusters, aiming to compete with the large enterprises and provide tailored IT solutions for their customers. However the lack of standardization for the cloud services and technologies leads to a myriad of different components that cannot be easily set to work together in the absence of a real cloud governance solution. Cloud governance acts like a catalyst to allow Small and Medium Enterprises to easily manage and optimize their services infrastructure, and to facilitate collaboration in a clustered or virtual-enterprise environment.

We have proposed a Cloud Governance architecture based on mOSAIC's multi-agent Cloud Management solution. The Cloud Governance solution relies on various datastores that are responsible with maintaining and managing a set of crucial data that are used during the cloud governance process. Our paper is focused to analyze and emphasize the requirements that must be fulfilled by different database systems in order to have a reliable storage system and also to suggest a concrete solution.

**Keywords:** Cloud Computing, Cloud Governance, Datastores, Databases.

## Hybrid Renewable Energy Systems (HRES) and Intelligent Monitoring and Control of Distributed Energy Resources (DER) Applied in Natural Disasters.

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### **Abstract**

According to seismologists Chile has yet to face another big earthquake in the very near future, yet the country remains largely unprepared against massive electric power systems brake-down. The problem lies in the centralized electric power systems and the lack of adequate technologies and back-up/emergency power systems for disaster recovery. The flaws that are built into the very fabric of the presently centralized power systems were on full display in the February 27<sup>th</sup> earthquake in Chile. Nowhere it becomes more evident that hugely centralized power generation and distribution systems are extremely vulnerable and ineffective to disruptions from natural disasters, human error or other calamities. The large power networks that once proved very efficient and secure, are now at the center of discussion fueling the need for decentralization and the rapid growth of distributed generation (DG). Highly decentralized, diversified and DG-oriented energy matrix is notoriously much better suited to withstand these disasters. In centralized electric power grids, servicing large metropolitan areas, albeit with some but limited differentiation in service, can only be on or off, so either everyone gets power or no one does. This makes recovering power service in an emergency situation a much more difficult task. On the other hand, decentralized power systems (DPS) reduce the obstacles to disaster preparation and recovery by allowing the focus to shift first to critical infrastructure and then to flow outward to less integrated outlets. A DG-based model for a smart micro-grid based on hybrid electric power systems (HEPS) using both renewable energy technologies (RET) and conventional power generation units is presented. The hybrid energy system may be portable or fixed in one place, highly reliable, easy to assemble, modular, flexible and cost-effective solution, that is ready-to-run and go to where it is needed to supply power in natural disaster.

**Keywords:** natural disasters, energy sustainability, smart micro-grid, hybrid electric power systems, sustainable blocks©, sustainable energy strategy.

## On the Applicability of the Anghel and Altman Bankruptcy Prediction Models in the Actual Crisis Conditions

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### **Abstract**

The current economic crisis demonstrates that the results of research studies on the prediction of bankruptcy risk are insufficient. Given the instability of the economic environment, this article aims to be a study on the prediction of the health of Romanian companies, regarding: profitability, insolvency, bankruptcy. Having into consideration the differences of the economic environments in which businesses operate, this study applies the models mentioned above to a group of 60 Romanian companies in the actual economic environment (2005-2009). The companies were classified in two categories: bankrupted companies (B) and non-bankrupted companies (N-B).

**Keywords:** Anghel model, Altman model, score function, discriminant analysis, bankruptcy prediction.

## Data Dimensionality Reduction for Data Mining: A Combined Filter-Wrapper Framework

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### Abstract

Knowledge Discovery in Databases aims to extract new, interesting and potential useful patterns from large amounts of data. It is a complex process whose central point is data mining, which effectively builds models from data. Data type, quality and dimensionality are some factors which affect performance of data mining task. Since the high dimensionality of data can cause some troubles, as data overload, a possible solution could be its reduction. Sampling and filtering reduce the number of cases in a dataset, whereas features reduction can be achieved by feature selection. This paper aims to present a combined method for feature selection, where a filter based on correlation is applied on whole features set to find the relevant ones, and then, on these features a wrapper is applied in order to find the best features subset for a specified predictor. It is also presented a case study for a data set provided by TERAPERS a personalized speech therapy system.

**Keywords:** data mining, feature selection, filters, wrappers.

## Data Consistency in Emergency Management

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### **Abstract**

Timely response is extremely important in emergency management. However, cardinal inconsistent data may exist in a judgment matrix because of the limited expertise, preference conflict as well as the complexity nature of the decision problems. The existing inconsistent data processing models for positive reciprocal matrix either are complicated or dependent on the priority weights, which will delay the decision making process in emergency. In this paper, a geometric mean induced bias matrix (GMIBM), which is only based on the original matrix  $A$ , is proposed to quickly identify the most inconsistent data in the judgment matrix. The correctness and effectiveness of the proposed model are proved mathematically and illustrated by two numerical examples. The results show that the proposed model not only preserves most of the original information in matrix  $A$ , but also is faster than existing methods.

**Keywords:** cardinal inconsistency, positive reciprocal matrix, geometric mean induced bias matrix (GMIBM), inconsistency identification.



## A Decision-Making Perspective for Designing and Building Information Systems

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### **Abstract**

This paper aims at highlighting several aspects and associated decision situations which may be met in the process of designing and building modern information systems, such as: choosing the approach and methods to be utilized for building the system and selecting the IT tools, integrating the system into the enterprise and evaluating the project. A particular emphasis is put on evaluation criteria to be utilized in solving the various decision problems.

**Keywords:** decision criteria, IT&C tools, methodology, prototype, SaaS, standards.

## Public Discourse Semantics. A Method of Anticipating Economic Crisis

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### **Abstract**

This paper provides a proof that anticipation of an economic crisis by analysing public discourses (in particular, speeches on economic issues) is feasible. It proposes a method of text classification and semantic interpretation based on natural language processing techniques that could be used to trace, over a period of time, the print press discourses, with the aim to valuate the perspective of occurrence of crises. Classification is the task of assigning tags (words, expressions) to the texts that make up a corpus. In our case, we were interested to identify among the texts under scrutiny those belonging to classes like financial, economic, nationalism, etc. This approach is sustained by the fact that public discourses can be characterized from a rhetorical perspective, depending on the specific strategies their authors have chosen: orientation to change opinions or to determine action, ratio between rational (logos) and emotional (pathos). We are proposing an automatic analysis of the content of the public language, by using quantitative measures. Our purpose was to develop a computational tool able to offer to researchers in the economic, social or political sciences, but, not less, to the public at large, the possibility to measure the acuity of different accents of a written public discourse (financial, emotional, etc.), as mean to anticipate the threat of financial accidents. Such a tool could help the processes of decision making in the analysis of crisis. Although our analysis used as data the journalistic and economic environments of Romania, it could easily be extrapolated to other languages/countries.

**Keywords:** public language, text categorization, semantic analysis, economic crisis.

## Strategic Decision Models Cross-Validation by use of Decision Reports Information Extraction

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### **Abstract**

From all the events in the life of a business entity, the Mergers and Acquisitions transactions are one of the most challenging ones, as they drastically affect the life of the involved entities, but also their business stakeholders (like clients or suppliers). The Merger transaction can be seen as a growth crisis in the life of the buyer entity and a strive for survival in the life of the acquired company. Studying such transactions are being a constant preoccupation for both academia and practitioners, modeling mergers in order to predict them - one of the most ambitious task. In this paper, we present our technique of cross-validating the results of our model and use several boosting methods for improving the computed decisions scores.

**Keywords:** Mergers and Acquisitions, Quantitative Models, Cross-Verification, Boosting Algorithm, Growth Crisis, Business Survival.

## Using Opinion Mining Techniques for Early Crisis Detection

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### **Abstract**

The goal of our research is to investigate the use of internet monitoring in crisis management using linguistic processing and text mining techniques. We present a system that detects and classifies events on topics and, using an altered opinion mining workflow, detects geographical entities related to these events and the sentiments expressed towards them. The results are displayed in customized GoogleMaps views, indicating areas with a potential risk, such as natural disasters, unfavorable weather or threatening protests. All the processing is done in real time and, depending on the monitored sources, our work could be of used as a population warning system, but it could also be useful for regional or local authorities in managing intervention time and resources by prioritizing the situations for which they have to act.

**Keywords:** Opinion mining, Event detection, Crisis management.

## PyBNEq - A tool for computing Bayes-Nash equilibrium

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### **Abstract**

Many real-world problems, including ones which contain germs of a crisis, are modeled as games of incomplete information. Examples include market competition, currency attacks, bank runs, liquidity crises, as well as military conflicts. This paper describes PyBNEq - a tool for computing Bayes-Nash equilibrium for games of incomplete information. It is implemented in Python and has a graphical user interface, allowing the user to load/save/edit game data, and to find Bayes-Nash equilibria. Currently, PyBNEq implements Porter-Nudelman-Shoham algorithm for 2-player games and can be considered as a decision support system for solving games of incomplete information.

**Keywords:** Bayes-Nash equilibrium, decision support systems.

## Quality System for Production Software as Tool for Monitoring and Improving Organization KPIs (Key Performance Indicators)

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### **Abstract**

In this paper we propose a solution as support for quality systems for production software. The motivation behind this study, was to reduce the costs in the production area that are caused by gaps in the quality of the production software. Our proposal: QSPS (Quality System for Production Software) is offering support in the vulnerable points of these quality systems which usually generate nonconformities and have proved to be difficult or impossible to control. QSPS is a method in seven steps or modules that integrates also software tools, templates, checklists, evaluating tools elaborated complying to products, process and system quality standards.

If other analyzed methods like: Scrum, XP, Fuzzy, Prompt, PTA, PRINCE2 or norms like: ISO 9001, ISO 9000-3, TickIT, CMM and CMMI, AQAP-110/AQAP-150, IEEE 730/983 are working in a reactive way, after the developing phase was finished, QSPS is an active system, helping the software developer from the beginning of the implementation phase to improve the developing methodology and to fulfil the quality requirements.

QSPS model was applied in one of the largest European automotive company, the result being finalized in a practical approach of the QSPS, named QSMA Quality System for Manufacturing Application. Using QSMA for industrial projects and not only therefore, has led to accurate running of the production line from beginning of the SOP (Start of Production).

Once this system was implemented and the production software applications were realized under the principles and rules of the QSMA, we defined strategically measurable KPIs (Key Performance Indicators) out of the seven modules of the QSMA. This KPIs have the role to signal every time a production application has not the desired quality level and presents a high level of risk that could cause additional costs in the production.

Based on the KPIs evolution, the weaknesses in the software applications can be identified in real time, so that the developer can react immediately, before occurrence of substantial damage.

**Keywords:** quality improvement, control, monitoring, efficiency, capability, performance, organization KPI.

## Detecting Distributed Denial of Service (DDoS) Attacks in Cloud Computing Environment

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### **Abstract**

This paper is focused on detecting and analyzing the Distributed Denial of Service (DDoS) attacks in cloud computing environments. This type of attacks is often the source of cloud services disruptions. Our solution is to combine the evidences obtained from Intrusion Detection Systems (IDSs) deployed in the virtual machines (VMs) of the cloud systems with a data fusion methodology in the front-end. Specifically, when the attacks appear, the VM- based IDS will yield alerts, which will be stored into the Mysql database placed within the Cloud Fusion Unit (CFU) of the front-end server. We propose a quantitative solution for analyzing alerts generated by the IDSs, using the Dempster-Shafer theory (DST) operations in 3-valued logic and the fault-tree analysis (FTA) for the mentioned flooding attacks. At the last step, our solution uses the Dempsters combination rule to fuse evidence from multiple independent sources.

**Keywords:** cloud computing, cloud security, DDoS attacks, Intrusion Detection Systems, data fusion, Dempster-Shafer theory.

## A Proactive Vertical Handover Decision Algorithm in Heterogeneous Wireless Networks for Critical Services

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### Abstract

Progress in the telecommunications sector has opened new scenarios where users want to access any application or service from any device anywhere at any time, connected to any network. In this environment, the Heterogeneous Wireless Networks (HWN) is the main operating infrastructure, intended to support the technical and quality needs that these users and services demand, along with the versatility and availability that comes with being able to connect to any interface. One of the most important characteristics of HWN is the possibility to connect many kinds of Radio Access Networks (RAN) like WiFi, WiMAX, GSM, UMTS, HSPA, LTE, among others. This brings many challenges in HWN surroundings, one of the most important is ensuring that a user terminal can move from one access network to another without losing connectivity and, of course, the service.

The aim of this paper is to propose a Vertical Handover Decision Algorithm (VHO-DA) that enables a single user terminal to initiate a proactive decision based on user preferences and QoS parameters, while at the same time considering the networks conditions to avoid over burdening an interface. The development of our VHO-DA was addressed like a Multi Criteria Decision Making Problem (MCDM) in order to provide the best possible connection for critical services and maintaining load balancing in networks.

**Keywords:** Multi criteria decision making problem, Handover decision, Heterogeneous wireless networks, Vertical handover.



## Mobile Network QoE-QoS Decision Making Tool for Performance Optimization in Critical Web Service.

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### Abstract

Regardless of the type of service that a company offers the customer satisfaction is a factor for success, if these services are in a highly competitive environment. This situation encourages companies to develop strategies to improve the Quality of the Experience (QoE) of their users. Strategies include improving their processes, or infrastructure for provisioning the services. These kind of decisions are very difficult to take because they unknown how the Key Performance Indicators (KPI) services are correlated with the information about user experience. This problem is approached from the perspective of mobile telecom operators. It has addressed this challenge through the Quality of Service (QoS) concept. Unfortunately, the QoS is only characterized by technical aspects, but the user's criteria are not included. Into a high competitive environment, the user's loyalty is a key component to be considered in the operator's development plan. Nowadays, they focus their efforts to ensure not only the QoS but also the QoE.

The aim of this paper was the develop a decision making tool that allows to the mobile telco operators support their determinations about the maintenance of network infrastructure, as well as the expansion of the same, specifically for their critical web services; based in a correlated information between QoS and QoE. This tool was developed on the basis of the Pseudo Subjective Quality Assessment (PSQA) methodology.

**Keywords:** Decision making tool, Pseudo subjective quality assessment, Quality of experience, Quality of service, Web services.

## Reliable Critical Infrastructure: Multiple Failures for Multicast Using Multi-Objective Approach

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### Abstract

Multicast is one of the new and most used services in telecommunication networks. It is a key for multimedia Internet. However, the network meets big challenges when it faces failures for diverse factors, including natural disasters and mis-configuration. Networks operators need to establish mechanisms for maintain a survivable service, and planning actions for handling those issues. We have studied and implemented an Elitist Evolutionary Algorithm based on SPEA. This mechanism is able to recalculate routes, even when there are multiple failures. The results indicated that our implementation find lower-cost and higheravailability multicast tree for protecting multicast services.

**Keywords:** resilience, protection, survivability networks, multi-objective evolutionary algorithm.

## A Fast KNN Algorithm Based on Centre Vector Condensing

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### **Abstract**

The K-Nearest Neighbor (KNN) is one of the most widely used classification algorithms. For large dataset, the computational demands for classifying patterns using KNN can be expensive. A way to solve this problem is through the condensing approach. It means we remove instances that will bring computational burden but do not contribute to better classification accuracy. In this paper, we propose a new condensing algorithm based on centre vector. The proposed idea is to extract some representative samples and take the processed result as a new training sample set. Our experiments shows that the proposed strategy can dramatically shorten the time consumption compared with the traditional KNN. On average, the speedup ratios improve 90% while classification accuracy only has 6% decrease.

**Keywords:** KNN, Condensing Training Data, Center Vector, Classification Algorithm.

## Decision Analysis Regarding Business Development Strategic Options Using WinQSB Software

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### Abstract

**Purpose** - The aim of this paper is to determine the most efficient strategic alternative in the case of a firm which provides consulting services in crisis management, by taking into account the expected values associated to different levels of supplementary services requests from the part of its customers.

**Design/Methodology/Approach** - The information about the strategic alternatives related to the business development strategy of the company involved in crisis management consulting services was collected after a discussion session with its manager, who also presented the results of a feasibility study which emphasizes the expected values of the strategic alternatives and the probabilities concerning three different levels of supplementary services requests from the part of its customers. Data were analyzed by using decision tree analysis function provided by WinQSB software.

**Findings** - The determination of expected monetary values associated to the strategic alternatives by means of WinQSB software confirms the hypotheses concerning the feasibility analysis results and the managers ability to make the right decision from the financial point of view.

**Managerial implications** - The manager of the company involved in crisis management consulting services will be able to make efficient decisions regarding the business development plan by using appropriate software tools, which deliver real time results in different simulation scenarios.

**Originality/value** - Our paper reveals the advantages of the decision making process simulation, which was facilitated by WinQSB software. Once the optimal decision is found, the company specialized in crisis management consulting services can seek to improve its business development strategy by taking into account more strategic options and levels of supplementary services requests from the part of its customers.

**Keywords:** decision tree analysis, crisis management, information technology, consulting services, expected monetary value.

## Using Artificial Neural Network and Cellular Automata for Land Use Changes

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### **Abstract**

The Artificial Neural Networks (ANN) have the capacity to recognize and classify patterns through training or learning processes. They have been used in urban studies and the results obtained indicate that they provide a better performance of conventional statistical models because they well handle uncertainties of spatial data.

This paper presents an approach and some results based on the Artificial Neural Network training, that can be used to obtain the parameters of transition rules needed for Cellular Automata simulation of land use changes. This approach was proposed in the FUPOL project ([www.fupol.eu](http://www.fupol.eu)), financed by FP7, as a simulation technology for modeling different policy domains regarding land use changes, land use planning, land cover and urban growth. The Artificial Neural Network architecture proposed has three layers: one input layer, one hidden layer and one output layer and the network training is based on backpropagation algorithm, that was implemented in Visual Basic language programme.

**Keywords:** Artificial Neural Network, Backpropagation algorithm, Cellular Automata, land use changes.

## Energy Optimization in Mobile Wireless Sensor Networks with Mobile Targets Achieving Efficient Coverage for Critical Applications

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### **Abstract**

The Mobile Wireless Sensor Networks (MWSN), classified within MANETS, have multiple applications for critical situations management such as target monitoring and tracking in conflict zones, supporting urban security, critical infrastructure monitoring, remote locations exploration (i.e. aerospace exploration), and patients monitoring and care in health facilities, among others. All of these applications have requirements of certain intelligence in the network that can be used for networks self-configuration in order to find targets, guarantee connectivity and information availability until its reception.

This paper proposes a MWSN architecture with an initial random distribution in a specific work area, and a centralized management to perform autonomous decision making about the movement and connectivity of the sensors. The work area presents mobile targets with interesting events which must be covered by the mobile sensors, and thus, send the collected information through the network to any base station available. Our work shows a dynamic mathematical model used to maximize targets coverage and send its sensed information to the base stations available, while minimizing systems power consumption and maximizing operation time. The heuristic algorithm we used to construct and find a feasible solution is also shown.

**Keywords:** MWSN, multiobjective optimization, shortest path, coverage, location, energy efficiency.

## Building a Cloud Governance Bus

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### **Abstract**

Thought still at its first steps, cloud governance lays the foundation upon which business innovations can be built. It fills in the gaps left by cloud providers and allows major players on the IT market to be challenged by small and medium-sized enterprises (SMEs) for their share.

At the core of cloud governance, its bus enables interaction and communication between various services and governance components. The cloud governance bus is a step forward for the enterprise service bus (ESB) into the cloud environment, addressing data integration and full implementation of enterprise integration patterns.

This paper covers current requirements for ESB migration to the cloud environment and proposes a cloud governance architecture that meets the given requirements.

**Keywords:** cloud governance, cloud management, cloud governance bus, enterprise integration patterns.

## Simulating the Need of Working Capital for Decision Making in Investments

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### **Abstract**

Simulation is one of the main instruments within the financial techniques of modeling decisions in condition of risk. The paper compares a couple of simulation methods for Sales and their impact on the need of short term financing. For simulating the need of working capital, the original software implementation is based on the data analysis and statistical facilities of a common spreadsheet program. The case study aims at proving the utility of the software for furnishing results with three of the main known simulation methods and helping the decisional process.

**Keywords:** investment cycle, working capital, stochastic models, computer simulation, case study.



## Implementing the Main Functionalities Required by Semantic Search in Decision-Support Systems

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### **Abstract**

This paper exploits different semantic web technologies and builds a prototype of semantic web mashup functionality based on an architecture proposed by us. The main scope is to improve decision-making processes. In this paper, we are focusing on querying different ontologies in order to improve decision-making semantic search. As a conclusion, we demonstrate that in order to improve decision-making semantic search there is a need of special constructions that a query language must support.

**Keywords:** semantic web, decision-making semantic search, ontology, SPARQL, SQWRL, RDF, OWL.

## Managing Information Technology Security in the Context of Cyber Crime Trends

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### **Abstract**

Cyber-attacks can significantly hurt an organizations IT environment, leading to serious operational disruptions, from simply damaging the first layers of IT security up to identity theft, data leakage and breaking down networks. These actions have a significant business impact that can lead to critical consequences. Moreover, the dangers through which current cybercrimes practices affect organizations present a tendency of developing more rapidly that decision makers can assess them and find countermeasures.

Because cyber threats are somewhat new thus a critical source of risks, within the context of the constantly changing IT environments (e.g. cloud services integration) organizations may not effectively implement and manage cyber threat risk related assessment processes. This paper highlights the importance of designing effective security strategies and proactively addressing cybercrime issues as key elements within the organizational risk management approaches.

Malware rises constantly in impact and complexity and has surpassed the traditional security model. A change of the classical approach must be performed; decision makers need to know how to effectively approach these elements, how to find solutions and take actions to reduce the exposure of these crimes. One of the main ideas of the study is to present the main areas of risks related to cyber security to which an organization is subject to and provide a baseline of an analysis model that would adequately evaluate input data, rank priorities and represent the results and solutions to decrease these risks.

The importance of this study is to increase awareness efforts and to highlight the critical importance of using the full extent of resources provided. Each member of an organization has a significant role in decreasing the exposure to the vulnerabilities created by cyber-attacks.

**Keywords:** cybercrime, IT security, risk assessment, vulnerability management.

## A Novel, Evolutionary Algorithm based on the Automata Theory for the Multi-objective Optimization of Combinatorial Problems

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### **Abstract**

This paper states a novel, Evolutionary Metaheuristic Based on the Automata Theory (EMODS) for the multiobjective optimization of combinatorial problems. The proposed algorithm uses the natural selection theory in order to explore the feasible solutions space of a combinatorial problem. Due to this, local optimums are often avoided. Also, EMODS exploits the optimization process from the Metaheuristic of Deterministic Swapping to avoid finding unfeasible solutions. The proposed algorithm was tested using well known multiobjective TSP instances from the TSPLIB. Its results were compared against others Automata Theory inspired Algorithms using metrics from the specialized literature. In every case, the EMODS results on the metrics were always better and in some of those cases, the distance from the true solutions was 0.89%.

**Keywords:** Combinatorial Optimization, Multi-objective Optimization, Automata Theory, Metaheuristic of Swapping.

## Decision Support for Healthcare ICT Network System Appraisal

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### Abstract

A framework to support the appraisal process to improve the quality of service (QoS) of an Information and Communication Technology (ICT) network system in health care service is presented. Most of health-related activities stand to benefit from ICT endorsement; however, technical problems may appear, as an inadequate physical infrastructure, insufficient access by the user to the hardware/software communication infrastructure and QoS issues. The aim is to develop a prototype assessment model based on data collected from the main users of a health network system. An evaluation process is carried out to analyze and assess the support of QoS of ICT, its infrastructure and user interface perception of the QoS offered through case study for hospitals in Chile. Performance has been evaluated by simulation and modelling network Architecture. The Optimization Network Engineering Tool (OPNET) simulation platform is used to examine the network behaviour and performance to ensure consistency and reliability for thousands of staff across the hospital network.

**Keywords:** ICT, Healthcare, OPNET, MCDM.

## Raising Energy Saving Awareness through Educational Software

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### **Abstract**

A study that I have conducted on a sample of 395 children aged 6 to 12, from both the urban and the rural environments, shows that an increasing number of them use computer related technologies. Today there are an increasing number of web sites that inform the user of different ways to save energy and to reduce energy consumption because it is only natural that the modern information society would go online to research such topics. The development of an educational application that is focused on teaching the children about energy saving is represented on a timeline. We conducted a study in which a number of 29 children, aged between 8 and 10, use this educational application and a questionnaire. We describe the methodology used in the process of data gathering and then the results are interpreted. The state of happiness and fatigue of the child user has a great potential of influencing the way in which he or she uses the application, and implicitly it's educational impact. Because we want to be able to reform these concepts, we will base our work on a series of Markov models and we will define some measures that are relevant to our goal.

**Keywords:** energy saving, educational software, eLearning, case study.

## An Hybrid Text-Image based Authentication for Cloud Services

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### **Abstract**

The problem of securing access to the online information is acute today when access to bank accounts, health records, intellectual property and business or politically sensitive information are made by only a few clicks, regardless of geographic location. At the same time, more and more of these accesses are made from handsets. Cloud Computing is eminently suitable for addressing problems related to limited client resources, as it offloads computation from clients and offers dynamic provisioning of compute resources. Authentication of the companys users to the cloud service is mandatory because in this way it is eliminated the attacks risks to enter into the Cloud services. A suitable authentication is required for organizations that want to access the Cloud services. Our solution regards increasing security at the Security Access Point level of Cloud Computing and it is in fact a strong hybrid user authentication solution based on using image combined with text in order to avoid the weakness of simple user and password solution for authentication. A two factor password image based authentication method is proposed in this paper for cloud services. This authentication approach is used without additional hardware involved and presents the advantages of utilization in terms of security and usability. Every time when the user will be asked to provide his/her identity, a form for each image included in the photo will be listed. The user will have to remember the secret code for each image and to carefully introduce them in the forms. The global cloud access solution will be based on our hybrid proposed text-image based solution, and will be completed by the X.509 certificates.

**Keywords:** authentication, multi factor password authentication, strong authentication, image based, cloud services, IaaS, PaaS, SaaS.

## Using SWRL and JESS to Assess the Risk Level in an Organisation Risk Management Ontology Developed in Protege

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### **Abstract**

Generally, risks are seen as a combination between the probability of a threat to occur and the severity of its consequence.

This study depicts an automated decision way to solve the problem of assigning risk classes to working activities in a simplified ontology model for occupational safety, depending on an existing data entry set, namely probability of a threat to occur and the severity of its consequence.

The ontology model was developed using PROTEGE and the decision process on assigning risk classes to working activities uses specific SWRL rules run through PROTEGE's rule engine plug-in, JESS.

This method can be applied in a real world occupational safety ontology, where a large number of working activities instances can be classified by the risk class assigned to them and where further inferences concerning risk prevention measures or other safety related aspects can be run from this starting point.

**Keywords:** occupational risks, occupational safety, risk management, SWRL rules for risk calculation, risk management SWRL rules.

## Structural Regular Multiple Criteria Linear Programming for Classification Problem

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### **Abstract**

Classification problem has attracted an increasing amount of interest. Various classifiers have been proposed in the last decade, such as ANNs, LDA, and SVM. Regular Multiple Criteria Linear Programming (RMCLP) is an effective classification method, which was proposed by Shi and his colleagues and have been applied to handle different real-life data mining problems. In this paper, inspired by the application potential of RMCLP, we propose a novel Structural RMCLP (called SRMCLP) method for classification problem. Unlike RMCLP, SRMCLP is sensitive to the structure of the data distribution and can construct more reasonable classifiers by exploiting these prior data distribution information within classes. The corresponding optimization problem of SRMCLP can be solved by a standard quadratic programming. The effectiveness of the proposed method is demonstrated via experiments on synthetic and available benchmark datasets.

**Keywords:** classification, RMCLP, structural information of data, SVM.



## Function Approximation with ARTMAP Architectures

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### **Abstract**

We analyze function approximation (regression) capability of Fuzzy ARTMAP (FAM) architectures - well-known incremental learning neural networks. We focus especially on the universal approximation property. In our experiments, we compare the regression performance of FAM networks with other standard neural models. It is the first time that ARTMAP regression is overviewed, both from theoretical and practical points of view.

**Keywords:** Fuzzy ARTMAP, universal approximation, regression.

## Developing Integrated Performance Measurement System using Component based Approach

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### **Abstract**

In an industrial context defined by more acute competition, performance measurement becomes a control tool. The Business Intelligence module of Manufacturing Execution System (MES) software achieves Performances analysis function. However, to implement performance indicators in information system is a difficult problem. Indeed, the enterprises need methods to specify and to install their Performance Measurement System (PMS). In this paper, we propose a methodology of performance indicators implementation. We use the Component Based Programming to develop PMS model. This method facilitates Performances Measurement System design and implementation.

**Keywords:** Manufacturing Execution Systems, Business Intelligence. Performances Measurement Systems, Component Based Approach.

## The implications of Geographic Information Systems in Bio-Economic Analyses of Some Risk Factors in the Rural Area of "Marginimea Sibiului"

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### **Abstract**

Agriculture is a business sector ideally suited for the application of Geographic Information Systems (GIS) because it is natural resource based, requires the movement, distribution, and/or utilization of large quantities of products, goods, and services, and is increasingly required to record details of its business operations from the field to the marketplace. Nearly all agricultural data has some form of spatial component, and a GIS allows you to visualize information that might otherwise be difficult to interpret. Environment has a major impact on agriculture. In this paper we presented how GIS software can be used to analyze risk factors that influence agricultural production naturally. Natural risk factors were taken into account are: land degradation, flooding, humidity, action on farmland of the wildlife. The conclusions drawn from this paper using GIS allows the adoption of important measures on a short or long time to reduce natural risk factors on agricultural production. The advantage of this model is possibility to be extended to national, regional and global area.

**Keywords:** Geographic Information Systems, bio-economy, risk factors, Information and Communication Technologies.

## Solving Method for Linear Fractional Optimization Problem with Fuzzy Coefficients in the Objective Function

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### **Abstract**

The importance of linear fractional programming comes from the fact that many real life problems are based on the ratio of physical or economic values (for example cost/time, cost/volume, profit/cost or any other quantities that measure the efficiency of a system) expressed by linear functions. Usually, the coefficients used in mathematical models are subject to errors of measurement or vary with market conditions. Dealing with inaccuracy or uncertainty of the input data is made possible by means of the fuzzy set theory.

Our purpose is to introduce a method of solving a linear fractional programming problem with uncertain coefficients in the objective function. We have applied recent concepts of fuzzy solution based on  $\alpha$ -cuts and Pareto optimal solutions of a bi-objective optimization problem.

As far as solving methods are concerned, the linear fractional programming, as an extension of linear programming, is easy enough to be handled by means of linear programming but complicated enough to elude a simple analogy. We follow the construction of the fuzzy solution for the linear case introduced by Dempe and Ruziyeva (2012), avoid the inconvenience of the classic weighted sum method for determining Pareto optimal solutions and generate the set of solutions for a linear fractional program with fuzzy coefficients in the objective function.

**Keywords:** fuzzy programming, fractional programming, multi-objective programming.

## Smallest Number of Sensors for k-Covering

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### **Abstract**

This paper presents some theoretical results on the smaller number  $N_k(a, b)$  of sensors to achieve  $k$  coverage for the rectangular area  $[0, a] \times [0, b]$ . The first properties show the numbers  $N_k(a, b)$  are sub-additive and increasing on each variable. Based on these results, some lower and upper bounds for  $N_k(a, b)$  are introduced. The main result of the article proves that the minimal density of sensors to achieve  $k$ -coverage is  $\lambda(k) \leq k/2$  improving a previous result of Ammari and Das [2]. Finally, the numbers  $N_1(a, b)$  are tabled for some small values of  $a, b$ .

**Keywords:** WSN Networks, Coverage, Range.

## Disaster Response Project Scheduling Problem: A Resolution Method Based on a Game-Theoretical Model

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### **Abstract**

We present a particular disaster response project scheduling problem (DRPSP) motivated by Fukushima's nuclear accident of Japan in 2011. We describe the problem as  $MPS; R, N | prec, d_n | \sum c_k f(r_k(S))$  by using Hartmann and Briskorn scheme and formulate a mixed integer linear programming (MILP) model. By considering the NP-hardness of problem, we propose a resolution method based on game theory. This method associates the DRPSP to a non-cooperative game model, such that game solution is a feasible solution of the problem. In order to explore the potential of the proposed model and resolution method performance, computational experiments are realized. The results of resolution method show on average, that the method finds a feasible solution with a difference of 19.6% with respect to optimal solution into one percent of the time required by the MILP over GAMS 22.7.2/CPLEX 11.0.

**Keywords:** Disaster response, project scheduling problem, resolution method, game-theoretical model.

## The Specification of ETL Transformation Operations Based on Weaving Models

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### **Abstract**

In the ETL process the transformation of data is achieved through the execution of a set of transformation operations. The realization of this process (the order in which the transformation operations must be executed) should be preceded by a specification of the transformation process at a higher level of abstraction. The specification is given through mappings representing abstract operations specific to the transformation process. These mappings are determined through weaving models and metamodels. A generated weaving metamodel (GWMM) is proposed giving the complete mapping semantics through specific link types (representing the abstract operations) and appropriate OCL constraints. Weaving models specifying the actual mappings must be in accordance with this proposed GWMM.

**Keywords:** ETL process, MDD, Weaving models.

## Error Correction Method in Classification by Using Multiple-Criteria and Multiple-Constraint Levels Linear Programming

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### **Abstract**

In classification based on multiple-criteria linear programming (MCLP), we need to find the optimal solution of the MCLP problem as a classifier. According to dual theory, multiple criteria can be switched to multiple constraint levels, and vice versa. An MCLP problem can be logically extended into a multiple-criteria and multiple-constraint levels linear programming (MC2LP) problem. In many applications, such as credit card account classification, how to handle two types of error is a key issue. The errors can be caused by a fixed cutoff between a good group and a bad group. Using the structure of MC2LP, which allows two alterable cutoffs, two types of errors can be systematically corrected. In order to do so, a penalty (or cost) is imposed to find the potential solution for all possible trade-offs in solving MC2LP problem. Some correction strategies can be investigated by the solution procedure. Furthermore, a framework of decision supporting system can be illustrated for various real-life applications of the proposed method.

**Keywords:** Classification, Two Types of Error, Multiple-Criteria Linear Programming, Multiple-Criteria and Multiple-Constraint Levels Linear Programming, Decision Supporting System.



## Alternative Wireless Network Technology Implementation for Rural Zones

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### Abstract

This paper describes a methodology that allows wireless networking allowing interconnection to the Internet through a Gateway, to interact and obtain products and services delivery. These Wireless Mesh Network(WMN), are based on routers which are programmed to work as nodes of a network. There are certain routers that allow the programming of its firmware to form network nodes. Communication is transmitted between nodes in the network and it is possible to cover long distances. The signal of a distant node, hop from node to node till reach the Gateway. This generates delays and congestion in the network. A path that contains nodes that make faster connection to the Gateway can be designed as a solution. This is called a backbone, has a different channel frequency of the common nodes. The characteristics of these networks is its fast implementation and low cost. These make them useful for rural areas, for developing countries and remote regions.

**Keywords:** Wireless Mesh Network, Routers, Back bones, Low cost communication Network

## Issues on Applying Knowledge-Based Techniques in Real-Time Control Systems

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### Abstract

At the time being knowledge-based systems are used in almost all life aspects. The main reason for trying to use knowledge-based systems in real-time control is to reduce cognitive load on users (overload), their application proving to be important when conventional techniques have failed or are not sufficiently effective [1]. The development of automated diagnosis techniques and systems can help also to minimize downtime and maintain efficient output. This paper presents some issues of applying knowledge-based systems to real-time control systems. It describes and analyzes the main issues concerning the real-time domain and provides possible solutions, such as a set of requirements that a real-time knowledge-based system must satisfy. The paper proposes a possible architecture for applying knowledge-based techniques in real-time control systems. Finally, a way of employing knowledge-based techniques for extending the existing automatic control and monitoring system for the geothermal plant from the University of Oradea is presented.

**Keywords:** Real-time control systems, knowledge-based systems, Programmable Logic Controller.

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