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IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is about information processing may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

Lazaros Iliadis Ilias Maglogiannis
Harris Papadopoulos (Eds.)

Artificial Intelligence Applications and Innovations

8th IFIP WG 12.5 International Conference, AIAI 2012
Halkidiki, Greece, September 27-30, 2012
Proceedings, Part I



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Preface

After 50 years of research in Artificial Intelligence (AI), the dream of intelligent machines that use sophisticated and advanced approaches is becoming a reality. AI researchers have already created systems capable of tackling complicated and challenging problems. Scientists have developed analytical models and corresponding systems that can mimic human behavior and cognition: they can understand speech, beat expert human chess players, and perform countless other feats that can have a potential impact on our everyday lives. It is a fact that humans are a species that learn by training plus trial and error, so it can be considered rational to see AI more as a blessing and less as an inhibition. On the other hand the misuse of AI technology is always a potential.

The eighth AIAI conference was supported and sponsored by the International Federation for Information Processing (IFIP). AIAI is the official conference of the IFIP Working Group 12.5 “Artificial Intelligence Applications”. IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress, held in Paris the previous year. The first AIAI conference was held in Toulouse, France in 2004 and since then it has been held annually, offering scientists the chance to present the achievements of AI applications in various fields.

This Springer volume belongs to the IFIP AICT series. It contains the papers that were accepted to be presented orally at the main event of the eighth AIAI conference. A second volume contains the papers accepted for the eight workshops that were organized as parallel events, namely: the second AIAB, the first AIEIA, the second CISE, the first COPA, the first IIVC, the third ISQL, the first MHDW, and the first WADTMB. More details on the workshops will be given in the following paragraphs.

The eighth AIAI conference was held during September 27–30, 2012 on the Sithonia peninsula of Halkidiki, Greece. The diverse nature of the papers presented demonstrates the vitality of AI computing approaches and proves the very wide range of AI applications as well. On the other hand, this volume contains basic research papers, presenting variations and extensions of several existing methodologies.

The response to the call for papers was more than satisfactory with 98 papers initially submitted to the main event. All papers were peer reviewed by at least two independent academic referees. Where needed a third referee was consulted to resolve any conflicts.

A total of 43.9% of the submitted manuscripts (44 papers) have been published in these proceedings as full papers whereas 5.1% have been published as short ones. The authors of the accepted papers of the main event came from 17 different countries, namely: Belgium, Croatia, Cyprus, the Czech Repub-

lic, France, Germany, Greece, Iran, Italy, Pakistan, Poland, Portugal, Romania, Russia, Tunisia, the UK, and the USA.

Three keynote speakers were invited to lecture at AIAI 2012:

1. Dr. Danil Prokhorov from Toyota Research Institute NA, Ann Arbor, Michigan delivered a talk entitled “Computational Intelligence in Automotive Applications”.
2. Prof. David Robertson from the University of Edinburgh talked on “Knowledge Engineering on a Social Scale”.
3. Prof. Dr. Bernard De Baets from KERMIT, Ghent University talked on: “Monotonicity Issues in Fuzzy Modelling, Machine Learning and Decision Making”.

Also, two tutorials were organized in the framework of the AIAI 2012:

1. Prof. Tatiana Tambouratzis from the University of Piraeus focused on “Identification of Key Music Symbols for Optical Music Recognition and On-Screen Presentation”.
2. Prof. Costin Badica from the University of Craiova focused on “Negotiations in Multi-Agent Systems”.

The accepted papers of AIAI 2012 are related to the following thematic topics:

- Artificial Neural Networks
- Bioinformatics
- Clustering
- Control Systems
- Data Mining
- Engineering Applications of AI
- Face Recognition - Pattern Recognition
- Filtering
- Fuzzy Logic
- Genetic Algorithms, Evolutionary Computing
- Hybrid Clustering Systems
- Image and Video Processing
- Multi Agent Systems
- Multi Attribute DSS
- Ontology - Intelligent Tutoring systems
- Optimization, Genetic Algorithms
- Recommendation Systems
- Support Vector Machines - Classification
- Text Mining

A total of eight workshops were organized as parallel events to AIAI 2012. Each one of these workshops was related to a specific AI topic, and was managed by internationally well-recognized colleagues, who put together the specific workshop programs mainly by invitation to prominent authors.

All workshops received a high response from scientists from all parts of the globe, from Europe to Australia, and we would like to thank all participants for

this. More specifically, scientists from 13 countries (Australia, Belgium, Cyprus, Finland, France, Germany, Greece, Italy, Romania, South Korea, Spain, the UK, and the USA) submitted interesting and innovative research papers to the eight workshops.

- We are grateful to Profs. Harris Papadopoulos, Efthymoulos Kyriacou (Frederick University, Cyprus) Prof. Ilias Maglogiannis (University of Central Greece) and Prof. George Anastassopoulos (Democritus University of Thrace, Greece) for their common effort towards the organization of the Second Artificial Intelligence Applications in Biomedicine Workshop (AIAB 2012).
- We wish to express our gratitude to Prof. Achilleas Kameas and Dr. Antonia Stefani (Hellenic Open University, Greece) for adding the First AI in Education Workshop: Innovations and Applications (AIEIA 2012) to the family of the AIAI workshops.
- We are very happy to see that AIAI workshops are repeated every year with the presentation of new and fresh research efforts. Many thanks to Prof. Andreas Andreou (Cyprus University of Technology) and Dr. Efi Papatheocharous (University of Cyprus) for the organization of the Second International Workshop on Computational Intelligence in Software Engineering (CISE 2012).
- We are also very happy about the organization of the First Conformal Prediction and its Applications Workshop (COPA 2012) by Prof. Harris Papadopoulos (Frederick University, Cyprus) and Profs. Alex Gammerman and Vladimir Vovk (Royal Holloway, University of London, UK).
- The First Intelligent Innovative Ways for Video-to-Video Communication in Modern Smart Cities Workshop (IIVC 2012) was an important part of the AIAI 2012 event and it was driven by the hard work of Drs. Ioannis P. Chochliouros and Ioannis M. Stephanakis (Hellenic Telecommunications Organization - OTE, Greece), and Profs. Vishanth Weerakkody (Brunel University, UK) and Nancy Alonistioti (National & Kapodistrian University of Athens, Greece).
- It was a pleasure to host the Third Intelligent Systems for Quality of Life Information Services Workshop (ISQL 2012) for one more time in the framework of the AIAI conference. We wish to sincerely thank Profs. Kostas Karatzas (Aristotle University of Thessaloniki, Greece), Lazaros Iliadis (Democritus University of Thrace, Greece), and Mihaela Oprea (University of Petroleum-Gas of Ploesti, Romania) for the presentation of AI applications in the crucial topics of sustainable development and quality of life.
- We would like thank Profs. Spyros Sioutas, Ioannis Karydis, and Katia Keramanidis (all with the Ionian University, Greece) for their hard work in organizing the First Mining Humanistic Data Workshop (MHDW 2012).
- Finally, we would like to thank Profs. Athanasios Tsakalidis and Christos Makris (all with the University of Patras, Greece) for the very successful organization of the First Workshop on Algorithms for Data and Text Mining in Bioinformatics (WADTMB 2012).

After eight years, the AIAI conference has become a mature well-established event with loyal followers and it has plenty of new and high-quality research results to offer to the International scientific community. We hope that these proceedings will be of major interest to scientists and researchers world wide and that they will stimulate further research in the domain of artificial neural networks and AI in general.

September 2012

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Vouyioukas, Demosthenis
Vovk, Volodya
Yialouris, Kostas
Yuen, Peter

Table of Contents – Part I

ANN-Classification and Pattern Recognition

| | |
|--|----|
| A Probabilistic Approach to Organic Component Detection in Leishmania Infected Microscopy Images | 1 |
| <i>Pedro Alves Nogueira and Luis Filipe Teófilo</i> | |
| Combination of M-Estimators and Neural Network Model to Analyze Inside/Outside Bark Tree Diameters | 11 |
| <i>Kyriaki Kitikidou, Elias Milios, Lazaros Iliadis, and Minas Kaymakis</i> | |
| Multi-classify Hybrid Multilayered Perceptron (HMLP) Network for Pattern Recognition Applications | 19 |
| <i>Fakroul Ridzuan Bin Hashim, John J. Soraghan, and Lykourgos Petropoulakis</i> | |
| Support Vector Machine Classification of Protein Sequences to Functional Families Based on Motif Selection | 28 |
| <i>Danai Georgara, Katia L. Kermanidis, and Ioannis Mariolis</i> | |

Optimization-Genetic Algorithms

| | |
|---|----|
| A Multi-objective Genetic Algorithm for Software Development Team Staffing Based on Personality Types | 37 |
| <i>Constantinos Stylianou and Andreas S. Andreou</i> | |
| An Empirical Comparison of Several Recent Multi-objective Evolutionary Algorithms | 48 |
| <i>Thomas White and Shan He</i> | |
| Fine Tuning of a Wet Clutch Engagement by Means of a Genetic Algorithm | 58 |
| <i>Yu Zhong, Abhishek Dutta, Bart Wyns, Clara-Mihaela Ionescu, Gregory Pinte, Wim Symens, Julian Stoev, and Robin De Keyser</i> | |

Artificial Neural Networks

| | |
|--|----|
| A Representational MDL Framework for Improving Learning Power of Neural Network Formalisms | 68 |
| <i>Alexey Potapov and Maxim Peterson</i> | |
| On the Design and Training of Bots to Play Backgammon Variants | 78 |
| <i>Nikolaos Papahristou and Ioannis Refanidis</i> | |

Surrogate Modelling of Solutions of Integral Equations by Neural Networks 88
Věra Kůrková

Learning and Data Mining

A Regularization Network Committee Machine of Isolated Regularization Networks for Distributed Privacy Preserving Data Mining 97
Yiannis Kokkinos and Konstantinos G. Margaritis

Improved POS-Tagging for Arabic by Combining Diverse Taggers 107
Maytham Abbas and Allan Ramsay

Multithreaded Implementation of the Slope One Algorithm for Collaborative Filtering 117
Efthalia Karydi and Konstantinos G. Margaritis

Experimental Identification of Pilot Response Using Measured Data from a Flight Simulator 126
Jan Boril and Rudolf Jalovecky

A Probabilistic Knowledge-Based Information System for Environmental Policy Modeling and Decision Making 136
Hamid Jahankhani, Elias Pimenidis, and Amin Hosseinian-Far

Conceptualization and Significance Study of a New Appliation CS-MIR 146
Kaichun K. Chang, Carl Barton, Costas S. Iliopoulos, and Jyh-Shing Roger Jang

Physical Bongard Problems 157
Erik Weitnauer and Helge Ritter

Taxonomy Development and Its Impact on a Self-learning e-Recruitment System 164
Evanthia Faliagka, Ioannis Karydis, Maria Rigou, Spyros Sioutas, Athanasios Tsakalidis, and Giannis Tzimas

Fuzzy Logic

Fuzzy Energy-Based Active Contours Exploiting Local Information 175
Stelios Krinidis and Michail Krinidis

Fuzzy Friction Modeling for Adaptive Control of Mechatronic Systems 185
Jacek Kabziński

| | |
|--|-----|
| Fuzzy Graph Language Recognizability | 196 |
| <i>Antonios Kalampakas, Stefanos Spartalis, and Lazaros Iliadis</i> | |
| Adaptive Intuitionistic Fuzzy Inference Systems of Takagi-Sugeno Type for Regression Problems | 206 |
| <i>Petr Hájek and Vladimír Olej</i> | |
| A Hybrid Method for Evaluating Biomass Suppliers – Use of Intuitionistic Fuzzy Sets and Multi-Periodic Optimization | 217 |
| <i>Vassilis C. Gerogiannis, Vasiliki Kazantzi, and Leonidas Anthopoulos</i> | |

Classification Pattern Recognition

| | |
|--|-----|
| A Neural Network for Spatial and Temporal Modeling of foF2 Data Based on Satellite Measurements | 224 |
| <i>Haris Haralambous and Harris Papadopoulos</i> | |
| Detecting Glycosylations in Complex Samples | 234 |
| <i>Thorsten Johl, Manfred Nimtz, Lothar Jänsch, and Frank Klawonn</i> | |
| Experiments with Face Recognition Using a Novel Approach Based on CVQ Technique | 244 |
| <i>Arman Mehrbakhsh and Alireza Khalilian</i> | |
| Novel Matching Methods for Automatic Face Recognition Using SIFT | 254 |
| <i>Ladislav Lenc and Pavel Král</i> | |

Multi Agent Systems

| | |
|--|-----|
| Exploring the Design Space of a Declarative Framework for Automated Negotiation: Initial Considerations | 264 |
| <i>Alex Muscar and Costin Bădică</i> | |
| Hybrid and Reinforcement Multi Agent Technology for Real Time Air Pollution Monitoring | 274 |
| <i>Andonis Papaleonidas and Lazaros Iliadis</i> | |
| Rule-Based Behavior Prediction of Opponent Agents Using Robocup 3D Soccer Simulation League Logfiles | 285 |
| <i>Asma Sanam Larik and Sajjad Haider</i> | |

Multi Attribute DSS

| | |
|---|-----|
| An Ontology-Based Model for Student Representation in Intelligent Tutoring Systems for Distance Learning | 296 |
| <i>Ioannis Panagiotopoulos, Aikaterini Kalou, Christos Pierrakeas, and Achilles Kameas</i> | |

Assistant Tools for Teaching FOL to CF Conversion 306
Foteini Grivokostopoulou, Isidoros Perikos, and Ioannis Hatzilygeroudis

Effective Diagnostic Feedback for Online Multiple-Choice Questions 316
Ruisheng Guo, Dominic Palmer-Brown, Sin Wee Lee, and Fang Fang Cai

Clustering

A Fast Hybrid k -NN Classifier Based on Homogeneous Clusters 327
Stefanos Ougiaroglou and Georgios Evangelidis

A Spatially-Constrained Normalized Gamma Process for Data Clustering 337
Sotirios P. Chatzis, Dimitrios Korkinof, and Yiannis Demiris

GamRec: A Clustering Method Using Geometrical Background Knowledge for GPR Data Preprocessing 347
Ruth Janning, Tomáš Horváth, Andre Busche, and Lars Schmidt-Thieme

Enhancing Clustering by Exploiting Complementary Data Modalities in the Medical Domain 357
Samah Jamal Fodeh, Ali Haddad, Cynthia Brandt, Martin Schultz, and Michael Krauthammer

Extraction of Web Image Information: Semantic or Visual Cues? 368
Georgina Tryfou and Nicolas Tsapatsoulis

Trust-Aware Clustering Collaborative Filtering: Identification of Relevant Items 374
Cosimo Birtolo, Davide Ronca, and Gianluca Aurilio

Unsupervised Detection of Fibrosis in Microscopy Images Using Fractals and Fuzzy c-Means Clustering 385
S.K. Tasoulis, Ilias Maglogiannis, and V.P. Plagianakos

Image-Video Classification and Processing

Image Threshold Selection Exploiting Empirical Mode Decomposition 395
Stelios Krinidis and Michail Krinidis

Modelling Crowdsourcing Originated Keywords within the Athletics Domain 404
Zenonas Theodosiou and Nicolas Tsapatsoulis

| | |
|--|-----|
| Scalable Object Encoding Using Multiplicative Multilinear Inter-camera Prediction in the Context of Free View 3D Video | 414 |
| <i>Ioannis M. Stephanakis and George C. Anastassopoulos</i> | |

Engineering Applications of AI and Artificial Neural Networks

| | |
|---|-----|
| Correlation between Seismic Intensity Parameters of HHT-Based Synthetic Seismic Accelerograms and Damage Indices of Buildings | 425 |
| <i>Eleni Vrochidou, Petros Alvanitopoulos, Ioannis Andreadis, and Anaxagoras Elenas</i> | |
| Improving Current and Voltage Transformers Accuracy Using Artificial Neural Network | 435 |
| <i>Haidar Samet, Farshid Nasrfard Jahromi, Arash Dehghani, and Afsaneh Narimani</i> | |
| Modeling of Syllogisms in Analog Hardware | 443 |
| <i>Darko Kovacevic, Nikica Pribacic, Radovan Antonic, Asja Kovacevic, and Mate Jovic</i> | |
| A New Approach to High Impedance Fault Detection Based on Correlation Functions | 453 |
| <i>Najmeh Faridnia, Haidar Samet, and Babak Doostani Dezfuli</i> | |
| Network Selection in a Virtual Network Operator Environment | 463 |
| <i>Ioannis Chamodrakas and Drakoulis Martakos</i> | |
| Position and Velocity Predictions of the Piston in a Wet Clutch System during Engagement by Using a Neural Network Modeling | 474 |
| <i>Yu Zhong, Bart Wyns, Abhishek Dutta, Clara-Mihaela Ionescu, Gregory Pinte, Wim Symens, Julian Stoev, and Robin De Keyser</i> | |
| Uniform Asymptotic Stability and Global Asymptotic Stability for Time-Delay Hopfield Neural Networks | 483 |
| <i>Adnene Arbi, Chaouki Aouiti, and Abderrahmane Touati</i> | |
| Author Index | 493 |

Table of Contents – Part II

Second Artificial Intelligence Applications in Biomedicine Workshop (AIAB 2012)

| | |
|--|----|
| Future SDP through Cloud Architectures | 1 |
| <i>Foteini Andriopoulou and Dimitrios K. Lymberopoulos</i> | |
| A Mahalanobis Distance Based Approach towards the Reliable Detection of Geriatric Depression Symptoms Co-existing with Cognitive Decline | 16 |
| <i>Christos A. Frantzidis, Maria D. Diamantoudi, Eirini Grigoriadou, Anastasia Semertzidou, Antonis Billis, Evdokimos Konstantinidis, Manousos A. Klados, Ana B. Vivas, Charalampos Bratsas, Magda Tsolaki, Constantinos Pappas, and Panagiotis D. Bamidis</i> | |
| Combining Outlier Detection with Random Walker for Automatic Brain Tumor Segmentation | 26 |
| <i>Vasileios G. Kanas, Evangelia I. Zacharaki, Evangelos Dermatas, Anastasios Bezerianos, Kyriakos Sgarbas, and Christos Davatzikos</i> | |
| Feature Selection Study on Separate Multi-modal Datasets: Application on Cutaneous Melanoma | 36 |
| <i>Konstantinos Moutselos, Aristotelis Chatziioannou, and Ilias Maglogiannis</i> | |
| Artificial Neural Networks to Investigate the Importance and the Sensitivity to Various Parameters Used for the Prediction of Chromosomal Abnormalities | 46 |
| <i>Andreas C. Neocleous, Kypros H. Nicolaides, Argyro Syngelaki, Kleanthis C. Neokleous, Gianna Loizou, Costas K. Neocleous, and Christos N. Schizas</i> | |
| Steps That Lead to the Diagnosis of Thyroid Cancer: Application of Data Flow Diagram | 56 |
| <i>Kallirroï Paschali, Anna Tsakona, Dimitrios Tsolis, and Georgios Skapetis</i> | |
| Random Walking on Functional Interaction Networks to Rank Genes Involved in Cancer | 66 |
| <i>Matteo Re and Giorgio Valentini</i> | |

| | |
|---|----|
| Fuzzy Multi-channel Clustering with Individualized Spatial Priors for Segmenting Brain Lesions and Infarcts | 76 |
| <i>Evangelia I. Zacharaki, Guray Erus, Anastasios Bezerianos, and Christos Davatzikos</i> | |

| | |
|---|----|
| Deployment of pHealth Services upon Always Best Connected Next Generation Network | 86 |
| <i>Georgia N. Athanasiou and Dimitrios K. LyMBERopoulos</i> | |

First AI in Education Workshop: Innovations and Applications (AIeIA 2012)

| | |
|--|----|
| An Ontological Approach for Domain Knowledge Modeling and Management in E-Learning Systems | 95 |
| <i>Ioannis Panagiotopoulos, Aikaterini Kalou, Christos Pierrakeas, and Achilles Kameas</i> | |

| | |
|--|-----|
| Association Rules Mining from the Educational Data of ESOG Web-Based Application | 105 |
| <i>Stefanos Ougiaroglou and Giorgos Paschalis</i> | |

| | |
|--|-----|
| Adaptation Strategies: A Comparison between E-Learning and E-Commerce Techniques | 115 |
| <i>Bill Vassiliadis and Antonia Stefani</i> | |

Second International Workshop on Computational Intelligence in Software Engineering (CISE 2012)

| | |
|---|-----|
| Player Modeling Using HOSVD towards Dynamic Difficulty Adjustment in Videogames | 125 |
| <i>Kostas Anagnostou and Manolis Maragoudakis</i> | |

| | |
|--|-----|
| Proposing a Fuzzy Adaptation Mechanism Based on Cognitive Factors of Users for Web Personalization | 135 |
| <i>Efi Papatheocharous, Marios Belk, Panagiotis Germanakos, and George Samaras</i> | |

| | |
|--|-----|
| Computational Intelligence for User and Data Classification in Hospital Software Development | 145 |
| <i>Masoud Mohammadian, Dimitrios Hatzinakos, and Petros Spachos</i> | |

| | |
|---|-----|
| Artificial Intelligence Applications for Risk Analysis, Risk Prediction and Decision Making in Disaster Recovery Planning | 155 |
| <i>Masoud Mohammadian</i> | |

First Conformal Prediction and Its Applications Workshop (COPA 2012)

| | |
|--|-----|
| Application of Conformal Prediction in QSAR | 166 |
| <i>Martin Eklund, Ulf Norinder, Scott Boyer, and Lars Carlsson</i> | |
| Online Cluster Approximation via Inequality | 176 |
| <i>Shriprakash Sinha</i> | |
| Reliable Probability Estimates Based on Support Vector Machines for Large Multiclass Datasets | 182 |
| <i>Antonis Lambrou, Harris Papadopoulos, Iliia Nouretdinov, and Alexander Gammerman</i> | |
| Online Detection of Anomalous Sub-trajectories: A Sliding Window Approach Based on Conformal Anomaly Detection and Local Outlier Factor | 192 |
| <i>Rikard Lazhammar and Göran Falkman</i> | |
| Introduction to Conformal Predictors Based on Fuzzy Logic Classifiers | 203 |
| <i>A. Murari, Jesús Vega, D. Mazon, T. Courregelongue, and JET-EFDA Contributors</i> | |
| Conformal Prediction for Indoor Localisation with Fingerprinting Method | 214 |
| <i>Khuong Nguyen and Zhiyuan Luo</i> | |
| Multiprobabilistic Venn Predictors with Logistic Regression | 224 |
| <i>Iliia Nouretdinov, Dmitry Devetyarov, Brian Burford, Stephane Camuzeaux, Aleksandra Gentry-Maharaj, Ali Tiss, Celia Smith, Zhiyuan Luo, Alexey Chervonenkis, Rachel Hallett, Volodya Vovk, Mike Waterfield, Rainer Cramer, John F. Timms, Ian Jacobs, Usha Menon, and Alexander Gammerman</i> | |
| A Conformal Classifier for Dissimilarity Data | 234 |
| <i>Frank-Michael Schleich, Xibin Zhu, and Barbara Hammer</i> | |
| Identification of Confinement Regimes in Tokamak Plasmas by Conformal Prediction on a Probabilistic Manifold | 244 |
| <i>Geert Verdoolaege, Jesús Vega, Andrea Murari, and Guido Van Oost</i> | |
| Distance Metric Learning-Based Conformal Predictor | 254 |
| <i>Fan Yang, Zhigang Chen, Guifang Shao, and Huazhen Wang</i> | |

First Intelligent Innovative Ways for Video-to-Video Communication in Modern Smart Cities Workshop (IIVC 2012)

LiveCity: A Secure Live Video-to-Video Interactive City Infrastructure 260
Joao Goncalves, Luis Cordeiro, Patricio Batista, and Edmundo Monteiro

Enhancing Education and Learning Capabilities via the Implementation of Video-to-Video Communications 268
Ioannis P. Chochliouros, Anastasia S. Spiliopoulou, Evangelos Sfakianakis, Ioannis M. Stephanakis, Donal Morris, and Martin Kennedy

Developing Innovative Live Video-to-Video Communications for Smarter European Cities 279
Ioannis P. Chochliouros, Ioannis M. Stephanakis, Anastasia S. Spiliopoulou, Evangelos Sfakianakis, and Latif Ladid

Utilizing a High Definition Live Video Platform to Facilitate Public Service Delivery 290
Vishanth Weerakkody, Ramzi El-Haddadeh, Ioannis P. Chochliouros, and Donal Morris

Multimedia Content Distribution over Next-Generation Heterogeneous Networks Featuring a Service Architecture of Sliced Resources 300
Ioannis M. Stephanakis and Ioannis P. Chochliouros

Video-to-Video for e-Health: Use Case, Concepts and Pilot Plan 311
Makis Stamatelatos, George Katsikas, Petros Makris, Nancy Alonistioti, Serafeim Antonakis, Dimitrios Alonistiotis, and Panagiotis Theodossiadis

The Impact of IPv6 on Video-to-Video and Mobile Video Communications 322
Latif Ladid and Ioannis P. Chochliouros

Third Intelligent Systems for Quality of Life Information Services Workshop (ISQL 2012)

Low Power and Bluetooth-Based Wireless Sensor Network for Environmental Sensing Using Smartphones 332
Siamak Aram, Amedeo Troiano, Francesco Rugiano, and Eros Pasero

| | |
|--|-----|
| Making Sense of Sensor Data Using Ontology: A Discussion for Residential Building Monitoring | 341 |
| <i>Markus Stocker, Mauno Rönkkö, and Mikko Kolehmainen</i> | |
| Personalized Environmental Service Orchestration for Quality of Life Improvement | 351 |
| <i>Leo Wanner, Stefanos Vrochidis, Marco Rospocher, Jürgen Moßgraber, Harald Bosch, Ari Karppinen, Maria Myllynen, Sara Tonelli, Nadjat Bouayad-Agha, Gerard Casamayor, Thomas Ertl, Désirée Hilbring, Lasse Johansson, Kostas Karatzas, Ioannis Kompatsiaris, Tarja Koskentalo, Simon Mille, Anastasia Moumtzidou, Emanuele Pianta, Luciano Serafini, and Virpi Tarvainen</i> | |
| Extraction of Environmental Data from On-Line Environmental Information Sources | 361 |
| <i>Stefanos Vrochidis, Victor Epitropou, Anastasios Bassoukos, Sascha Voth, Kostas Karatzas, Anastasia Moumtzidou, Jürgen Moßgraber, Ioannis Kompatsiaris, Ari Karppinen, and Jaakko Kukkonen</i> | |
| Agent-Based Modeling of an Air Quality Monitoring and Analysis System for Urban Regions | 371 |
| <i>Mihaela Oprea</i> | |
| A Microcontroller-Based Radiation Monitoring and Warning System . . . | 380 |
| <i>Vasile Buruiană and Mihaela Oprea</i> | |
| Investigation and Forecasting of the Common Air Quality Index in Thessaloniki, Greece. | 390 |
| <i>Ioannis Kyriakidis, Kostas Karatzas, George Papadourakis, Andrew Ware, and Jaakko Kukkonen</i> | |
| First Mining Humanistic Data Workshop (MHDW 2012) | |
| Success Is Hidden in the Students' Data | 401 |
| <i>Dimitrios Kravvaris, Katia L. Kermanidis, and Eleni Thanou</i> | |
| Web Mining to Create Semantic Content: A Case Study for the Environment | 411 |
| <i>Georgia Theocharopoulou and Konstantinos Giannakis</i> | |
| Mood Classification Using Lyrics and Audio: A Case-Study in Greek Music | 421 |
| <i>Spyros Brilis, Evagelia Gkatzou, Antonis Koursoumis, Karolos Talvis, Katia L. Kermanidis, and Ioannis Karydis</i> | |

| | |
|--|-----|
| From Tags to Trends: A First Glance at Social Media Content Dynamics | 431 |
| <i>Evangelos Spyrou and Phivos Mylonas</i> | |
| An Integrated Ontology-Based Model for the Early Diagnosis of Parkinson’s Disease | 442 |
| <i>Athanasios Alexiou, Maria Psiha, and Panayiotis Vlamos</i> | |
| Mining and Estimating Users’ Opinion Strength in Forum Texts Regarding Governmental Decisions | 451 |
| <i>George Stylios, Dimitrios Tsolis, and Dimitrios Christodoulakis</i> | |
| Melodic String Matching via Interval Consolidation and Fragmentation | 460 |
| <i>Carl Barton, Emilios Cambouropoulos, Costas S. Iliopoulos, and Zsuzsanna Lipták</i> | |
| Allocating, Detecting and Mining Sound Structures: An Overview of Technical Tools | 470 |
| <i>Monika Dörfler</i> | |
| Cutting Degree of Meanders | 480 |
| <i>A. Panayotopoulos and Panayiotis Vlamos</i> | |
| Collective Intelligence in Video User’s Activity | 490 |
| <i>Ioannis Karydis, Markos Avlonitis, and Spyros Sioutas</i> | |
| Data-Driven User Profiling to Support Web Adaptation through Cognitive Styles and Navigation Behavior | 500 |
| <i>Panayiotis Germanakos, Efi Papatheocharous, Marios Belk, and George Samaras</i> | |
| Learning Vague Knowledge from Socially Generated Content in an Enterprise Framework | 510 |
| <i>Panos Alexopoulos, John Pavlopoulos, and Phivos Mylonas</i> | |
| A Mobile-Based System for Context-Aware Music Recommendations . . . | 520 |
| <i>Börje F. Karlsson, Karla Okada, and Tomaz Noletto</i> | |
| Predicting Personality Traits from Spontaneous Modern Greek Text: Overcoming the Barriers | 530 |
| <i>Vasileios Komianos, Eleni Moustaka, Maria Andreou, Eirini Banou, Sofia Fanarioti, and Katia L. Kermanidis</i> | |
| An Implementation of the Digital Music Stand for Custom-Made On-Screen Music Manuscript Viewing | 540 |
| <i>Tatiana Tambouratzis and Marianna Tzormpatzaki</i> | |

First Workshop on Algorithms for Data and Text Mining in Bioinformatics (WADTMB 2012)

| | |
|---|-----|
| Multi-genome Core Pathway Identification through Gene Clustering | 545 |
| <i>Dimitrios M. Vitsios, Fotis E. Psomopoulos, Pericles A. Mitkas, and Christos A. Ouzounis</i> | |
| On Topic Categorization of PubMed Query Results | 556 |
| <i>Andreas Kanavos, Christos Makris, and Evangelos Theodoridis</i> | |
| Using an Atlas-Based Approach in the Analysis of Gene Expression Maps Obtained by Voxelation | 566 |
| <i>Evangelia I. Zacharaki, Angeliki Skoura, Li An, Desmond J. Smith, and Vasileios Megalooikonomou</i> | |
| Parallel Implementation of the Wu-Manber Algorithm Using the OpenCL Framework | 576 |
| <i>Themistoklis K. Pyrgiotis, Charalampos S. Kouzinopoulos, and Konstantinos G. Margaritis</i> | |
| Querying Highly Similar Structured Sequences via Binary Encoding and Word Level Operations | 584 |
| <i>Ali Alatabbi, Carl Barton, Costas S. Iliopoulos, and Laurent Mouchard</i> | |
| GapMis-OMP: Pairwise Short-Read Alignment on Multi-core Architectures | 593 |
| <i>Tomáš Flouri, Costas S. Iliopoulos, Kunsoo Park, and Solon P. Pissis</i> | |
| Genome-Based Population Clustering: Nuggets of Truth Buried in a Pile of Numbers? | 602 |
| <i>Marina Ioannou, George P. Patrinos, and Giannis Tzimas</i> | |
| HINT-KB: The Human Interactome Knowledge Base | 612 |
| <i>Konstantinos Theofilatos, Christos Dimitrakopoulos, Dimitrios Kleftogiannis, Charalampos Moschopoulos, Stergios Papadimitriou, Spiros Likothanassis, and Seferina Mavroudi</i> | |
| DISCO: A New Algorithm for Detecting 3D Protein Structure Similarity | 622 |
| <i>Nantia Iakovidou, Eleftherios Tiakas, and Konstantinos Tsichlas</i> | |
| ncRNA-Class Web Tool: Non-coding RNA Feature Extraction and Pre-miRNA Classification Web Tool | 632 |
| <i>Dimitrios Kleftogiannis, Konstantinos Theofilatos, Stergios Papadimitriou, Athanasios Tsakalidis, Spiros Likothanassis, and Seferina Mavroudi</i> | |

| | |
|--|-----|
| Molecular Modeling and Conformational Analysis of MuSK Protein | 642 |
| <i>Vasilis Haidinis, Georgios Dalkas, Konstantinos Poulas, and Georgios Spyroulias</i> | |
| Author Index | 651 |