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## **IFIP – The International Federation for Information Processing**

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 Kostas Karatzas  
Spyros Sioutas (Eds.)

# Artificial Intelligence Applications and Innovations

AIAI 2012 International Workshops: AIAB, AIeIA,  
CISE, COPA, IIVC, ISQL, MHDW, and WADTMB  
Halkidiki, Greece, September 27-30, 2012  
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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 accepted for the eight workshops that were organized as parallel events at the eighth AIAI conference, 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. A second volume contains the papers that were accepted to be presented orally at the main event. 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

AIAI 2012 Chairs



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