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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
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Artificial Intelligence Applications and Innovations

10th IFIP WG 12.5 International Conference, AIAI 2014
Rhodes, Greece, September 19-21, 2014
Proceedings

Springer

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Preface

It has been 58 years since the term artificial intelligence (AI) was coined in 1956 by John McCarthy at the Massachusetts Institute of Technology USA. Since then, after huge efforts of the international scientific community, sophisticated and advanced approaches— e.g., games playing, (computers capable of playing games against human opponents) natural languages, computers able to see, hear, and react to sensory stimuli— that would appear only as science fiction in the past are gradually becoming a reality. Multi-agent systems and autonomous agents, image processing, and biologically inspired neural networks (Spiking ANN) are already a reality. Moreover, AI has offered the international scientific community many mature tools that are easily used, well documented, and applied. These efforts have been continuously technically supported by various scientific organizations like the IFIP.

The International Federation for Information Processing (IFIP) was founded in 1960 under the auspices of UNESCO, following the first historical World Computer Congress held in Paris in 1959. The first AIAI conference (Artificial Intelligence Applications and Innovations) was organized in Toulouse, France, in 2004 by the IFIP. Since then, it has always been technically supported by the Working Group 12.5 "Artificial Intelligence Applications." After 10 years of continuous presence, it has become a well-known and recognized mature event, offering AI scientists from all over the globe the chance to present their research achievements. The 10^{th} AIAI was held in Rhodes, Greece, during September 19–21, 2014.

Following a long-standing tradition, this Springer volume belongs to the IFIP AICT series and it contains the accepted papers that were presented orally at the AIAI 2014 main conference. An additional volume comprises the papers that were accepted and presented to the workshops and were held as parallel events. Four workshops were organized, by invitation to prominent and distinguished colleagues, namely:

- The Third CoPA (Conformal Prediction and Its Applications)
- The Third MHDW (Mining Humanistic Data Workshop)
- The Third IIVC (Intelligent Innovative Ways for Video-to-Video Communications in Modern Smart Cities)
- The First MT4BD (New Methods and Tools for Big Data)

It is interesting that three of the above workshops were organized for the third time in the row, which means that they are well established in the AI community.

As the title of the conference denotes, there are two core orientations of interest, basic research AI approaches and also applications in real-world cases. The diverse nature of papers presented demonstrates the vitality of AI computing methods and proves the wide range of AI applications.

All papers went through a peer-review process by at least two independent academic reviewers. Where needed, a third and a fourth reviewer was consulted to resolve any potential conflicts. In the 10th AIAI conference, 41.3% of the submitted manuscripts (62) were accepted for oral presentation. From these, only 33 (22%) were accepted as full papers, whereas 29 (19.3%) were accepted as short ones. The authors of accepted papers of the main event come from 20 countries, namely: Brazil, Bulgaria, Canada, Cyprus, China, Czech Republic, Denmark, Finland, Germany, Great Britain, Greece, Iran, Italy, Pakistan, Poland, Russia, Spain, Switzerland, Tunisia, and Turkey.

Three distinguished keynote speakers were invited to present a lecture at the 10th AIAI conference.

1. Professor Hojjat Adeli, Ohio State University, USA.

Title: "Multi-Paradigm Computational Intelligence Models for EEG-Based Diagnosis of Neurological and Psychiatric Disorders"

- Professor in the Departments of Biomedical Informatics, Civil and Environmental Engineering and Geodetic Science and Neuroscience and Centers of Biomedical Engineering and Cognitive Science
- Director of Knowledge Engineering Lab at the Ohio State University
- Author of nearly 400 research and scientific publications in various fields of computer science, engineering, and applied mathematics since 1976 when he received his Ph.D. from Stanford University
- Author of nine books
- Founder and Editor-in-Chief of the international research journals *Computer-Aided Civil and Infrastructure Engineering* and *Integrated Computer-Aided Engineering*
- Over 100 academic, research, and leadership awards, honors, and recognition
- Keynote/plenary lecturer at 43 national and international computing conferences held in 28 different countries

2. Professor Plamen Angelov, Lancaster University, UK.

Title: "Autonomous Learning Systems: Association-Based Learning"

- Chair in Intelligent Systems and leads the Intelligent Systems Research within the School of Computing and Communications, Lancaster University, UK
- Founding Chair of the Technical Committee on Evolving Intelligent Systems with Systems, Man and Cybernetics Society, IEEE
- Co-recipient of several best paper awards at IEEE conferences (2006 and 2009, 2012, 2013)
- Co-recipient of two prestigious Engineer 2008 Technology + Innovation awards for Aerospace and Defense
- Co-recipient of the Special Award as well as the Outstanding Contributions Award by IEEE and INNS (2013)

- Editor-in-Chief of the Springer journal *Evolving Systems*, Associate Editor of the prestigious *IEEE Transactions on Fuzzy Systems* and of Elsevier's *Fuzzy Sets and Systems*

3. Professor Tharam Dillon, La Trobe University, Australia

Title: "Conjoint Mining of Data and Content with Applications in Business, Bio-medicine, Transport Logistics and Electrical Power Systems"

- Life Fellow IEEE, FACS, FIE
- Editor-in-Chief of the *International Journal of Computer Systems Science & Engineering* (UK) 1986–1991 Butterworths, 1992–1996 CRL Publishing
- Editor-in-Chief of the *International Journal of Engineering Intelligent Systems* (UK) 1993–1996
- Chief Co-editor of the *International Journal of Electric Power and Energy Systems* (UK) 1978–1991, Butterworths 1992–1996 Elsevier
- Associate Editor of *IEEE Transactions on Neural Networks* (USA) 1994–2004

The accepted papers of the 10^{th} AIAI conference are related to the following thematic topics:

- Artificial neural networks
- Bioinformatics
- Feature extraction
- 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
- Environmental applications
- Multi-attribute DSS
- Ontology, intelligent tutoring systems
- Optimization, genetic algorithms
- Recommendation systems
- Support vector machines, classification
- Text mining

- We wish to thank Professors Harris Papadopoulos (Frederick University, Cyprus), Alex Gammerman and Vladimir Vovk (Royal Holloway University of London, UK) for their common efforts toward the organization of the third CoPA workshop.
- We are also grateful to Professors Spyros Sioutas, Katia Lida Kermanidis (Ionian University, Greece), Christos Makris (University of Patras, Greece), and Giannis Tzimas (TEI of Western Greece). Thanks to their invaluable contribution and hard work, the third MHDW workshop was held successfully once more and it has already become a well-accepted event running in parallel with AIAI.

- The third IIVC workshop was an important part of the AIAI 2014 event and it was driven by the hard work of Drs. Ioannis P. Chochliouros and Ioannis M. Stephanakis (Hellenic Telecommunications Organization— OTE, Greece) and Professors Vishanth Weerakkody (Brunel University, UK) and Nancy Alonistioti (National and Kapodistrian University of Athens, Greece).
- It was a pleasure to host the MT4BD 2014 in the framework of the AIAI conference. We wish to sincerely thank its organizers for their great efforts. More specifically we wish to thank Professors Spiros Likothanassis (University of Patras, Greece), Dimitrios Tzovaras (CERTH/ITI, Greece), Eero Hyvönen (Aalto University, Finland), and Jörn Kohlhammer (Fraunhofer-Institut für Graphische Datenverarbeitung IGD, Germany).

A Keynote lecture was given by Dr. Dimitrios Tzovaras in the framework of the MT4BD 2014 workshop.
Title: Visual Analytics Technologies for the Efficient Processing and Analysis of Big Data

The AIAI 2014 conference had a high attendance from scientists from all parts of the globe and we would like to thank all participants for this. The organization of the 10^{th} AIAI was truly a milestone. After 10 years, it has been established as a mature event with loyal followers and it has plenty of new and qualitative research results to offer the international scientific community. We hope that the readers of these proceedings will be highly motivated and stimulated for further research in the domain of AI in general.

September 2014

Lazaros Iliadis
Ilias Maglogiannis
Harris Papadopoulos

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