

IFIP AICT 437



Lazaros Iliadis  
Ilias Maglogiannis  
Harris Papadopoulos  
Spyros Sioutas  
Christos Makris  
(Eds.)

# Artificial Intelligence Applications and Innovations

AIAI 2014 Workshops: CoPA, MHDW, IIVC, and MT4BD  
Rhodes, Greece, September 19–21, 2014  
Proceedings



Springer

Editor-in-Chief

*A. Joe Turner, Seneca, SC, USA*

Editorial Board

Foundations of Computer Science

*Jacques Sakarovitch, Télécom ParisTech, France*

Software: Theory and Practice

*Michael Goedicke, University of Duisburg-Essen, Germany*

Education

*Arthur Tatnall, Victoria University, Melbourne, Australia*

Information Technology Applications

*Erich J. Neuhold, University of Vienna, Austria*

Communication Systems

*Aiko Pras, University of Twente, Enschede, The Netherlands*

System Modeling and Optimization

*Fredi Tröltzsch, TU Berlin, Germany*

Information Systems

*Jan Pries-Heje, Roskilde University, Denmark*

ICT and Society

*Diane Whitehouse, The Castlegate Consultancy, Malton, UK*

Computer Systems Technology

*Ricardo Reis, Federal University of Rio Grande do Sul, Porto Alegre, Brazil*

Security and Privacy Protection in Information Processing Systems

*Yuko Murayama, Iwate Prefectural University, Japan*

Artificial Intelligence

*Tharam Dillon, Curtin University, Bentley, Australia*

Human-Computer Interaction

*Jan Gulliksen, KTH Royal Institute of Technology, Stockholm, Sweden*

Entertainment Computing

*Matthias Rauterberg, Eindhoven University of Technology, The Netherlands*

## **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 Spyros Sioutas  
Christos Makris (Eds.)

# Artificial Intelligence Applications and Innovations

AIAI 2014 Workshops: CoPA, MHDW, IIVC, and MT4BD  
Rhodes, Greece, September 19-21, 2014  
Proceedings

## Volume Editors

Lazaros Iliadis  
Democritus University of Thrace, Orestiada, Greece  
E-mail: liliadis@fmenr.duth.gr

Ilias Maglogiannis  
University of Piraeus, Greece  
E-mail: imaglo@unipi.gr

Harris Papadopoulos  
Frederick University, Nicosia, Cyprus  
E-mail: h.papadopoulos@frederick.ac.cy

Spyros Sioutas  
Ionian University, Corfu, Greece  
E-mail: sioutas@ionio.gr

Christos Makris  
University of Patras, Rio, Greece  
E-mail: makri@ceid.upatras.gr

ISSN 1868-4238  
ISBN 978-3-662-44721-5  
DOI 10.1007/978-3-662-44722-2  
Springer Heidelberg New York Dordrecht London

e-ISSN 1868-422X  
e-ISBN 978-3-662-44722-2

Library of Congress Control Number: 2014947384

© IFIP International Federation for Information Processing 2014

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

*Typesetting:* Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

# 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<sup>th</sup> 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. It contains the accepted papers that were presented orally at the AIAI 2014 workshops that 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 four workshops that were held as parallel events in the framework of the 10<sup>th</sup> AIAI conference, 36 papers were accepted for oral presentation, which corresponds to an acceptance ratio as high as 44.4%. The authors of accepted papers of the workshops come from several countries, namely: Estonia, Finland, UK, Greece, Cyprus, Portugal, Russia, and Sweden.

Three distinguished keynote speakers were invited to present a lecture at the 10<sup>th</sup> 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 PhD 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<sup>th</sup> AIAI conference are related to the following thematic topics:

- |  |   |
|--|---|
| – Artificial neural networks                 | – Hybrid clustering systems               |
| – Bioinformatics                             | – Image and video processing              |
| – Feature extraction                         | – Multi-agent systems                     |
| – Clustering                                 | – Environmental applications              |
| – Control systems                            | – Multi-attribute DSS                     |
| – Data mining                                | – Ontology, intelligent tutoring systems  |
| – Engineering applications of AI             | – Optimization, genetic algorithms        |
| – Face recognition, pattern recognition      | – Recommendation systems                  |
| – Filtering                                  | – Support vector machines, classification |
| – Fuzzy logic                                | – Text mining                             |
| – Genetic algorithms, evolutionary computing |   |
- 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

All workshops had a high attendance from scientists from all parts of Europe and we would like to thank all participants for this.

The organization of the 10<sup>th</sup> AIAI conference 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

Spyros Sioutas  
Christos Makris

# Organization

## Executive Committee

### General Chair

Tharam Dillon

La Trobe University, Australia

### Program Committee Co-chairs

Lazaros Iliadis

Democritus University of Thrace, Greece

Ilias Maglogiannis

University of Piraeus, Greece

Harris Papadopoulos

Frederick University, Cyprus

### Workshop Co-chairs

Spyros Sioutas

Ionian University, Greece

Christos Makris

University of Patras, Greece

### Organizing Co-chairs

Yannis Manolopoulos

Aristotle University of Thessaloniki, Greece

Andreas Andreou

Cyprus University of Technology, Cyprus

### Advisory Co-chairs

Elias Pimenidis

University of East London, UK

Chrisina Jayne

Coventry University, UK

Haralambos Mouratidis

University of Brighton, UK

### Website and Advertising Chair

Ioannis Karydis

Ionian University, Greece

### Honorary Co-chairs

Nikola Kasabov

KEDRI Auckland University of Technology,  
New Zealand

Vera Kurkova

Czech Academy of Sciences, Czech Republic

Hojjat Adeli

The Ohio State University, USA

## Program Committee

El-Houssaine Aghezzaf

Ghent University, Belgium

Michel Aldanondo

Toulouse University, Mines Albi, France

George Anastassopoulos	Democritus University of Thrace, Greece
Ioannis Andreadis	Democritus University of Thrace, Greece
Andreas Andreou	Cyprus University of Technology, Cyprus
Emili Balaguer-Ballester	Bournemouth University, UK
Zbigniew Banaszak	Warsaw University of Technology, Poland
Zorana Bankovic	Universidad Politecnica de Madrid, Spain
Ramazan Bayindir	Gazi University, Turkey
Nik Bessis	University of Derby, UK
Peter Brida	University of Zilina, Slovakia
Frantisek Capkovic	Slovak Academy of Sciences, Slovakia
George Caridakis	National Technical University of Athens, Greece
Ioannis Chamodrakas	National and Kapodistrian University of Athens, Greece
Aristotelis Chatziioannou	Institute of Biological Research and Biotechnology, National Hellenic Research Foundation, Greece
Badica Costin	University of Craiova, Romania
Georgios Evangelidis	University of Macedonia, Greece
Javier Fernandez De Canete	University of Malaga, Spain
Mauro Gaggero	University of Genoa, Italy
Alexander Gammernan	Royal Holloway, University of London, UK
Christos Georgiadis	University of Macedonia, Greece
Ioannis Hatzilygeroudis	University of Patras, Greece
Hakan Haberdar	University of Houston, USA
Petr Hajek	University of Pardubice, Czech Republic
Francisco Herrera	University of Granada, Spain
Jacek Kabzinski	Technical University of Lodz, Poland
Antonios Kalampakas	University of Kuwait, Kuwait
Achilles Kameas	Hellenic Open University, Greece
Stelios Kapetanakis	University of Brighton, UK
Kostas Karpouzis	National Technical University of Athens, Greece
Ioannis Karydis	Ionian University, Greece
Petros Kefalas	City College of Thessaloniki, Greece
Katia Lida Kermanidis	Ionian University, Greece
Muhammad Khurram Khan	King Saud University, Saudi Arabia
Dimitrios Kosmopoulos	Demokritos National Centre for Scientific Research, Greece
Ondrej Krejcar	University of Hradec Kralove, Czech Republic
Stelios Krinidis	TEI of Kavala, Greece
Michail Krinidis	TEI of Kavala, Greece
Adam Krzyzak	Concordia University, Canada

Vera Kurkova	Czech Academy of Sciences, Czech Republic
Ruggero Donida Labati	Università degli Studi di Milano, Italy
Helge Langseth	Norwegian University of Science and Technology, Norway
Spiridon Likothanassis	University of Patras, Greece
Mario Malcangi	Università degli Studi di Milano, Italy
Manolis Maragoudakis	University of the Aegean, Greece
Francesco Marcelloni	University of Pisa, Italy
Konstantinos Margaritis	University of Macedonia, Greece
Seferina Mavroudi	Technological Education Institute of Western Greece, Greece
Haralambos Mouratidis	University of East London, UK
Nicoletta Nicolaou	University of Cyprus, Cyprus
Vladimir Olej	University of Pardubice, Czech Republic
Eva Onaindia	Universidad Politecnica de Valencia, Spain
Mihaela Oprea	University of Ploiesti, Romania
Stefanos Ougiaroglou	University of Macedonia, Greece
Harris Papadopoulos	Frederick University of Cyprus, Cyprus
Elpiniki I. Papageorgiou	Technological Education Institute of Central Greece, Greece
Efi Papatheocharous	Swedish Institute of Computer Science, Sweden
Miltos Petridis	University of Brighton, UK
Vassilis Plagianakos	University of Central, Greece
Manuel Roveri	Politecnico di Milano, Italy
Alexander Ryjov	Lomonosov Moscow State University, Russia
Alexander B. Sideridis	Agricultural University of Athens, Greece
Ioannis Stephanakis	OTE Hellenic Telecommunications S.A., Greece
Ilias Sakellariou	University of Macedonia, Greece
Christos Schizas	University of Cyprus, Cyprus
Kyriakos Sgarbas	University of Patras, Greece
Alexei Sharpanskykh	Delft University of Technology, The Netherlands
Dragan Simic	University of Novi Sad, Serbia
Spyros Sioutas	Ionian University, Greece
Stefanos Spartalis	Democritus University of Thrace, Greece
Anastasios Tefas	Aristotle University of Thessaloniki, Greece
Konstantinos Theofilatos	University of Patras, Greece
Nicolas Tsapatsoulis	Cyprus University of Technology, Cyprus
Theodore Tsiligiridis	Agricultural University of Athens, Greece
Giannis Tzimas	CTI, Greece
Theodoros Tzouramanis	University of the Aegean, Greece

Vassilios Verykios	Hellenic Open University, Greece
Jørgen Villadsen	Technical University of Denmark, Denmark
Demosthenes Vouyioukas	University of the Aegean, Greece
Vladimir Vovk	Royal Holloway, University, UK
Arlette Van Wissen	VU University Amsterdam, The Netherlands
Michalis Xenos	Hellenic Open University, Greece
Xin-she Yang	University of Cambridge, UK
Engin Yesil	Technical University of Istanbul, Turkey
Contantine Yialouris	Agricultural University of Athens, Greece
Peter Yuen	Cranfield University, UK
Drago Zagar	University of Osijek, Croatia

# Table of Contents

## IIVC Workshop

Modern Video-to-Video Communications to Enhance Citizens' Quality of Life and Create Opportunities for Growth in "Smart" European Cities .....	1
<i>Ioannis P. Chochliouros, Anastasia S. Spiliopoulou, Ioannis M. Stephanakis, Evangelos Sfakianakis, Evangelia Georgiadou, Maria Belesioti, Luís Cordeiro, and João Gonçalves</i>	
Optimal Video Delivery in Mobile Networks Using a Cache-Accelerated Multi Area eMBMS Architecture.....	13
<i>Ioannis M. Stephanakis, Ioannis P. Chochliouros, George L. Lympieropoulos, and Kostas Berberidis</i>	
Video-to-Video E-Health Applications Supporting Medical Use Cases for Remote Patients .....	24
<i>Panagiotis Diamantopoulos, Eleni Patouni, Nikolaos Bompetsis, Nancy Alonistioti, João Gonçalves, Luís Cordeiro, Ioannis P. Chochliouros, and George Lyberopoulos</i>	
The Potential of Telemedicine .....	30
<i>Bibiana Metelmann, Camilla Metelmann, Konrad Meissner, Michael Wendt, João Gonçalves, Peadar Gilligan, Ahjoku Amadi-Obi, Donal Morris, Eleni Patouni, and Martin von der Heyden</i>	
Software-Defined Networking: Guidelines for Experimentation and Validation in Large-Scale Real World Scenarios .....	38
<i>João Gonçalves, David Palma, Luís Cordeiro, Sachin Sharma, Didier Colle, Adam Carter, and Paulo Simoes</i>	
Remote Video-to-Video Eye Telemonitoring Use Case for Glaucoma Patients .....	48
<i>Dimitrios Alonistiotis, Evgenia Kontou, Nikolaos Karachalios, Eleni Patouni, Panagiotis Diamantopoulos, Nikolaos Bompetsis, Nancy Alonistioti, and Ioannis P. Chochliouros</i>	
ICT in the Future Classrooms and Teaching: Preparing the Knowledge Workers of the 21st Century .....	56
<i>Dimitrios Charalambidis</i>	

Promoting ICT Skills through Online Services: Case Study of Video Use for Adult Education in Municipalities . . . . .	63
<i>Andreea Molnar, Vishanth Weerakkody, and Ahlam Almuwil</i>	

## MHDW Workshop

Modification of Colors in Images for Enhancing the Visual Perception of Protanopes . . . . .	73
<i>Polyxeni Sgouroglou and Christos-Nikolaos Anagnostopoulos</i>	
Extracting Knowledge from Collaboratively Annotated Ad Video Content . . . . .	85
<i>Manolis Maragoudakis, Katia Lida Kermanidis, and Spyros Vosinakis</i>	
Mining Biological Data on the Cloud – A MapReduce Approach . . . . .	96
<i>Zafeiria-Marina Ioannou, Nikolaos Nodarakis, Spyros Sioutas, Athanasios Tsakalidis, and Giannis Tzimas</i>	
On-line Minimum Closed Covers . . . . .	106
<i>Costas S. Iliopoulos and Manal Mohamed</i>	
Reciprocal Rank Using Web Page Popularity . . . . .	116
<i>Xenophon Evangelopoulos, Christos Makris, and Yannis Plegas</i>	
A Survey of Geo-tagged Multimedia Content Analysis within Flickr . . . .	126
<i>Evangelos Spyrou and Phivos Mylonas</i>	
Algebraic Interpretations towards Clustering Protein Homology Data . . . . .	136
<i>Fotis E. Psomopoulos and Pericles A. Mitkas</i>	
Comparative Evaluation of Feature Extraction Methods for Human Motion Detection . . . . .	146
<i>Olga Politi, Iosif Mporas, and Vasileios Megalooikonomou</i>	
Eye Blink Artifact Removal in EEG Using Tensor Decomposition . . . . .	155
<i>Dimitrios Triantafyllopoulos and Vasileios Megalooikonomou</i>	
The Greek Audio Dataset . . . . .	165
<i>Dimos Makris, Katia Lida Kermanidis, and Ioannis Karydis</i>	
Affect in Complex Decision-Making Systems: From Psychology to Computer Science Perspectives . . . . .	174
<i>Amine Chohra, Aziza Chohra, and Kurosh Madani</i>	
InfluenceTracker: Rating the Impact of a Twitter Account . . . . .	184
<i>Gerasimos Razis and Ioannis Anagnostopoulos</i>	

A New Framework for Bridging the Gap from Protein-Protein Interactions to Biological Process Interactions . . . . .	196
<i>Christos Dimitrakopoulos, Andreas Dimitris Vlantis, Konstantinos Theofilatos, Spiros Likotheanassis, and Seferina Mavroudi</i>	
Adjusting the Tests According to the Perception of Greek Students Who Are Taught Russian Motion Verbs via Distance Learning . . . . .	205
<i>Oksana Kalita and Georgios Pavlidis</i>	
CSMR: A Scalable Algorithm for Text Clustering with Cosine Similarity and MapReduce . . . . .	211
<i>Victor Giannakouris-Salalidis, Antonia Plerou, and Spyros Sioutas</i>	
<b>COPA Workshop</b>	
From Conformal to Probabilistic Prediction . . . . .	221
<i>Vladimir Vovk, Ivan Petej, and Valentina Fedorova</i>	
Aggregated Conformal Prediction . . . . .	231
<i>Lars Carlsson, Martin Eklund, and Ulf Norinder</i>	
A Cross-Conformal Predictor for Multi-label Classification . . . . .	241
<i>Harris Papadopoulos</i>	
SVM Venn Machine with $k$ -Means Clustering . . . . .	251
<i>Chenzhe Zhou, Ilia Nouretdinov, Zhiyuan Luo, and Alexander Gammerman</i>	
Efficiency Comparison of Unstable Transductive and Inductive Conformal Classifiers . . . . .	261
<i>Henrik Linusson, Ulf Johansson, Henrik Boström, and Tuve Löfström</i>	
Anomaly Detection of Trajectories with Kernel Density Estimation by Conformal Prediction . . . . .	271
<i>James Smith, Ilia Nouretdinov, Rachel Craddock, Charles Offer, and Alexander Gammerman</i>	
Rule Extraction with Guaranteed Fidelity . . . . .	281
<i>Ulf Johansson, Rikard König, Henrik Linusson, Tuve Löfström, and Henrik Boström</i>	
Conformal Prediction under Probabilistic Input . . . . .	291
<i>Ilia Nouretdinov</i>	



## MT4BD Workshop

Rule-Based Impact Analysis for Enterprise Business Intelligence . . . . .	301
<i>Kalle Tomingas, Tanel Tammet, and Margus Kliimask</i>	
Feature Extraction and Visual Feature Fusion for the Detection of Concurrent Prefix Hijacks . . . . .	310
<i>Stavros Papadopoulos, Konstantinos Votis, Christos Alexakos, and Dimitrios Tzovaras</i>	
Linking Data in the Insurance Sector: A Case Study . . . . .	320
<i>Katerina Kalou and Dimitrios Koutsomitropoulos</i>	
Enhanced Visual Analytics Services for the Optimal Planning of Renewable Energy Resources Installations . . . . .	330
<i>Votis Konstantinos, Yiannis Karras, Jörn Kohlhammer, Martin Steiger, Dimitrios Tzovaras, and Elias Gounopoulos</i>	
Integrating High Volume Financial Datasets to Achieve Profitable and Interpretable Short Term Trading with the FTSE100 Index . . . . .	340
<i>Thomas Amorgianiotis, Konstantinos Theofilatos, Sovan Mitra, Efstratios F. Georgopoulos, and Spiros Likothanassis</i>	
<b>Author Index . . . . .</b>	<b>351</b>