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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 ist member countries and to encourage technology transfer to developing nations. As ist 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 less 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 in information 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 Chrisina Jayne (Eds.)

Engineering Applications of Neural Networks

12th INNS EANN-SIG International Conference, EANN 2011
and 7th IFIP WG 12.5 International Conference, AIAI 2011
Corfu, Greece, September 15-18, 2011
Proceedings Part I

Springer

Volume Editors

Lazaros Iliadis
Democritus University of Thrace
68200 N. Orestiada, Greece
E-mail: liliadis@fmenr.duth.gr

Chrisina Jayne
London Metropolitan University
London N7 8DB, UK
E-mail: c.jayne@londonmet.ac.uk

ISSN 1868-4238 e-ISSN 1868-422X
ISBN 978-3-642-23956-4 e-ISBN 978-3-642-23957-1
DOI 10.1007/978-3-642-23957-1
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2011935861

CR Subject Classification (1998): F.1, I.2, H.5, I.7, I.2.7, I.4.8

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

Artificial intelligence (AI) is a rapidly evolving area that offers sophisticated and advanced approaches capable of tackling complicated and challenging problems. Transferring human knowledge into analytical models and learning from data is a task that can be accomplished by soft computing methodologies. Artificial neural networks (ANN) and support vector machines are two cases of such modeling techniques that stand behind the idea of learning. The 2011 co-organization of the 12th Engineering Applications of Neural Networks (EANN) and of the 7th Artificial Intelligence Applications and Innovations (AIAI) conferences was a major technical event in the fields of soft computing and AI, respectively.

The first EANN was organized in Otaniemi, Finland, in 1995. It has had a continuous presence as a major European scientific event. Since 2009 it has been guided by a Steering Committee that belongs to the "EANN Special Interest Group" of the International Neural Network Society (INNS).

The 12th EANN 2011 was supported by the INNS and by the IEEE branch of Greece. Moreover, the 7th AIAI 2011 was supported and sponsored by the International Federation for Information Processing (IFIP).

The first AIAI 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. It is the official conference of the Working Group 12.5 "Artificial Intelligence Applications" of the IFIP Technical Committee 12, which is active in the field of AI. IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year.

It was the first time ever that these two well-established events were hosted under the same umbrella, on the beautiful Greek island of Corfu in the Ionian Sea and more specifically in the Department of Informatics of the Ionian University.

This volume contains the papers that were accepted to be presented orally at the 7th EANN conference and the papers accepted for the Applications of Soft Computing to Telecommunications (ASCOTE) Workshop, the Computational Intelligence Applications in Bioinformatics (CIAB) Workshop and the Second Workshop in Informatics and Intelligent Systems Applications for Quality of Life information Services (ISQLIS). The conference was held during September 15–18, 2011. The diverse nature of papers presented demonstrates the vitality of neural computing and related soft computing approaches and it also proves the very wide range of AI applications. On the other hand, this volume contains basic research papers, presenting variations and extensions of several approaches.

The response to the call for papers was more than satisfactory with 150 papers initially submitted. All papers passed through a peer-review process by at least two independent academic referees. Where needed a third referee was consulted to resolve any conflicts. In the EANN/AIAI 2011 event, 34% of the submitted

manuscripts (totally 52) were accepted as full papers, whereas 21% were accepted as short ones and 45% (totally 67) of the submissions were rejected. The authors of accepted papers came from 27 different countries from all over Europe (e.g., Austria, Bulgaria, Cyprus, Czech Republic, Finland, France, Germany, Greece, Italy, Poland, Portugal, Slovakia, Slovenia, Spain, UK), America (e.g., Brazil, Canada, Chile, USA), Asia (e.g., China, India, Iran, Japan, Taiwan), Africa (e.g., Egypt, Tunisia) and Oceania (New Zealand). Three keynote speakers were invited and they gave lectures on timely aspects of AI and ANN.

1. Nikola Kasabov. Founding Director and Chief Scientist of the Knowledge Engineering and Discovery Research Institute (KEDRI), Auckland (www.kedri.info/). He holds a Chair of Knowledge Engineering at the School of Computing and Mathematical Sciences at Auckland University of Technology. He is a Fellow of the Royal Society of New Zealand, Fellow of the New Zealand Computer Society and a Senior Member of IEEE. He was Past President of the International Neural Network Society (INNS) and a Past President of the Asia Pacific Neural Network Assembly (APNNA). Title of the keynote presentation: "Evolving, Probabilistic Spiking Neural Network Reservoirs for Spatio- and Spectro-Temporal Data."
2. Tom Heskes. Professor of Artificial Intelligence and head of the Machine Learning Group at the Institute for Computing and Information Sciences, Radboud University Nijmegen, The Netherlands. He is Principal Investigator at the Donders Centre for Neuroscience and Director of the Institute for Computing and Information Sciences. Title of the keynote presentation: "Reading the Brain with Bayesian Machine Learning."
3. A.G. Cohn. Professor of Automated Reasoning Director of Institute for Artificial Intelligence and Biological Systems, School of Computing, University of Leeds, UK. Tony Cohn holds a Personal Chair at the University of Leeds, where he is Professor of Automated Reasoning. He is presently Director of the Institute for Artificial Intelligence and Biological Systems. He leads a research group working on knowledge representation and reasoning with a particular focus on qualitative "spatial/spatio-temporal reasoning, the best known being the well-cited region connection calculus (RCC). Title of the keynote presentation: "Learning about Activities and Objects from Video."

The EANN/AIAI conference consisted of the following main thematic sessions:

- AI in Finance, Management and Quality Assurance
- Computer Vision and Robotics
- Classification-Pattern Recognition
- Environmental and Earth Applications of AI
- Ethics of AI
- Evolutionary Algorithms—Optimization
- Feature Extraction-Minimization
- Fuzzy Systems
- Learning—Recurrent and RBF ANN
- Machine Learning and Fuzzy Control

- Medical Applications
- Multi-Layer ANN
- Novel Algorithms and Optimization
- Pattern Recognition-Constraints
- Support Vector Machines
- Web-Text Mining and Semantics

We would very much like to thank Hassan Kazemian (London Metropolitan University) and Pekka Kumpulainen (Tampere University of Technology, Finland) for their kind effort to organize successfully the Applications of Soft Computing to Telecommunications Workshop (ASCOTE).

Moreover, we would like to thank Efstratios F. Georgopoulos (TEI of Kalamata, Greece), Spiridon Likothanassis, Athanasios Tsakalidis and Seferina Mavroudi (University of Patras, Greece) as well as Grigorios Beligiannis (University of Western Greece) and Adam Adamopoulos (Democritus University of Thrace, Greece) for their contribution to the organization of the Computational Intelligence Applications in Bioinformatics (CIAB) Workshop.

We are grateful to Andreas Andreou (Cyprus University of Technology) and Harris Papadopoulos (Frederick University of Cyprus) for the organization of the Computational Intelligence in Software Engineering Workshop (CISE).

The Artificial Intelligence Applications in Biomedicine (AIAB) Workshop was organized successfully in the framework of the 12th EANN 2011 conference and we wish to thank Harris Papadopoulos, Efthyvoulos Kyriacou (Frederick University of Cyprus) Ilias Maglogiannis (University of Central Greece) and George Anastassopoulos (Democritus University of Thrace, Greece).

Finally, the Second Workshop on Informatics and Intelligent Systems Applications for Quality of Life information Services (2nd ISQLIS) was held successfully and we would like to thank Kostas Karatzas (Aristotle University of Thessaloniki, Greece) Lazaros Iliadis (Democritus University of Thrace, Greece) and Mihaela Oprea (University Petroleum-Gas of Ploiesti, Romania).

The accepted papers of all five workshops (after passing through a peer-review process by independent academic referees) were published in the Springer proceedings. They include timely applications and theoretical research on specific subjects. We hope that all of them will be well established in the future and that they will be repeated every year in the framework of these conferences.

We hope that these proceedings will be of major interest for scientists and researchers world wide and that they will stimulate further research in the domain of artificial neural networks and AI in general.

September 2011 Dominic Palmer Brown

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Workshops

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Elias Maglogiannis	University of Central Greece, Greece
George Anastassopoulos	Democritus University of Thrace, Greece

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Sponsoring Institutions

The 12th EANN / 7th AIAI Joint Conferences were organized by IFIP (International Federation for Information Processing), INNS (International Neural Network Society), the Aristotle University of Thessaloniki, the Democritus University of Thrace and the Ionian University of Corfu.

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