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Artificial Neural Networks – ICANN 2010

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Proceedings, Part I



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Preface

This volume is part of the three-volume proceedings of the 20th International Conference on Artificial Neural Networks (ICANN 2010) that was held in Thessaloniki, Greece during September 15–18, 2010.

ICANN is an annual meeting sponsored by the European Neural Network Society (ENNS) in cooperation with the International Neural Network Society (INNS) and the Japanese Neural Network Society (JNNS). This series of conferences has been held annually since 1991 in Europe, covering the field of neurocomputing, learning systems and other related areas.

As in the past 19 events, ICANN 2010 provided a distinguished, lively and interdisciplinary discussion forum for researchers and scientists from around the globe. It offered a good chance to discuss the latest advances of research and also all the developments and applications in the area of Artificial Neural Networks (ANNs). ANNs provide an information processing structure inspired by biological nervous systems and they consist of a large number of highly interconnected processing elements (neurons). Each neuron is a simple processor with a limited computing capacity typically restricted to a rule for combining input signals (utilizing an activation function) in order to calculate the output one. Output signals may be sent to other units along connections known as weights that excite or inhibit the signal being communicated. ANNs have the ability “to learn” by example (a large volume of cases) through several iterations without requiring a priori fixed knowledge of the relationships between process parameters.

The rapid evolution of ANNs during the last decades has resulted in their expansion in various diverse scientific fields, like engineering, computer science, mathematics, artificial intelligence, biology, environmental science, operations research and neuroscience. ANNs perform tasks like pattern recognition, image and signal processing, control, classification and many others.

In 2010 ICANN was organized by the following institutions: Aristotle University of Thessaloniki, University of Macedonia at Thessaloniki, Technological Educational Institute of Thessaloniki, Hellenic International University and Democritus University of Thrace.

The conference was held in the Kapsis Hotel and conference center in Thessaloniki, Greece. The participants were able to enjoy the atmosphere and the cultural heritage of Thessaloniki, which is built by the seaside and has a glorious history of 2300 years.

As a matter of fact, a total of 241 research papers were submitted to the conference for consideration. All of the submissions were peer reviewed by at least two academic referees. The international Program Committee of ICANN 2010 carefully selected 102 submissions (42%) to be accepted as full papers. Additionally 68 papers were selected for short presentation and 29 as posters.

The full papers have up to 10 pages, short ones have up to 6 pages and posters have up to 4 pages in the proceedings.

In addition to the regular papers, the technical program featured four keynote plenary lectures by the following worldwide renowned scholars:

- Prof. Alessandro E.P. Villa: NeuroHeuristic Research Group, Information Science Institute, University of Lausanne, Switzerland and Institut des Neurosciences, Université Joseph Fourier, Grenoble, France. Subject: “Spatiotemporal Firing Patterns and Dynamical Systems in Neural Networks”;
- Prof. Stephen Grossberg: Department of Cognitive and Neural Systems, Center for Adaptive Systems, and Center of Excellence for Learning in Education, Science, and Technology, Boston University. Subject: “The Predictive Brain: Autonomous Search, Learning, Recognition, and Navigation in a Changing World”;
- Prof. Sergios Theodoridis: Department of Informatics and Telecommunications, National and Kapodistrian University of Athens. Subject: “Adaptive Learning in a World of Projections”;
- Prof. Nikola Kasabov: Knowledge Engineering and Discovery Research Institute (KEDRI), Auckland University of Technology. Subject: “Evolving Integrative Spiking Neural Networks: A Computational Intelligence Approach”.

Also two tutorials were organized on the following topics:

- Prof. J.G. Taylor: Department of Mathematics, King’s College London. Subject: “Attention versus Consciousness: Independent or Conjoined?”;
- Dr. Kostas Karpuzis: Image, Video and Multimedia Systems Lab, Institute of Communication and Computer Systems (ICCS/NTUA). Subject: “User Modelling and Machine Learning for Affective and Assistive Computing”.

Finally three workshops were organized namely:

- The First Consciousness Versus Attention Workshop (CVA);
- The Intelligent Environmental Monitoring, Modelling and Management Systems for Better QoL Workshop (IEM3);
- The First Self-Organizing Incremental Neural Network Workshop (SOINN).

The ENNS offered 12 travel grants to students who participated actively in the conference by presenting a research paper, and a competition was held between students for the best paper award.

The three-volume proceedings contain research papers covering the following topics: adaptive algorithms and systems, ANN applications, Bayesian ANNs, bio inspired-spiking ANNs, biomedical ANNs, data analysis and pattern recognition, clustering, computational intelligence, computational neuroscience, cryptography algorithms, feature selection/parameter identification and dimensionality reduction, filtering, genetic-evolutionary algorithms, image, video and audio processing, kernel algorithms and support vector machines, learning algorithms and systems, natural language processing, optimization, recurrent ANNs, reinforcement learning, robotics, and self organizing ANNs.

As General Co-chairs and PC Co-chair and in the name of all members of the Steering Committee, we would like to thank all the keynote invited speakers and the tutorial-workshops' organizers as well. Also, thanks are due to all the reviewers and the authors of submitted papers. Moreover, we would like to thank the members of the Organizing Committee headed by Prof. Yannis Manolopoulos and Prof. Ioannis Vlahavas. In particular, we wish to thank Dr. Maria Kontaki for her assistance and support towards the organization of this conference.

Additionally, we would like to thank the members of the Board of the European Neural Network Society for entrusting us with the organization of the conference as well as for their assistance. We wish to give our special thanks to Prof. Włodzisław Duch, President of the ENNS, for his invaluable guidance and help all the way.

Finally, we would like to thank Springer for their cooperation in publishing the proceedings in the prestigious series of Lecture Notes in Computer Science. We hope that all of the attendees enjoyed ICANN 2010 and also the conference site in Thessaloniki, both scientifically and socially. We expect that the ideas that have emerged here will result in the production of further innovations for the benefit of science and society.

September 2010

Włodzisław Duch
Kostandinos Diamandaras
Lazaros Iliadis

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