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In memoriam of Prof. Dr. José Mira,
advocate of scientific research on the interplay
between natural and artificial computation,
Co-chair of IWANN from 1991 to 2005,
and friend.

Preface

This volume presents the set of final accepted papers for the tenth edition of the IWANN conference "International Work-Conference on Artificial neural Networks" held in Salamanca (Spain) during June 10–12, 2009.

IWANN is a biennial conference focusing on the foundations, theory, models and applications of systems inspired by nature (mainly, neural networks, evolutionary and soft-computing systems). Since the first edition in Granada (LNCS 540, 1991), the conference has evolved and matured. The list of topics in the successive Call for Papers has also evolved, resulting in the following list for the present edition:

1. **Mathematical and theoretical methods in computational intelligence.** Complex and social systems. Evolutionary and genetic algorithms. Fuzzy logic. Mathematics for neural networks. RBF structures. Self-organizing networks and methods. Support vector machines.
2. **Neurocomputational formulations.** Single-neuron modelling. Perceptual modelling. System-level neural modelling. Spiking neurons. Models of biological learning.
3. **Learning and adaptation.** Adaptive systems. Imitation learning. Reconfigurable systems. Supervised, non-supervised, reinforcement and statistical algorithms.
4. **Emulation of cognitive functions.** Decision making. Multi-agent systems. Sensor mesh. Natural language. Pattern recognition. Perceptual and motor functions (visual, auditory, tactile, virtual reality, etc.). Robotics. Planning motor control.
5. **Bio-inspired systems and neuro-engineering.** Embedded intelligent systems. Evolvable computing. Evolving hardware. Microelectronics for neural, fuzzy and bio-inspired systems. Neural prostheses. Retinomorphic systems**.** Brain-computer interfaces (BCI). Nanosystems**.** Nanocognitive systems.
6. **Ambient intelligence**. Unobtrusive hardware. Seamless mobile/fixed communication and computing infrastructure. Dynamic and massively distributed device networks. Human-centric computer interfaces. Dependable and secure systems and devices. Ambient-assisted living (AAL).
7. **Applications.** Adaptive interfaces. Ambient intelligence. Biomimetic applications**.** Data analysis and pre-processing. Data mining. Economy and financial engineering. Fuzzy systems for control. Internet. Neural networks for control. Power systems. Signal processing. Telecommunication applications. Time series and prediction.

At the end of the scheduled period, we got more than 230 submitted papers under the above topics. A careful peer review process was organized, and, as its main result, we are able to offer you the following collection of 167 papers, including 3 invited

conferences and a reduced number of tutorial contributions by some of the special sessions organizers, on the hot topic of their respective session.

It must be pointed out that, for the sake of consistency and readability of the book, the presented papers are not organized as they were presented in the IWANN sessions, but classified under 15 chapters with the listed specific topics:

1. Theoretical Foundations and Models
2. Learning and Adaptation
3. Self-Organizing Networks, Methods and Applications
4. Fuzzy Systems.
5. Evolutionary Computation and Genetic Algorithms
6. Pattern Recognition
7. Formal Languages in Linguistics
8. Agents and Multi-agents on Intelligent Systems
9. Brain-Computer Interfaces (BCI)
10. Multiobjetive Optimization
11. Robotics
12. Bioinformatics
13. Biomedical Applications
14. Ambient-Assisted Living (AAL) and Ambient Intelligence (AI)
15. Other Applications

IWANN 2009 was organized as the main conference, together with four complimentary events (accepted papers have been included in the LNCS 5518 volume):

- DCAI 2009 (International Symposium on Distributed Computing and Artificial Intelligence), covering artificial intelligence and its applications in distributed environments, such as the Internet, electronic commerce, mobile communications, wireless devices, distributed computing, and so on.
- IWAAL 2009 (International Workshop of Ambient-Assisted Living), covering solutions aimed at increasing the quality of life, safety and health problems of elderly and disabled people by means of technology.
- IWPACBB 2009 (Third International Workshop on Practical Applications of Computational Biology and Bioinformatics), covering computational biology and bioinformatics as a possibility for knowledge discovery, modelling and optimization tasks, aiming at the development of computational models so that the response of biological complex systems to any perturbation can be predicted.
- SOCO 2009 (4^{th} International Workshop on Soft Computing Models in Industrial Applications), covering the implementation of soft computing in industrial applications.

The organizers decided to share the site and some of the plenary conferences and social events, trying to facilitate the attendance of delegates to all the conferences and workshops.

The tenth edition of IWANN was organized by the Universitat Politècnica de Catalunya, the Universidad de Málaga and the Universidad de Granada, together with the Universidad de Salamanca as the local manager. We wish to thank to the Spanish Ministerio de Ciencia e Innovación, the Universidad de Salamanca, the City Council of Salamanca and the Castilla-León Government for their support and grants.

We would also like to express our gratitude to the members of the different committees for their support, collaboration and good work. Finally, we want to thank Springer, and especially Alfred Hoffman and Anna Kramer for their continuous support and cooperation.

June 2009

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