

# Preface

The present book includes extended and revised versions of a set of selected papers from the Seventh International Joint Conference on Computational Intelligence (IJCCI 2015). IJCCI was sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC). This conference was held in Lisbon, Portugal, from November 12 to 14, 2015.

IJCCI was technically co-sponsored by IEEE Systems, Man, and Cybernetics Society and by International Federation of Automatic Control (IFAC). It was held in cooperation with the ACM SIGAI—ACM Special Interest Group on Artificial Intelligence, AI\*IA Associazione Italiana per l'Intelligenza Artificiale, INNS—International Neural Network Society, AAAI—Association for the Advancement of Artificial Intelligence, EUSFLAT—European Society for Fuzzy Logic and Technology, APPIA Associação Portuguesa para a Inteligência Artificial, IFSA—International Fuzzy Systems Association and APNNA—Asia Pacific Neural Network Assembly. Since its first edition in 2009, the purpose of the International Joint Conference on Computational Intelligence (IJCCI) has been to bring together researchers, engineers and practitioners in computational technologies, especially those related to the areas of fuzzy computation, evolutionary computation, and neural computation. IJCCI is composed of three co-located conferences, each one specialized in one of the aforementioned areas, namely:

- International Conference on Evolutionary Computation Theory and Applications (ECTA)
- International Conference on Fuzzy Computation Theory and Applications (FCTA)
- International Conference on Neural Computation Theory and Applications (NCTA)

Their aim is to provide major forums for scientists, engineers and practitioners interested in the study, analysis, design, and application of these techniques to all fields of human activity. In ECTA, evolutionary computation is associated with systems that use computational models of evolutionary processes as the key elements in design and implementation, i.e., computational techniques which are based

to some degree on the evolution of biological life in the natural world. A number of evolutionary computational models have been proposed, including evolutionary algorithms, genetic algorithms, evolution strategy, evolutionary programming, and swarm intelligence. These techniques form the basis of several disciplines such as artificial life and evolutionary robotics. FCTA is concerned with modeling and implementation of fuzzy systems, in a broad range of fields. Fuzzy computation is a field that encompasses the theory and application of fuzzy sets and fuzzy logic to the solution of information processing, system analysis and decision problems. Supported by the information technology developments, fuzzy computation has grown continuously during the last decades, and actually leads to major applications in many fields such as medical diagnosis, machine learning, image understanding, automation, and process control. NCTA is focused on modeling and implementation of artificial neural networks (ANN) and neural computing architectures. Neural computation and ANN have seen an explosion of interest over the last few decades, and are being successfully applied across an extraordinarily wide range of problems and domains, in areas as diverse as finance, medicine, engineering, geology, and physics, in problems of complex dynamics and complex behaviour prediction, classification or control. Various structural designs, learning strategies, and algorithms have been introduced in this highly dynamic field in the last couple of decades.

The joint conference IJCCI received 127 paper submissions from 45 countries, of which 20 % were presented as full papers. The high quality of the papers received imposed difficult choices in the review process. To evaluate each submission, a double-blind paper evaluation method was used: each paper was reviewed by at least two experts from the independent international Program Committee, in a double-blind review process, and most papers had three reviews or more. This book includes revised and extended versions of a strict selection of the best papers presented at the conference.

On behalf of the Conference Organizing Committee, we would like to thank all participants. First of all to the authors, whose quality work is the essence of the conference, and to the members of the Program Committee, who helped us with their expertise and diligence in reviewing the papers. As we all know, producing a post-conference book, within the high technical level exigency, requires the effort of many individuals. We wish to thank also all the members of our Organizing Committee, whose work and commitment were invaluable.

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Papers

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