Studies in Computational Intelligence

Volume 577

Series editor

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Computational Intelligence

International Joint Conference, IJCCI 2012
Barcelona, Spain, October 5–7, 2012
Revised Selected Papers

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ISSN 1860-949X ISSN 1860-9503 (electronic)
ISBN 978-3-319-11270-1 ISBN 978-3-319-11271-8 (eBook)
DOI 10.1007/978-3-319-11271-8

Library of Congress Control Number: 2014950399

Springer Cham Heidelberg New York Dordrecht London

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Printed on acid-free paper

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

Preface

The present book includes extended and revised versions of a set of selected papers from the Fourth International Joint Conference on Computational Intelligence (IJCCI 2012). Sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC), IJCCI 2012 held in Barcelona, Spain, from 5 to 7 October, 2012, and was organized in cooperation with the Association for the Advancement of Artificial Intelligence (AAAI).

The purpose of International Joint Conference on Computational Intelligence (IJCCI) is 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 - knowledge 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 modeling and implementation of bioinspired systems namely on the evolutionary premises, both theoretically and in a broad range of application fields, is the central scope. Considered a subfield of computational intelligence focused on combinatorial optimization problems, 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 inspired by the evolution of biological life in the natural world. A number of evolutionary computational models have been proposed, including evolutionary algorithms, genetic algorithms, evolution strategies, evolutionary programming, swarm optimization and artificial life.

In FCTA, development and implementation of fuzzy systems, for modelling, control

and decision making in a broad range of fields is the main concern. 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. The continuous growth of fuzzy computation in recent years, associated with higher available computational power, has led to major applications in many fields ranging from medical diagnosis and automated learning to image understanding and systems control.

NCTA is focused on modeling and implementation of artificial neural networks computing architectures. Neural computation and artificial neural networks have seen an explosion of interest over the last few years, and are being successfully applied across an extraordinary range of problem domains, in areas as diverse as finance, medicine, engineering, geology and physics, in problems of prediction, classification decision or control. Several architectures, learning strategies and algorithms have been introduced in this highly dynamic field in the last couple of decades.

IJCCI 2012 received 200 paper submissions from 53 countries, which demonstrates the global dimension of this conference. 33 papers were published as full papers (16,5% of submissions) and 49 were accepted for short presentation (24,5% of submissions). Moreover, 26 were accepted for poster presentation. These ratios denote a high level of quality which we aim to continue reinforcing in the next edition of this conference. 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.

December 2013

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