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Syeda Darakhshan Jabeen
Javid Ali
Oscar Castillo *Editors*

Soft Computing and Optimization

SCOTA 2021, Ranchi, India, March 26–27

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Editors

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Preface

Indeed, research is a continuous process and its progress outlines and illuminates a new horizon. As a result of which there is a massive enhancement in technology innovation and, at the same time, educational pursuit advances with a coherent vibration toward its perfection. There is no doubt that modern science is still striving to unravel many unexplored questions and mysteries. And in this endeavor, science is also attempting to take itself to a novel and higher level. In recent past, advances in soft computing techniques and optimization strategies have made much-needed achievements with substantial success. Indeed, soft computing has the potential to provide tractable, low cost, and comprehensible solutions even when the problem domain is partially true and ambiguous. Even more, this has emerged forth as robust, efficient and highly effective methods for solving challenging optimization problems that require faster and better decision-making efficacy. It has manifested its kaleidoscopic arrays of successful applications in solving a number of complex real-life problems with improved and progressively solvable methods, where conventional hard computing techniques have either failed to work or were partially successful. It would not be wrong to say that soft computing has not yet attained its maturity, and there are many areas and applications where soft computing techniques need to be explored, and some modifications are needed to improve their solution-finding strategies.

This book introduces the various strategies and applications of soft computing and optimization, and it will render as the basis for increasing transparency, interpretability and trustworthiness of diverse perspectives in other frameworks and for the progressive and holistic development of the miscellaneous realms. The book discusses the applications of soft computing techniques in portfolio management, image processing, machine learning, scheduling problems and other relevant application problems encountered in real life. Perhaps, soft computing is inextricably linked with many intelligent computing methods, including fuzzy logic, neural networks, bio-inspired optimization algorithms, evolutionary algorithms, etc. These are currently being used in research to develop a resilient and hybrid intelligent, affective and cognitive system. Comprehensive information about all these genres has been included in various sections of the book.

The book is broadly segregated into three parts with each part covering research papers on similar topics. The first part consists of ten chapters (Chapters "Classification of MRI Images for Detecting Alzheimer's Disease Using Convolutional Neural Network"–"A Soft Computing Approach for Predicting and Categorizing Learner's Performance Using Fuzzy Model") with the main theme of soft computing methods, in which the authors introduce novel and innovative models and concepts. There is no doubt that all these chapters can fortify the basis for achieving intelligent optimization in diverse fields. These research papers deal with neural networks, particle swarm optimization methods, support vector machines, ant colony optimization and other artificial intelligence techniques. In the second part, five chapters have been assimilated (Chapters "A Fuzzy Logic-Based Approach to Solve Interval Multi--objective Non-linear Transportation Problem: Suggested Modifications"–"Discontinuity at Fixed Point Over Partial Metric Spaces). All these five chapters reflect novel theoretical and pragmatic concepts and methods pertaining to optimization principles. These include fuzzy logic, fixed point theory, multi-objective optimization, approximate optimality, etc. Subsequently, 12 chapters are placed in the third part (Chapters "Fuzzy Logic Implementation in Home Appliances"–"Asymptotic Behavior of Resolvents on Complete Geodesic Spaces With General Perturbation Functions"). These chapters are devoted to research papers covering diverse applications of various advanced topics such as fuzzy logic, machine learning and multi-objective optimization. Additionally, research papers for the pursuit of theoretical underpinnings of heuristic methods in real-world problems such as home appliances, portfolio structuring, image processing, music classification, agriculture, scheduling problems, venue allocation problems, stress level analysis, etc., are also included.

Overall, the book covers interesting selected collections of original contributions by prominent academicians and researchers who presented their latest findings in an open forum at the SCOTA 2021 international conference. We hope and believe that the readers will considerably be benefitted from the topics assimilated in different chapters. In this book, the exciting findings pertaining to theories, modeling and algorithms are illustrated in a lucid manner through simulated and experimental results for a better understanding. Editors consider that this book will in particular be bestow deep insight to practitioners and researchers already working or planning to work in this field and the students in general in their rudimentary research stage.

Ranchi, India — Syeda Darakhshan Jabeen
Aligarh, India — Javid Ali
Tijuana, Mexico — Oscar Castillo

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Syeda Darakhshan Jabeen
Javid Ali
Oscar Castillo

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