Preface

With the shortcoming and limitation of classical platforms of computation, particularly for tackling uncertainty and imprecision prevalent in our day-to-day life, Soft Computing as an alternative and extended computation paradigm has been making its presence felt, practically in problems being faced by the human civilization along all walks of life. Accordingly, a phenomenal growth of research initiative in this field is quite evident. Soft Computing techniques include (i) the elements of fuzzy mathematics, primarily used for handling various real-life problems engrossed with uncertainty, (ii) the ingredients of artificial neural network, usually applied for cognition, learning, and subsequent recognition by machine inducing thereby the flavor of intelligence in a machine through the process of its learning, and (iii) components of Evolutionary Computation mainly used for search, exploration, efficient exploitation of contextual information, and knowledge useful for optimization.

These techniques individually have got their points of strength as well as limitations. On several real-life contexts, it is being observed that they play a supplementary role to one another. Naturally, this has given rise to serious research initiative for exploring avenues of hybridization of the above-mentioned Soft Computing techniques. It is in this context that the editors of the present treatise aim at bringing out some latest findings in the field of hybrid Soft Computing.

- "A Hybrid CS–GSA Algorithm for Optimization" intends to enhance the exploration effectiveness of the Gravitational Search Algorithm (GSA) by computing with Cuckoo Search. Authors apply their hybridized technique on 23 different benchmark test functions to justify the supremacy of their technique over existing methods.
- Authors of "Study of Economic Load Dispatch by Various Hybrid Optimization Techniques" consider the Economic Load Dispatch (ELD) problem of electrical power system. Many techniques figure in the literature ranging from classical, linear, quadratic, nonlinear programming methods to various Soft Computing techniques including ABC, PSO, CSA, ACO, SA, GA, etc. Of late, hybridization of these Soft Computing techniques proves to be even more

encouraging. Authors provide a comprehensive study on such hybrid techniques applied on ELD in this chapter.

- As of now, Template-Based Modeling (TBM) algorithms applied for structural and functional characterizations of protein sequences in biological research suffer from drawbacks in respect of accuracy as indicated by the authors of "Unsolved Problems of Ambient Computationally Intelligent TBM Algorithms". In the present initiative, the authors try to come out with corrective measures in various steps of TBM algorithms.
- In "Hybridizing Differential Evolution Variants Through Heterogeneous Mixing in a Distributed Framework", authors try to identify the effectiveness as well as advantages of heterogeneous DE variants having diverse characteristics applied in a distributed framework over its homogeneous counterpart. The robustness of the proposed method is due to benchmarked comparison with existing state-of-the-art DE techniques available in the literature.
- "Collaborative Simulated Annealing Genetic Algorithm for Geometric Optimization of Thermo-electric Coolers" contains the impact of collaboration (hybridization) of Simulated Annealing and Genetic Algorithm. Authors earmark the rate of refrigeration (ROR) for indexing the performance of thermo-electric coolers (TEC) and justify the supremacy of such collaboration over the performance of Simulated Annealing (SA) or Genetic Algorithm (GA) individually.
- In course of "Color Magnetic Resonance Brain Image Segmentation by ParaOptiMUSIG Activation Function: An Application", authors establish how parallel optimized multilevel sigmoidal (ParaOptiMUSIG) activation function associated to Parallel Self-organizing Neural Network (PSONN) outperforms MUSIG activation function-based technique for segmenting color MR brain images.
- Authors of "Convergence Analysis of Backpropagation Algorithm for Designing an Intelligent System for Sensing Manhole Gases" carry out a comprehensive study and report the effectiveness of Back Propagation (BP) algorithm in the context of sensing the presence in excess proportion of hazardous gas components in manholes. They supplement their finding with theoretical justification of convergence of the BP algorithm they used for this purpose.
- In "REFII Model as a Base for Data Mining Techniques Hybridization with Purpose of Time Series Pattern Recognition", authors take up Raise-Equal-Fall model, version II, in short REF II which essentially is a transformation characteristic unique in nature and capable of automating time series analysis. The utility of REF II, coupled with other methods such as Self-organizing Maps or Frequent pattern trees offers a hybrid platform for efficient data mining.
- Authors have demonstrated in "A Soft Computing Approach for Targeted Product Promotion on Social Networks", as to how the Soft Computing paradigm may be useful for promoting different items on social networks.
- In the course of "Hybrid Rough-PSO Approach in Remote Sensing Imagery Analysis", authors combine the technical ingredients of Rough Set theory on

one hand and of Particle Swarm Optimization on the other to offer a hybridized platform for effective application in remotely sensed imagery along with analysis.

- An extensive study and comprehensive analysis of the usefulness of hybrid intelligent techniques for detection of breast cancer on the basis of breast thermograms are reported in "A Study and Analysis of Hybrid Intelligent Techniques for Breast Cancer Detection Using Breast Thermograms".
- Indian Summer Monsoon Rainfall (ISMR) prediction is reportedly inadequate with the use of Artificial Neural Network (ANN) alone. However, when ANN is hybridized with the power of Fuzzy Time Series analysis (FTS), the accuracy of prediction gets enhanced drastically, as demonstrated by the author in "Neuro-Fuzzy Hybridized Model for Seasonal Rainfall Forecasting: A Case Study in Stock Index Forecasting".
- Comprehensive overview of 3D face registration as a Computer Vision problem is reported in "Hybridization of 2D-3D Images for Human Face Recognition". There, the authors also make use of two supervised classifier techniques along with 2D and 3D hybrid face images for effective 3D face recognition purpose.
- In view of the imprecision inherent in the Business to Customer (B2C) E-commerce trust, authors of "Neutrosophic Trust Evaluation Model in B2C E-Commerce" attempt to offer a solution by exploiting the capability of handling uncertainty in the context of relevant trust models.
- Authors of "Immune-Based Feature Selection in Rigid Medical Image Registration Using Supervised Neural Network" exploit the power of Artificial Immune-based System for feature extraction. The extracted features are then fed into back propagation-based supervised Artificial Neural Network (ANN) for achieving the task medical image registration.

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