

APPLICATIONS OF SOFT COMPUTATIONAL APPROACHES IN BIOINFORMATICS

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In today's world, the use of soft computational approaches has been increased to a variety of bioinformatics application. Bioinformatics approaches – from soft computational methods such as fuzzy system, neural networks, evolutionary algorithms, statistical model algorithms are currently attractive topic in wide variety of bioinformatics research areas. Usually, biological systems and its objects have intrinsically fuzzy as their features and behaviors consist of randomness or uncertainty in nature. Subsequently, only limited computational intelligence approaches are available to handle bio-informatics problems. In order to address the research gap, this special issue identifies the novel work that focuses on the recent advances in bioinformatics, bio-inspired methods, and contribution of computational intelligence approaches to solve biological problems. In the following section, we start by providing the readers of this special issue a brief overview of these research papers.

KEY WORDS

Bio informatics; Soft Computing,
Optimization Methodology

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The first paper in this special issue, “Diagnosis of diabetic retinopathy from fundus image using fuzzy c-means clustering algorithm”, Mohan Jagannath and Kanagasabai Adalarasu presents novel spatially weighted Fuzzy C-Means clustering algorithm for vessel detection in ocular fundus images.

The second paper by Pradeep Reedy et al. intend presenting a novel on-demand multicast routing protocol generally known as Cross-Layered Ant Colony Optimization Multicast Routing Protocol (CLAMR). The result of this selected protocol has been improved and enhanced version of the already existing on-demand multicast routing protocol (ODMRP).

The next paper by Sasi Kumar and Tripathy describes the improvement in automated analysis for human brain signal processing to finding alzheimer's disease using intelligent techniques. Also they presented an improved fuzzy firefly algorithm, which would enhance the classification of the brain signal efficiently with minimum iteration.

The predictive analytical approach towards improving the crop growth yield using fuzzy cognitive maps is the focus of the next paper. Gunasundari Anantharaj et al. describe an important case study to multiple rethegorical factors from the basis of improved crop yield. Moreover, this paper proposes Fuzzy Cognitive Map approach to help in decisive making and suggesting an optimized solution of improving crop yield as well compared with existing approaches such as Genetic Algorithm and Artificial Neural Networks (ANN).

The subsequent two papers deal with a recent wireless sensor network research issues. The paper by Roselin Jones et al. focuses an novel redeployment strategies for balanced coverage in Wireless Sensor Network (WSN). Moreover, the proposed redeployment strategies significantly result in balanced point coverage, which in turn, improves the overall lifetime of the network. Likewise, next paper by Rajesh et al. proposing Chaos Theory based Data Aggregation (CTAg) based approach to reduce redundant information and number of packet transmission between aggregator and sink node in WSN.

The next paper by Maheswari Arumugam and Arun Kumar Sangaiah gives a brief review on various methods applicable for feature extraction and classification of bio signals for cardiac arrhythmia. Similarly, the paper

complemented by Challa Anusha et al. determines the evaluation criteria of social network usage from the perspective of student academic performance, authors have integrated multi-criteria decision making (MCDM) approaches: (a) Quality Function Deployment (QFD), (b) Decision Making Trial and Evaluation Laboratory (DEMATEL) and (c) Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) under fuzzy environment is proposed.

The next paper by Suresh Thangakrishnan and Kadarkaraiyandi Ramar presents biometrics for identifying a person in the world by the physiological features in the human body. Various biometric techniques include features in the human body like the facial, iris, gestures, fingerprint, gene, key stroke biometrics, etc. Subsequently, next paper by Prabhavathy Paneer, Balakrishna Tripathy tunes the existing rough c-means and fuzzy c-means and integrates them into a tuned hybrid soft clustering algorithm termed as the tuned rough-fuzzy c-means algorithm. In addition, the proposed algorithm performance is compared with the existing rough c means, fuzzy c-means, and rough fuzzy c –means approaches.

Dynamic fuzzy clustering algorithm on cancer data and identify the changes in cluster structures for every incoming new data set with respect to previous data is the focus of a next paper. Chatti Subbalakshmi et al. elaborates fuzzy c-means clustering or soft clustering algorithm on cancer data to get initial clustering solution, after that for each cycle added into the new cases for apply conditions to identify the changes.

The next paper by Ramsingh, and Bhuvaneshwari presents hybridized approach for biomarker discovery using Particle Swarm Optimization (PSO) and Genetic Algorithm (GA). The proposed approach is found to be better for identifying optimal gene is verified based on biological validation. Further, next paper by Nagaraju and Tripathy presents the rough equality and rough equivalence in the context of covering based optimistic multi-granular rough sets and establish their properties in the general form as well as in the replacement form.

Final paper by Suja et al. sums up the Extreme Learning Machine (ELM) has been simple and effective algorithm for single-hidden layer feed forward neural networks (SLFN) which automatically classifies the EMG signal into healthy, myopathic or neuropathic.

EDITORS' BACKGROUND



Arun Kumar Sangaiah obtained his Doctor of Philosophy (Ph.D.) in Computer Science and Engineering from VIT University, Vellore, Tamil Nadu, India. He is presently working as a Associate Professor in School of Computing Science and Engineering, VIT University, India. His experience and areas of interest focus on Software Engineering, Soft Computing, Wireless Networks, Bio-Informatics, and Embedded Systems. He has author of more than 100 publications in different journals and conference of National and International repute. Dr. Arun Kumar is member of international advisory board of IJIT (IGI publisher) and editorial board member of IJIES, Japan. Also, he has served a special guest editor of various international journals (InderScience, Hindawi, IGI publishers). He is active member for Compute Society of India. He has guided many research students and post-graduate students in the field of software engineering, communication networks, ad hoc networks, database, and soft computing techniques.



Arunkumar Thangavelu is associated with Vellore Institute of Technology as Senior Professor in School of Computing Sciences. His area of research interest focus on soft computing approaches, adhoc high-performance networking (in MANET/ VANET/ PANET), data mining / analysis, Big Data Analysis, ambient intelligence, aspect based network management, context aware middleware and Internet of Things (IoT). He has published more than 90 works in multiple international conferences and journals. He serves as chair and program committee member in organizing numerous international / national conferences, in which he had delivered key note lecturers. He had authored research books and review research works from International journals such as IEEE, Science Direct and Wiley publications. He is also fond of giving lecturers and helping the research community to achieve and potential towards active participation of research.