Section 1: Big Data Mining and Pattern Discovery

Section description

Section 1 embodies four chapters which primarily focus on the data-mining techniques to deal with enormous amount of data. Methods to address the problem inherent to micro-array datasets i.e., curse of dimensionality are presented in this section. Advance feature selection and classification techniques to handle high dimensional data are also discussed. Spatial data-mining and its challenges are also addressed here. Different knowledge representation techniques and an extensive review of use of artificial intelligence in pattern mining are presented in this section.

Chapter 1
Unleashing Artificial Intelligence onto Big Data - A Review

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Chapter 2
Hybrid Ensemble Learning Methods for Classification of Microarray Data

Sujata Dash, North Orissa University, India

Chapter 3
Recent trends in spatial data mining and its challenges
Section 2

Computational Intelligence in Bioinformatics

Section description

This section explains the development of various intelligent computational models for predicting complex biological problems. A complex novel hybrid model using radial basis function neural network and multi-objective algorithm-based classifier is introduced to predict protein structural class. This section proposes the use of rough sets in conjunction with techniques like Fuzzy sets and Granular (Neighborhood Approximation) computing for the classic problem of data representation, dimensionality reduction, generation, and harvest of minimal rules. The challenges faced by conventional computing methods in dealing with real-world problems by natural systems are also addressed here. An efficient Rough set theory model to capture uncertainty in data and the processing of data using rough set techniques is discussed. The last chapter presents some general ideas for the timeline of different uncertainty models to handle uncertain information and their applications in the various fields of biology.
Section 3

Nature-inspired computing for analysis of DNA and Protein Microarray Data

Section description

In this section many nature inspired computing algorithms are discussed for analyzing and predicting protein and micro-array data. Five chapters are included in this section. Various computational approaches for predicting protein-protein interactions are discussed. Many nature inspired algorithms are discussed in this section to analyze micro-array gene expression dataset. Nature inspired algorithms like PSO K-Means clustering and bi-clustering approaches are discussed to extract the motif information from protein microarray data. Protein microarray data is mainly used to identify the interactions and activities of proteins with other molecules, and to determine their function for a system at normal state and stressed state. This section also classifies individuals that differ in their susceptibility to a particular disease or response to a particular treatment into subpopulations based on individual's unique genetic and clinical information along with environmental factors.

Chapter 10

Computational Methods for Prediction of Protein-Protein Interactions: PPI Prediction Methods

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Chapter 11

Analysis of Microarray Data using Artificial Intelligence Based Techniques

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Chapter 12

Extraction of Protein Sequence Motif Information using Bio-Inspired Computing

Gowri Rajasekaran, Periyar University, India
Rathipriya R, Periyar University, India

Chapter 13

Study of basic concepts on the development of protein microarray - gene expression profiling.

Protein microarray

P Sivashanmugam, National institute of Technology, India
Arun C., National Institute of Technology, India
Selvakumar P., National Institute of Technology, India

Chapter 14

Personalized Medicine in the Era of Genomics

Navneet Kaur Soni, Delhi Technological University, India
Nitin Thukral, Delhi Technological University, India
Yasha Hasija, Delhi Technological University, India

Section 4

Bio-Inspired Algorithms and Engineering Applications

Section description

This section gives in-depth information about bio-inspired algorithms and its application in finding optimized solutions for engineering problems. Different evolutionary computing techniques are discussed to identify complex systems effectively in engineering applications. A popular technique like Bacteria Foraging Algorithm is quite faster in optimization such that there is reduction in the computational burden and also minimal use of computer resource utilization is discussed. Solution of some Differential Equation in Fuzzy Environment by Extension Principle method and its application in Biomathematics problems are explained here. Last chapter discusses application of computational intelligence techniques in wireless sensor networks on the coverage problem in general and area coverage in particular.

Chapter 15
Evolutionary Computing Approaches to System Identification

Bidyadhar Subudhi, National Institute of Technology, India
Debashisha Jena, National Institute of Technology, India

Chapter 16

BFO Optimized automatic load frequency control of a multi area power system

Pravat Kumar Ray, National Institute of Technology, India
Sushmita Ekka, National Institute of Technology, India

Chapter 17

Solution of some Differential Equation in Fuzzy Environment by Extension Principle method and its application in Biomathematics

Sankar Prasad Mondal, National Institute of Technology, India

Chapter 18

Application of Computational Intelligence Techniques in Wireless Sensor Networks: The State of the Art

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Ananta Charan Ojha, Bijupatnaik University of Technology, India

Compilation of References About the Contributors Index