

Patricia Melin, Janusz Kacprzyk, and Witold Pedrycz (Eds.)

Soft Computing for Recognition Based on Biometrics

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Soft Computing for Recognition Based on Biometrics

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Preface

We describe in this book, bio-inspired models and applications of hybrid intelligent systems using soft computing techniques for image analysis and pattern recognition based on biometrics and other information sources. Soft Computing (SC) consists of several intelligent computing paradigms, including fuzzy logic, neural networks, and bio-inspired optimization algorithms, which can be used to produce powerful hybrid intelligent systems. The book is organized in five main parts, which contain a group of papers around a similar subject. The first part consists of papers with the main theme of classification methods and applications, which are basically papers that propose new models for classification to solve general problems and applications. The second part contains papers with the main theme of modular neural networks in pattern recognition, which are basically papers using bio-inspired techniques, like modular neural networks, for achieving pattern recognition based on biometric measures. The third part contains papers with the theme of bio-inspired optimization methods and applications to diverse problems. The fourth part contains papers that deal with general theory and algorithms of bio-inspired methods, like neural networks and evolutionary algorithms. The fifth part contains papers on computer vision applications of soft computing methods.

In the part of classification methods and applications there are 5 papers that describe different contributions on fuzzy logic and bio-inspired models with application in classification for medical images and other data. The first paper, by Carlos Alberto Reyes et al., deals with soft computing approaches to the problem of infant cry classification with diagnostic purposes. The second paper, by Pilar Gomez et al., deals with neural networks and SVM-based classification of leukocytes using the morphological pattern spectrum. The third paper, by Eduardo Ramirez et al., describes a hybrid system for cardiac arrhythmia classification with fuzzy K-Nearest Neighbors and neural networks combined by a fuzzy inference system. The fourth paper, by Christian Romero et al., offers a comparative study of blog comments spam filtering with machine learning techniques. The fifth paper, by Victor Sosa et al., describes a distributed implementation of an intelligent data classifier.

In the part of pattern recognition there are 6 papers that describe different contributions on achieving pattern recognition using hybrid intelligent systems based on biometric measures. The first paper, by Daniela Sanchez et al., describes a genetic algorithm for optimization of modular neural networks with fuzzy logic integration for face, ear and iris recognition. The second paper, by Denisse Hidalgo et al., deals with modular neural networks with type-2 fuzzy logic response integration for human recognition based on face, voice and fingerprint. The third paper, by Lizette Gutierrez et al., proposes an intelligent hybrid system for person

identification using the ear biometric measure and modular neural networks with fuzzy integration of responses. The fourth paper, by Luis Gaxiola et al., describes the modular neural networks with fuzzy integration for human recognition based on the iris biometric measure. The fifth paper, by Juan Carlos Vazquez et al., proposes a real time face identification using a neural network approach. The sixth paper, by Miguel Lopez et al., describes a comparative study of feature extraction methods of type-1 and type-2 fuzzy logic for pattern recognition systems based on the mean pixels.

In the part of optimization methods there are 6 papers that describe different contributions of new algorithms for optimization and their application to real world problems. The first paper by Marco Aurelio Sotelo-Figueroa et al., describes the application of the bee swarm optimization BSO to the knapsack problem. The second paper, by Jose A. Ruz-Hernandez et al., deals with an approach based on neural networks for gas lift optimization. The third paper, by Fevrier Valdez et al., describes a new evolutionary method combining particle swarm optimization and genetic algorithms using fuzzy logic. The fourth paper by Claudia Gómez Santillán et al., describes a local survival rule for steer an adaptive ant-colony algorithm in complex systems. The fifth paper by Francisco Eduardo Gosch Ingram et al., describes the use of consecutive swaps to explore the insertion neighborhood in tabu search solution of the linear ordering problem. The sixth paper by Leslie Astudillo et al., describes a new optimization method based on a paradigm inspired by nature.

In the part of theory and algorithms several contributions are described on the development of new theoretical concepts and algorithms relevant to pattern recognition and optimization. The first paper, by Jose Parra et al., describes an improvement of the backpropagation algorithm using (1+1) Evolutionary Strategies. The second paper, by Martha Cardenas et al., describes parallel genetic algorithms for architecture optimization of neural networks for pattern recognition. The third paper, by Mario Chacon et al., deals with scene recognition based on fusion of color and corner features. The fourth paper, by Hector Fraire et al., describes an improved tabu solution for the robust capacitated international sourcing problem. The fifth paper, by Martin Carpio et al., describes variable length number chains generation without repetitions. The sixth paper, by Juan Javier González-Barbosa et al., describes a comparative analysis of hybrid techniques for an ant colony system algorithm applied to solve a real-world transportation problem.

In the part of computer vision applications several contributions on applying soft computing techniques for achieving artificial vision in different areas are presented. The first paper, by Olivia Mendoza et al., describes a comparison of fuzzy edge detectors based on the image recognition rate as performance index calculated with neural networks. The second paper, by Roberto Sepulveda et al., proposes an intelligent method for contrast enhancement in digital video. The third paper, by Oscar Montiel et al., describes a method for obstacle detection and map reconfiguration in wheeled mobile robotics. The fourth paper, by Pablo Rivas et al., describes a method for automatic dust storm detection based on supervised classification of multispectral data.

In conclusion, the edited book comprises papers on diverse aspects of bio-inspired models, soft computing and hybrid intelligent systems. There are theoretical aspects as well as application papers.

May 31, 2010

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