Preface

The topic of this book is important. Many real-life problems/tasks are difficult to be solved by humans due to their: complexity/difficulty, large number, and/or the required physical human effort. Many situations in which such problems appear are characteristic to field like healthcare that represented the principal target of our book. Difficult problems solving by humans may involve vagueness, imprecision, and/or uncertainty. Among the examples of difficult problem, we mention: the diagnosis of a very difficult medical case; prescription of a medicine for treating a patient who suffers from a very little known illness whose evolution is unpredictable; analyzing a large number of medical images, signals or multimedia etc. To exemplify situations when an increased human effort is necessary, we mention: search for patients' data in a large number of paper-based medical records, a longer time checking/monitoring of a patient health status, etc.

The previously mentioned motivations suggest the necessity of human specialists to require assistance from computing systems. "Soft" assistance may vary from simple information support (data obtained by request from a database for example) to complex forms of decision support (offered by new generations of intelligent expert systems for example). "Hard" assistance could be offered by systems that include software (for decisions and/or control) and hardware components (for example, a wheelchair of a neurologically disabled patient that must be controlled by software).

The main aim of this book was to offer a state-of-the-art chapters' collection that cover themes related to *Advanced Intelligent Computational Technologies and Decision Support Systems* that could be applied for different problems solving in fields like healthcare assisting the humans in solving problems. Efficient solving of various problems by computing systems may require different problem solving algorithms adapted based on the specific of the problems type, complexity and the information/details known about the problems. Computational intelligence algorithms are frequently used for different computational hard problems solving. Computational intelligence provides algorithms for important applications in medicine, such as diagnosis, health datasets analyzing, and drug design. Sometime the combination/hybridization of more algorithms is necessary, in order to obtain their combined advantages. The combination of a neural network with a genetic algorithm represents such an example of hybridization.

The book brings forward a wealth of ideas, algorithms, and case studies in themes like: intelligent predictive diagnosis; intelligent analyzing of medical images; new format for coding of single and sequences of medical images; Medical Decision Support Systems; diagnosis of Down's syndrome; computational perspectives for electronic fetal monitoring; efficient compression of CT Images; adaptive interpolation and halftoning for medical images; development of a brain–computer interface decision support system for controlling the movement of a wheelchair for neurologically disabled patients using their electroencephalography; applications of artificial neural networks for real-life problems solving; present and perspectives for Electronic Healthcare Record Systems; adaptive approaches for noise reduction in sequences of CT images; rule-based classification of patients screened with the MMPI test; scan converting OCT images using Fourier analysis; teaching for long-term memory; Medical Informatics; Intelligent Mobile Multiagent Systems; quantifying anticipatory characteristics, anticipation scope and anticipatory profile; Bio-inspired Computational Methods; Complex Systems; optimization problems solving; fast cost update and query algorithms; new generation of biomedical equipment based on FPGA; negotiation-based patient scheduling in hospitals, etc.

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