Preface

In this book "Novel Applications of Intelligent Systems," selected scientific and scientific-application investigations on intelligent systems are presented. The problems vary from industrial to web and problem-independent applications. All this is united under the slogan: "Intelligent systems conquer the world." It is difficult today to find innovation projects without any analytical research, invention, retrieval and processing of knowledge and logical applications in technology. The crisis that burst forth in 2008 and the following recession decelerated slightly the pace of intelligent applications, but today some countries are preparing for a technological jump on the base of the innovation technologies stored, while others will quickly lag.

That is why this book is recommended to a wide circle of readers and it is particularly recommended to the young generation of IT experts who will build the next generations of intelligent systems.

In the chapter "Modern Approaches for Grain Quality Analysis and Assessment" authors M. Mladenov, M. Deyanov, and S. Penchev present methods and tools for assessment of the main quality features of grain samples, which are based on color image and spectral analysis. The results obtained by two proposed data fusion approaches are compared.

In "Intelligent Technical Fault Condition Diagnostics of Mill Fan" written by M. Hadjiski and L. Doukovska, sase-based reasoning (CBR) approach is used where predictive modeling and the standard statistical applications do not provide satisfactory results. Positive effects of the various machine self-learning methods application are also investigated

In "Abstraction of State-Action Space Utilizing Properties of the Body and Environment" by K. Ito, S. Kuroe and T. Kobayashi, innovative results are presented for industrial applications of autonomous robotized systems. Reinforcement learning is used in the method being proposed for control of the different types of robots developed. As a result, the lack of reproducibility problem and other important problems have been solved.

K. Shiev, S. Ahmed, N. Shakev, and A. Topalov are the authors of the next, chapter "Trajectory Control of Manipulators Using an Adaptive Parametric Type-2 Fuzzy CMAC Friction and Disturbance Compensator." They elaborated a novel type-2 fuzzy cerebellar model articulation controller neural network aiming at better trajectory tracking robot control. An overview of the manipulator dynamics and CT control is given. The control approach guarantees the stability of closed-loop system.

In "On Heading Change Measurement: Improvements for Any-Angle Path-Planning" by P. Muňoz and M. D. R-Moreno, an original research is presented for finding the most efficient and safe path between locations using mobile robots and other applications.

In the next chapter, the authors G. Ulutagay and E. Nasibov present their research "C × K-Nearest Neighbor Classification with Ordered Weighted Averaging Distance." Ordered weighted averaging (OWA) distance is used in a modification of K-nearest neighbors method. By just adjusting the OWA weights the authors show different clustering strategies.

P. Sadeghi-Tehran and P. Angelov wrote the chapter "ARTOD: Autonomous Real Time Objects Detection by a Moving Camera Using Recursive Density Estimation," where a new approach to autonomously detect moving objects in a video captured by a moving camera is proposed. Two surveillance videos were tested which can be categorized as ground-based and aerial videos.

Improved genetic algorithm is used for optimization of the search space by N. El-Zarif and M. Awad in order to solve the problem of downlink resource allocation in a special class of networks. The research in the chapter "Improved Genetic Algorithm for Downlink Carrier Allocation in an OFDMA System" is dedicated to this problem.

In the chapter "Structure-Oriented Techniques for XML Document Partitioning," G. Costa and R. Ortale consider data mining approaches focusing on data clusterization from XML texts. Two new approaches are proposed in this connection whose effectiveness is demonstrated by comparative analysis with the other best representatives in the area. An experimental evaluation of the devised techniques is presented.

Chapter "Security Applications Using Puzzle and Other Intelligent Methods" by V. Jotsov and V. Sgurev is dedicated to applications of special types of data analytics methods called puzzle methods. The name of this group of methods is chosen due to the fact that some of the new types of constraints introduced in this direction may be explained by analogy with human thinking when solving su-doku, puzzles, etc. It is shown that application of this group of methods for the purpose of security increases considerably the indicators of actions' unexpectedness and the applications' actions and protection security as a whole.

In the chapter "Semiautomatic Telecontrol by Multi-link Manipulators Using Mobile Telecameras" written by V. Filaretov and A. Katsurin, a system for semi-automatic control of submarine robots or manipulators is presented. This investigation resolves the problem of telecontrol by multi-link manipulator when the telecamera orientation changes. Original solutions are also proposed for the problem of developing new methods and algorithms of semiautomatic telecontrol by

multi-link manipulators with changing of orientation the optical axis of television camera, which is located in the zone of the realization of working operations. This paper resolves the problem of developing two methods of semiautomatic position and combined telecontrol by multi-link manipulators using the setting devices whose kinematic schemes are differed from the kinematic schemes of manipulators.

Map-building and localization are some of the fundamental topics in mobile robots research. S. Rady in "Vision-Based Hybrid Map-Building and Robot Localization in Unstructured and Moderately Dynamic Environments" focuses on developing efficient environment representation and localization for mobile robots. The solution-approach is suitable for unstructured and moderately dynamic environments. The approach proposed is capable of localizing a moadaptive neurobile robot at both topological and metric levels. A hybrid map construction is proposed, based on maintaining distinctive features to provide recognition accuracy with less computational overhead and the map size is simultaneously decreased.

"Innovative Fuzzy-Neural Model Predictive Control Synthesis for Pusher Reheating Furnace" by G. Stojanovski, M. Stankovski, I. Rudas, and J. Jing is dedicated to the fuzzy-neural variant of the Sugeno fuzzy model. It is used as an adaptive neuro-fuzzy implementation and employed as a predictor in a predictive controller. In order to build the predictive controller the adaptation of the fuzzy model using dynamic process information is carried out. Simulation results for RZS Furnace at Skopje Steelworks are also presented. This control system employs a fuzzy-neural model to implement the predicting function and a gradient-optimization algorithm to synthesize the controlling sequence and close the control loop.

In "Exactus Expert—Search and Analytical Engine for Research and Development Support" written by G. Osipov, I. Smirnov, I. Tikhomirov, I. Sochenkov, and A. Shelmanov the system Exactus Expert is presented—a search and analytical engine. This is a kind of analytical tool that can process large amounts of unstructured and semistructured data, which is basically represented by texts in different natural languages. The search and analytic engine "Exactus Expert" is demanded by experts to support the decision-making process on research topics funding by giving aggregated information about different sides of scientific activity.

In the last chapter of the book "Acoustic and Device Feature Fusion for Load Recognition" the authors A. Zoha, A. Gluhak, M. Nati, M. Ali Imran, and S. Rajasegarar discuss the initial investigation of a multi-layer decision framework for smart energy sensing. Their objective is to improve the device recognition accuracy of low-power consumer appliances by combining steady-state load features with audio features derived from the device usage. They investigate the use of time-domain and FFT-based audio feature sets for recognizing acoustic activity within an office environment. SVM was found out to be the best classification model for both audio and device recognition tasks.

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Springer