

Preface

Together with the increase in computer technology development the importance of human–computer system interaction problems is increasing due to the growing expectations of users on general computer systems’ capabilities in human work and life facilitation. Users expect a system that is not a passive tool in human hands, but rather an active partner equipped with a sort of artificial intelligence, having access to large information resources, being able to adapt its behavior to human requirements, and to collaborate with human users. Achieving these expectations is possible through interaction with technology-based systems (e.g., computers, embedded computer devices) through interactive modalities (e.g., video, voice, touching, writing, gesture, facial expressions, and many others). Thus, the computational methods of Artificial Intelligence are inherent tools utilized in this research area. It is an idea of the book titled *Issues and Challenges in Artificial Intelligence* to collect examples of such attempts. Its preparation was made possible thanks to the papers sent in by our colleagues, working as we do, in the area of Human Interaction Systems. We appreciate these contributions very much.

The contents of the book were divided into the following parts: Part I. Detection, Recognition and Reasoning; Part II. Data Modeling, Acquisition and Mining; and Part III. Optimization.

Part I, consisting of six chapters, is devoted to detection, recognition, and reasoning in different circumstances and applications. H. M. Nguyen et al. evaluate a hybrid approach to reconstruct a wide range of 3D objects from photographs. A. Lipnickas et al. tune parameters of the RANSAC method and determine the number of planes in 3D data by means of indices describing validity of clusters. In another chapter, these authors again adopt the RANSAC method for segmentation of flat areas and detection of planes. A new approach in automatic speech recognition is presented in the chapter by R. Amami and coworkers. It is based on a non-conventional utilization of Real Adaboost algorithm in combination with Support Vector Machines. A. Smiti and Z. Elouedi recognize the importance of the clustering exploitation in competence computing for Case-Based Reasoning systems. B. Sniezynski et al. discuss a methodology for application of Logic Plausible Reasoning formalism in a creation of specific knowledge.

Problems associated with data modeling, acquisition, and mining are presented in papers collected in Part II. A comparison of two approaches used for intelligent planning of complex chemical synthesis is presented by Z. S. Hippe.

In effect, the results of experiments enhancing the matrix model of constitutional chemistry by machine learning algorithms put a new quality into the worldwide known **D-U** model. The chapter by P. G. Clark and coworkers deals with generalized probabilistic approximations applicable in mining inconsistent data. J. L. Kulikowski presents a computer-aided assessment of complex effects of decisions and shows that finding trade-offs between costs and profits is possible due to adequately chosen algebraic tools. A new concept of a distributed system for data acquisition, preprocessing, and subsequent passing by modern mobile devices is discussed by P. Czarnul. An exemplary implementation of the concept on modern Phonegap platform is also provided in this chapter.

Part III contains four chapters. J. Balicki et al. consider a genetic scheduler applied for optimization of a bottleneck computer workload and costs. Genetic programming is applied for finding the Pareto solutions by applying an immunological procedure. The authors conclude that a computer program as a chromosome gives the possibility to represent specific knowledge of the considered problem in a more intelligent way than the data structure. C. Barbulescu and S. Kilyeni examine, in their chapter, the particle swarm optimization algorithm applied to study the power flow in complex power systems. T. Potuzak, in his chapter, describes time requirements of genetic algorithm optimization for road traffic division when using a distributed version of the algorithm. In turn, A. P. Rotshtein and H. B. Rakytyńska discuss optimal design of rule-based system by means of solving fuzzy relational equations. The proposed approach leads to achieving an optimal accuracy-complexity trade-off as a result of the total number of decision classes optimization.

We hope that this book will find a wide audience of readers and that they find it an interesting one.

Zdzisław S. Hippe
Juliusz L. Kulikowski
Teresa Mroczek
Jerzy Wtorek

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Hippe, Z.S.; Kulikowski, J.L.; Mroczek, T.; Wtorek, J. (Eds.)

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