

Preface

This proceedings book of the Mendel conference (<http://www.mendel-conference.org>) contains a collection of selected accepted papers which have been presented at this event in June 2016. The Mendel conference was held in the second largest city in the Czech Republic—Brno (<http://www.brno.cz/en>), which is a well-known university city. The Mendel conference was established in 1995 and is named after the scientist and Augustinian priest Gregor J. Mendel who discovered the famous Laws of Heredity.

The main aim of the Mendel conference was to create a regular possibility for students, academics, and researchers to exchange their ideas on novel research methods as well as to establish new friendships on a yearly basis. The scope of the conference includes many areas of soft computing including *genetic algorithms, genetic programming, grammatical evolution, differential evolution, evolutionary strategies, hybrid and distributed algorithms, probabilistic metaheuristics, swarm intelligence, ant colonies, artificial immune systems, computational intelligence, evolvable hardware, chemical evolution, fuzzy logic, Bayesian methods, neural networks, data mining, multi-agent systems, artificial life, self-organization, chaos, complexity, fractals, image processing, computer vision, control design, robotics, motion planning, decision-making, metaheuristic optimization algorithms, intelligent control, bio-inspired robots, computer vision, and intelligent image processing.*

Soft computing is a formal area of computer science and an important part in the field of artificial intelligence. Professor Lotfi A. Zadeh introduced the first definition of soft computing in the early 1990s: “Soft computing principles differs from hard (conventional) computing in that, unlike hard computing, it is tolerant of imprecision, uncertainty, partial truth, and approximation.” The role model for soft computing is the human mind and its cognitive abilities. The guiding principle of soft computing can be specified as follows: exploit the tolerance for imprecision, uncertainty, partial truth, and approximation to achieve tractability and robustness at a low solution cost.

The main constituents of soft computing include fuzzy logic, neural computing, evolutionary computation, machine learning, and probabilistic reasoning, whereby

probabilistic reasoning contains belief networks as well as chaos theory. It is important to say that soft computing is not a random mixture of solution approaches. Rather, it is a collection of methodologies in which each part contributes a distinct way to address a certain problem in its specific domain. In this point of view, the set of soft computing methodologies can be seen as complementary rather than competitive. Furthermore, soft computing is an important component for the emerging field of contemporary artificial intelligence.

Image processing is a complex process, in which image processing routines and domain-dependent interpretation steps often alternate. In many cases, image processing has to be extensively intelligent regarding the tolerance of imprecision and uncertainty. A typical application of intelligent image processing is computer vision in robotics.

This proceedings book contains three chapters which present recent advances in soft computing including intelligent image processing and bio-inspired robotics. The accepted selection of papers was rigorously reviewed in order to maintain the high quality of the conference. Based on the topics of accepted papers, the proceedings book consists of three chapters: Chapter 1: *Evolutionary Computing, Swarm intelligence, and Metaheuristics*, Chapter 2: *Neural Networks, Self-organization and Machine Learning*, and Chapter 3: *Intelligent Image Processing*.

We would like to thank the members of the International Program Committees and Reviewers for their hard work. We believe that Mendel conference represents a high standard conference in the domain of soft computing. Mendel 2016 enjoyed outstanding keynote lectures by distinguished guest speakers: René Lozi (France), Roman Senkerik (Czech Republic), Wolfram Wiesemann (UK), and Janez Brest (Slovenia).

Particular thanks go to the conference organizers and main sponsors as well. In 2016, the conference is organized under the auspices of the rector of Brno University of Technology with support of WU Vienna University of Economics and Business, and University of Vaasa. The conference sponsors are Humusoft Ltd. (international reseller and developer for MathWorks, Inc., USA.), B&R automation Ltd. (multi-national company, specialized in factory and process automation software), and Autocont Ltd. (private Czech company that operates successfully in the area of ICT).

We would like to thank all contributing authors, as well as the members of the International Program Committees, the Local Organizing Committee, and the Executive Organizing Committee namely Ronald Hochreiter and Lars Nolle for their hard and highly valuable work. Their work has definitely contributed to the success of the Mendel 2016 conference.

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