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 2015. 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. In 2015 we are commemorating 150 years since Mendel's lectures, which he presented in Brno during February and March 1865.

The main aim of the Mendel conference is 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 in a distinct way to address a certain problem in its specific domain. From 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.

Bio-inspired robotics is a fairly new sub-category of robotics. It is about learning concepts from nature and applying them to the design of real-world engineered systems. More specifically, this field is about making robots that are inspired by biological systems. It includes difficult mathematical theories as well as simple central pattern generators (CPG) based on biological neural networks.

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 Parts: Part I: *Evolutionary Computing, Swarm Intelligence*, Part II: *Neural Networks, Self-organization, and Machine Learning*, and Part III: *Intelligent Image Processing, and Bio-Inspired Robotics*.

We would like to thank the members of the International Program Committees and Reviewers for their hard work. We believe that the Mendel conference represents a high standard conference in the domain of Soft Computing. Mendel 2015 enjoyed outstanding keynote lectures by distinguished guest speakers: Julian Miller (United Kingdom), Swagatam Das (India), Wolfram Wiesemann (United Kingdom), Eva Matalová (Czech Republic) and René Lozi (France).

Particular thanks go to the conference organizers and main sponsors as well. In 2015 the conference is organized under the auspices of the Brno City Mayor Petr Vokřál and Brno University of Technology with support from WU Vienna University of Economics and Business, and University of Vaasa. The conference sponsors are Humusoft Ltd. (International reseller and developer for MathWorks, Inc., U.S.A.), B&R automation Ltd. (multinational company, specialised 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 Jouni Lampinen for their hard and highly valuable work. Their work has definitely contributed to the success of the Mendel 2015 conference.

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