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FUZZY LOGIC AND SOFT COMPUTING

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Printed on acid-free paper.

To: *Yan and Luke.*

-- GQC

To: *Professor Chuanyuan Wen, who gave me generous support for my research on fuzzy reliability.*

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PREFACE

Classical computing theories and models are often found to be incapable of dealing with uncertain and imprecise information. Since its inception in 1965, Zadeh's fuzzy logic has been infiltrating in many fields of pure and applied mathematics. In parallel, the past decades have witnessed an increasing number of real world applications of fuzzy logic in various domains that are of interest to both researchers and practitioners. Fuzzy logic aims at dealing with uncertainty and imprecision of a particular kind - fuzziness in concept, with which people usually think and reason in their decision-making and problem-solving processes. In addition, there have been other computing theories and disciplines that can deal with uncertainty and imprecision of different kinds. A number of these theories and disciplines have recently been grouped together, resulting in the emergence of a new area which is nowadays referred to as soft computing. The components of soft computing are considered to include fuzzy logic, neural networks and genetic algorithms, evidence theory, probabilistic reasoning, and many others that could "tolerate" uncertain and imprecise information.

This edited volume, "Fuzzy Logic and Soft Computing", centers around several aspects of fuzzy logic and soft computing. It may be characterized from two perspectives. First, it is a combination of the contributions from world leading experts and Chinese scholars whose research work should be well received. They are internationally well-known in their fields and play active roles in both academic and industrial communities. The names of the international authors include D. Dubois (France), G. Gerla (Italy), L. Godo (Spain), J. Kacprzyk (Poland), E. Kerre (Belgium), H. Prade (France), et al. The Chinese authors include Chun-Bo Feng, Licheng Jiao, Yanda Li, Hongxing Li, Zongben Xu, Guo-Jun Wang, Jue Wang, Wujia Zhu, et al.

Second, this volume is a combination of the subjects that are both typical and non-typical. The typical subjects include fuzzy reasoning, possibilistic logic, fuzzy control, linguistic modifiers, genetic algorithms, and neural network applications. The non-typical subjects covered in the volume, which can be categorized as being within the scope of soft computing in general, include medium logic, rough sets, factor spaces, etc. Two other topics, partial repeatability and limits of agents in process calculus, are also discussed for their potential relevance to soft computing.

Another characteristic of the volume is its orientation towards applications. The articles included in the volume are not only theoretically sound and well formulated, but also coupled with applicability implications and/or implementation treatments. The domains of applications realized or implied are, for example, decision analysis, word computation, databases and knowledge discovery, power systems, control systems, and multi-destinational routing. Furthermore, the articles in the volume contain the materials that are outgrowth of research the authors have recently conducted, which are new and original, and address fundamental and important issues of fuzzy logic and soft computing.

The volume is organized into two parts. Part I consists of five invited papers by international authors describing possibilistic logic in decision analysis, fuzzy dynamic programming in optimization, linguistic modifiers for word computation, and theoretical treatments and applications of fuzzy reasoning. Part II is composed of eleven contributions from Chinese authors focusing on some of the key issues in the fields, such as stable adaptive fuzzy control systems, partial evaluations and fuzzy reasoning, fuzzy wavelet neural networks, analysis and applications of genetic algorithms, partial repeatability, rough set reduction for data enriching, limits of agents in process calculus, medium logic and its evolution, and factor spaces canes.

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