Foreword

by Igor S. Litvinchev

Many scientific and business problems require understanding data that is in some way uncertain or ambiguous. The objective is generally to extract as much useful information as possible from the data and at the same time maintain a quantified understanding of the final accuracy. Uncertainty may arise by many reasons: from noisy sensors, imperfect models, or the inherent nature of medical or biological systems and experiments. In all cases, the key need is to understand and manage uncertainty.

The principal components of artificial intelligence, such as fuzzy logic, neural computing, evolutionary computation, machine learning, and probabilistic reasoning are used to choose actions on the basis of the available information. When a sequence of decisions is needed, each choice can have complex and far-reaching consequences; making good decisions in this situation is challenging from both a mathematical and a computational perspective. In addition, human insights cannot be ignored: any computer system must permit a human decision maker to stay in control.

This book covers various aspects of handling uncertainty by artificial intelligence techniques in a broad area of engineering, management, and technology. The applications range from language optical character recognition to early warning systems to recognize potentially dangerous trends in company business, from fuzzy logic in healthcare, medical decisions, and adaptive digital control to evolutionary techniques in logistics, including vehicle routing, production scheduling, and supply chain design. Novel techniques and approaches are also presented, giving a reader a complete and comprehensive vision of the current state-of-the-art in this area. The chapters show how the major soft computing techniques, fuzzy systems, neural networks, evolutionary algorithms, and especially hybrid systems combining methods from these fields lead to successful industrial applications.

In my opinion, the book, Handbook of Research on Artificial Intelligence Techniques and Algorithms, edited by Pandian Vasant, presents a carefully selected text collection in the area. This volume is highly recommended and can be interesting for soft computing professionals and engineers, practitioners, and problem solvers. The reader will find an interesting, inspiring, and wide variety of soft computing techniques and applications in this book.

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