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**Fuzzy Systems  
in Computer Science**

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# **Fuzzy-Systems in Computer Science**



Verlag Vieweg, P.O. Box 58 29, D-65048 Wiesbaden

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Softcover reprint of the hardcover 1st edition 1994



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Printed on acid-free paper

ISBN-13: 978-3-322-86826-8

e-ISBN-13: 978-3-322-86825-1

DOI: 10.1007/978-3-322-86825-1

## Preface

In recent years it has become apparent that fuzzy systems provide useful tools for obtaining greater generality, higher expressive power, and more convenient concepts for modelling imprecision and uncertainty in many real world applications in order to achieve tractability and low cost realizations without affecting the overall quality of products. For this reason fuzzy systems have an increasing impact in the realms of artificial intelligence, information processing, diagnostics, intelligent control, optimization techniques, decision analysis, and related fields. New and active areas of research emerged, equipped with many practical applications and interesting theoretical problems that have not been solved yet. In this connection several German research projects and working groups in Computer science have been formed that focus on various topics of fuzzy systems. Considering the need for a regular forum where the corresponding work can be discussed by specialists, the research group “Fuzzy Systems” was founded in October 1993 as a part of the German Society of Computer Science (GI).

The first important activity of this group referred to the organization of the workshop “Fuzzy Systems – Management of Uncertain Information” in Braunschweig (October 20-22, 1993) with about 120 attending participants. Invited speakers were Abe Mamdani, the founder of fuzzy control, and Didier Dubois, the designed World President of the International Fuzzy Systems Association (IFSA). All major German research groups on fuzzy systems contributed to this workshop.

In this book we want to address some essential topics that were discussed at the mentioned workshop. The whole presentation is organized as follows:

The first paper gives an overview about the historical development of fuzzy systems in Germany. Then the book is partitioned into the five following chapters:

- Fuzzy Control
- Fuzzy Neuro Systems
- Fuzzy Systems in AI
- Theory of Fuzzy Systems
- Fuzzy Classification

These chapters reflect basic trends and recent results in fuzzy systems methodology. The organization of each section is uniform: It starts with an authoritative introduction to the main issues of the respective field of research and applications, involving the actual state of the art. The preceding papers in a section address recent deliverables and present new ideas regarding the improvement of fuzzy systems.

Since theory and application of fuzzy systems is highly interactive in different fields, the material addresses practitioners and scientists in computer science as well as control engineering, the natural sciences, and mathematics.

The editors wish to thank the authors who contributed their work to this book. We also express our gratitude to Reinald Klockenbusch from Vieweg Verlag for his support, and to our students Heiner Bunjes and Roland Stellmach for their excellent assistance in putting together the final manuscript.

Rudolf Kruse  
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Rainer Palm

June, 1994.

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