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Book Review

Complexity Management in Fuzzy Systems: a rule base compression approach, Alexander Gegov, Published by Springer Verlag, 2007.

The first thing to say about this book is that it is not for the beginner. I came to it as a practitioner who has built fuzzy systems and taught the basics, but nevertheless I found the book challenging to read. If you have a similar background, but wish to take fuzzy logic ideas further and place them on a firm theoretical foundation, then this book may be for you. It is certainly not a primer. So, if you a newcomer to fuzzy systems or you just want a practical guide, then I suggest you start elsewhere and come back when you know all the essentials but want to know more.

Even though the book starts with an introductory chapter, followed by a chapter on some fundamentals entitled "basic types of fuzzy rule based systems", these preambles are clearly written by someone who understands his topic in a detailed mathematical way and is writing a terse refresher for like-minded people. The descriptions of basic fuzzy set types are short, concise and rarefied compared with the usual more practical texts. Their brevity is exemplified by the fact that they are over by page 16. Surprisingly, no explicit mention is made of the increasingly popular theme of type-2 fuzzy logic, in which membership of a fuzzy set is itself a fuzzy function.

From Chapter 3 onward, the author engages with his driving principle, namely his view that conventional fuzzy systems are over-complex and unwieldy, but that they can be simplified by removing redundancy while preserving the solution. Chapter 3 overviews six methods of simplification: removal and merging of linguist values, removal and fusion of inputs, singular value decomposition of output matrix, conversion into union rule configuration, spatial decomposition in subsystems, and decomposition into multilayer hierarchical structure. The chapter concludes with a comparative analysis of the six approaches.

The titles of chapters 4–10 all start with the word 'formal'. They take a formal mathematical approach to describing fuzzy rule based systems, their manipulation, transformation, and simplification. For anyone interested in the inherent complexity in fuzzy systems, these chapters will form a valuable resource. They are clearly intended for a specialist audience, who will no doubt welcome the systematic and rigorous approach. Examples and two case studies help to reinforce the messages.

A concluding chapter briefly summarises the key themes of the book, and proposes some new directions. Unusually, the book ends with the author's self-assessment of the book and its role in helping to place fuzzy logic into the mainstream of research and university teaching. This is an enlightening reflection on the book and the author's perspectives. The inclusion of a similar postscript would be beneficial to most academic texts.

In conclusion, this book is a useful addition for specialists interested in the theoretical and mathematical underpinnings of fuzzy systems.

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