

Fuzzy Models for Pattern Recognition

Methods That Search for Structures in Data

Edited by

James C. Bezdek

Division of Computer Science
University of West Florida

Sankar K. Pal

Electronics and Communications Science Unit
Indian Statistical Institute, Calcutta



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Preface

Applications of fuzzy pattern recognition have matured in the last five years, especially as they interact with and support control systems. At the same time, the theory on which these applications are based has evolved into a cohesive subject, as reflected by the papers we have collected for this volume. From a practical view then, as well as pedagogically, it is timely to introduce a unified presentation of fuzzy models for pattern recognition. From a more utilitarian viewpoint, scientists and engineers are very anxious to understand this approach because of the commercial success in recent years of Japanese products based on fuzzy technology.

This volume collects seminal papers relating to the theory and applications of pattern recognition based on fuzzy sets. Specifically, the volume begins with Zadeh's original 1965 article on fuzzy sets, and proceeds chronologically through the evolution of fuzzy algorithms for feature analysis, clustering, classifier design, neural network learning image processing and computer vision. Each of these major categories is represented by papers important to the theory or an actual application in a pattern recognition system design problem. Each chapter contains an introduction to the topic, comments on the importance of the papers selected, and a bibliography for further reading.

Scientists and engineers in academia, industry, and government that do research about, and development of, fielded systems that process sensor data for classification, prediction, and control should find this collection useful. This volume

can also be used as a secondary (supplementary) text for courses in fuzzy sets, classifier design, cluster analysis, feature analysis, image processing, and computational models for uncertain reasoning. The material in most of the papers is at a level appropriate for senior undergraduates and/or first year graduate students in engineering, and the physical and computational sciences.

This volume was commissioned by the Neural Networks Council (NNC) of the IEEE. The NNC, under the guidance and vision of Bob Marks, Stamatos Kartolopoulos, Pat Simpson, and Russ Eberhart, has championed the sponsorship of fuzzy conferences, an *IEEE Transactions on Fuzzy Systems*, and books such as this one on fuzzy pattern recognition within the IEEE. Thus, we owe the NNC and their leaders a vote of thanks for their help and encouragement. Second, preliminary drafts of the original material were reviewed by perhaps a dozen readers, each of whom provided us with valuable comments that made the material more comprehensible, correct, and accessible; we acknowledge their help and constructive advice. Finally, the staff at IEEE PRESS—in particular, Dudley Kay and Karen Miller, have done an outstanding job of overseeing the production of this volume. Their patience with us at what must have been a remarkably difficult task for them (the production schedule was very, very tight; and, of course, they had to deal with us!) has been outstanding.