

Industrial Applications of Fuzzy Control

M. Sugeno (Ed.), North-Holland, 1985

Fuzzy control is one of the earliest successful attempts at using fuzzy set-based methodologies in real applications. It has also proposed an expert-system approach to the control of complex systems before such an approach gained wide-spread recognition in the field of artificial intelligence. Indeed fuzzy controllers date back to the mid-seventies, when the basic tools were constructed by the team of Prof. Mamdani at Queen-Mary College, England, soon followed by other teams, first in Europe. However, mainly due to the emphasis on classical logic and symbolic processing in the field of artificial intelligence, fuzzy controllers never gained recognition or acceptance in the artificial intelligence community. However, by now, most people involved in basic research on fuzzy controllers are aware of the close connection between their paradigm and that of expert-systems.

The book edited by Sugeno witnesses how much the fuzzy control methodology has now pervaded research in automatic control at the application level, but also geographically, since contributions to this volume are authored by Japanese, Northern-American, Eastern Countries researchers as well as Europeans. The range of topics covered by the book is also surprising: train operation, water purification, robotics, engine control, casting plants, flight control, machining processes, blast furnace control. Apart from dedicated application-oriented papers, the book also contains the results of several empirical studies concerning practical methods for the derivation of control rules, and robustness issues. Techniques based on the modeling of operator's control actions, as well as based on the construction of a fuzzy model by means of fuzzy relational equations are discussed. The problem of parking a car, which is one of the most well known example of fuzzy algorithms, as advocated by Zadeh in the late sixties is also considered, and experiments with a model car equipped with an on-board microprocessor carrying the fuzzy parking rules are reported by the Editor and K. Murakami. The question of building general purpose software for fuzzy control implementation is also addressed in a

joint paper of the Editor and M. Yamazaki who present a microprocessor-based algorithm. The book ends with an excellent contribution by R.M. Tong who outlines the history of fuzzy control and the main trends of development. His annotated bibliography is an invaluable source of information to any body wishing to get involved in the field.

On the whole, this book is very good picture of the state of the art of a methodology whose simplicity contrasts with the extent of its applicability and its good performance. It forms a good complement to a previous collection [1] edited by Gaines and Mamdani (who founded fuzzy control), and which gathered the main contributions of the 70's.

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Reference :

[1] Mamdani, E.H., Gaines, B.R. (Eds.) Fuzzy Reasoning and its Applications. Academic Press, London, 1981.