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# Fuzzy Logic for Planning and Decision Making

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The theory of fuzzy set and fuzzy logic was developed, after 1965, as an exact mathematical tool for processing uncertainty of non-stochastic type. Namely, its concepts and results are especially adequate to the formal representation of vagueness, subjectivity or non-exactness connected with human thinking and description of non-precisely specified objects and phenomena. The optimization procedures, including planning and decision-making, are frequently connected with vagueness of data, criteria, and classification and in this sense they offer numerous good opportunities for application of fuzzy logic to practical situations. In fact, these optimization procedures represent a typical pattern of situations for the mathematical representation of which the fuzzy set theory was developed.

The referred book significantly contributes to handling the link between formal mathematical tools and modelled real optimization problems. It is focused to several interesting and methodologically significant types of planning and decision-making problems. Each of them is formulated and discussed on general level, fuzzy approach to its solution is suggested, and the solution procedure is illustrated on numerical example. Each chapter, devoted to one of particular problems, is completed by a list of references.

The referred book is divided into eight chapters. The first two of them, namely brief *"Introduction"* and *"Basic Concepts of Fuzzy Logic"* present the heuristic description of the investigated problems and the basic general concepts of fuzzy set theory and fuzzy logic including fuzzy numbers and their processing. The following chapters are focused to specific types of problems. The first one of them, *"Stochastic and Fuzzy PERT"* (project evaluation and review technique), deals with critical path method and comparison of stochastic and fuzzy generalizations of its basic deterministic form. The chapter is completed by discussion of fuzzy and stochastic linear programming as equivalent approaches to the PERT. The fourth chapter, titled *"Fuzzy SMART"* (simple multi-attribute rating technique), deals with fuzzy models of categorization and aggregation of criteria. The aggregation of weighted criteria, as well as nomination procedures, calculation of impact grades and scores, and their fuzzified alternatives are investigated also in the fifth chapter *"Fuzzy Additive and Multiplicative AHP"* (analytic hierarchy process). The sixth chapter, *"The ELECTRE Systems"* (from French "elimination et choix traduisant le realité") brings a short explanation of special ranking and ordering procedures. Some special views on the multicriteria decision-making problems are presented in the next section *"Fuzzy Multi–Objective Optimization"*. Finally, the last chapter, titled *"Colour Perception"* is focused to a psychologically oriented problem of subjective evaluation and linguistic categorization using the fuzzy set theoretical tools. The book is completed with *Subject Index*.

The book is written in a lucid, well readable style, the theoretical parts are completed by brief but illustrative comments. The numerical examples adequately support the general methods and concepts. The referred publication offers a good and representative sample of decision-making and planning procedures using fuzzy logic and other fuzzy set theoretical tools. In this sense it has fulfilled its purpose in a mathematically precise style which, parallelly, respects the needs of readers oriented to mathematical applications in social, economic and human sciences. It can be recommended for any such reader.

*Milan Mareš*