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Mathematical Publications

BOOK REVIEW

Wang, Z.—Klir, G. J.: FUZZY MEASURE THEORY. Plenum Press, New York and London, 354 pp., ISBN 0–306–44260–4

The authors present a comprehensive treatment of a recent mathematical subject referred to as a fuzzy measure theory. Fuzzy measure theory is a generalization of classical measure theory, where the additivity axiom of classical measures is replaced by weaker axioms of monotonicity and continuity.

The nine chapters of the book are supplemented with six appendices and authors and subject indexes. The first chapter includes an introduction and a short historical overview of fuzzy measure theory. Chap. 2 is devoted to the relevant prerequisites from the set theory.

The essence of fuzzy measure theory is covered in Chaps. 3-8. Namely, Chap. 3 presents the basic definitions and results on general fuzzy measures and special types, such as λ-fuzzy measures, quasi-measures, belief and plausibility measures, possibility and necessity measures, etc.

Chap. 4 deals with extensions of fuzzy measures and Chap. 5 is devoted to several structural characteristics for set functions, such as null-additivity, autocontinuity, uniform autocontinuity, etc.

Chap. 6 is devoted to the measurable functions on fuzzy measurable spaces, including several types of convergencies.

Chap. 7 deals with fuzzy integrals, generalizing the original Sugeno integral for non-negative measurable functions, including the convergence theorems, transformation theorem, etc.

Chap. 8 deals with Pan-integrals, including Pan-additions and Pan-multiplications, definition and basic properties of Pan-integrals.

The applicability of the theory is illustrated by simple examples in Chap. 9.

Individual chapters are accompanied by notes (with relevant bibliographical and historical information), and several exercises.

Appendices A and B are devoted to some relevant concepts and results regarding the classical measure theory and the fuzzy set theory.

Appendices C and D are glossaries of key concepts and symbols.

Appendices E and F contain three reprinted articles opening new directions in fuzzy measure theory (App. E), and three reprinted articles describing significant applications of fuzzy measure theory (App. F).

There are several minor slips and misprints, which can be taken as (hidden) exercises for a reader. For example, see Theorem 3.14 on p. 58, Example 4.1 on p. 73 or Example 7.4 on p. 140. Further, it would be desirable to include more results from the non-additive measure and integral theory. On the other hand, it should be mentioned that this is a first book devoted purely to the fuzzy measure theory and it includes several new mathematical results and concepts. The book is accessible to readers even not familiar with classical measure theory, including researchers and students who do not major in mathematics. It can be recommended to everybody who wants to enrich his capability to properly model the intricacies of the real world.

Radko Mesiar, Bratislava