Fuzzy Switching and Automata—A. Kandel and S. C. Lee (New York: Crane, Russak and Company, 1979). *Reviewed by Ching Yang Wang, Department of Electrical Engineering, Duke University, Durham, NC 27706.*

Beginning with a review of modern algebra, Chapter 1 of this book briefly discusses basic set theory, lattices, and Boolean algebra. The basic properties of lattices and Boolean algebra are introduced by a set of theorems and corollaries, together with many illustrative examples. The reader will find this interesting chapter a very helpful tool such that the extension of conventional set theory to the theory of fuzzy subsets can be well appreciated.

Chapter 2 gives the definition of a fuzzy set. Membership function is interpreted as the grades of belongingness of elements to a not sharply defined class. Then basic operations on fuzzy subsets are discussed through membership functions. Fuzzy relations and convex fuzzy sets are given special attention because of their important roles in switching and automata theory. This is followed by a brief discussion of fuzzy logic, probability measure of fuzzy events, and the entropy of a fuzzy set. Properties of fuzzy algebra are summarized at the end of this chapter.

In Chapter 3 fuzzy algebra is used to study the fuzzy switching functions in combinational switching systems. The minimization and decomposition of fuzzy switching functions are achieved by means of applying fuzzy identities of fuzzy algebra instead of algebraic manipulations. Although it is inefficient for expressions of even a small number of variables and it does not constitute an algorithm, the relationship between fuzzy functions and binary logic can be well exposed and thus is very instructive. A more systematic method of fuzzy simple disjunctive (FSD), decomposition, and fuzzy complex disjunctive (FCD) decomposition is also presented.

Chapter 4 discusses fuzzy automata and languages. Fuzzy matrices serve as the basis for this discussion. Regular expressions in describing finite fuzzy automata and regular fuzzy languages are demonstrated together with the introduction of a normal form for production of a regular fuzzy grammar when the "max(min)" rule is used. The relationships between formal languages and λ-fuzzy languages are given at the end of this chapter.

Various applications of fuzzy automata are presented in Chapter 5. Through fuzzy models, imprecise concepts and fuzzy phenomena in the real world can be analysed. Fuzzy neural networks, approximation of functions by fuzzy forms, and hazards detection in digital systems are discussed through the notation of fuzzy automata and fuzzy languages. They are followed by the application of fuzzy matrix to pattern recognition and classification, and to role theory.

At the end of the text there is a fairly complete bibliography on fuzzy set theory and their applications and related topics. Some representative works can be found on this list.

Because both authors are actively engaged in the field of fuzzy set theory and applications, much of the material covered by this book is the result of current research done by the authors and others, so that the readers are surely going to benefit from being updated with this presentation. It can be used as a complement book to A. Kaufmann's series [1]. Though this is a well-written book, in the reviewer's opinion, it needs more coverage of the basic concepts of fuzzy subsets in order to become a good textbook. However this is an indispensable reference for those involved in the new applications of fuzzy set theory.

References

[1] A. Kaufmann, *Introduction a la Theorie des Sous-Ensembles Flous*. Paris: Masson et Cie Editeurs, 1973.