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**Statistics with vague data.** (English) Zbl 0663.62010

Theory and Decision Library. Series B: Mathematical and Statistical Methods, 6. Dordrecht etc.: D. Reidel Publishing Company, a member of the Kluwer Academic Publishers Group. VII, 279 p.; Dfl. 150.00; $ 59.00; £42.00 (1987).

From the introduction: "In this monograph, problems resulting from two types of uncertainty - randomness and vagueness - are treated. Randomness involves only uncertainties in the outcomes of an experiment; vagueness, on the other hand, involves uncertainties in the meaning of the data."

From the preface: "This monograph is an attempt to unify existing works in the field of random sets, random variables, and linguistic random variables with respect to statistical analysis. The methods form the basis of a user-friendly software tool which supports the statistical inference in the presence of vague data. This textbook is designed for readers with an advanced knowledge of mathematics."

This clear conception is realized in a clear but advanced style. The basic notion in this book is that of a fuzzy random variable X which is considered as a fuzzy perception of an unknown usual random variable U which is called the original of X. And the basic question is: How we can evaluate the acceptability of the vague statement "U is the original of X". One of the essential sources of this monograph are the starting papers on fuzzy random variables by *H. Kwakernaak* [Inf. Sci. 15, 1- 29 (1978; Zbl 0438.60004); and ibid. 17, 253-278 (1979; Zbl 0438.60005)].

The following chapter headings give a rough impression of the hard work done by the authors:

1. Introduction. 2. Vague data. 3. Fuzzy Sets of the real line. 4. Operations on fuzzy sets. 5. Representation of vague data in a digital computer. 6. Topological properties of fuzzy set spaces. 7. Random sets and fuzzy random variables. 8. Descriptive statistics with vague data. 9. Distribution functions and i.i.d.-sequences of random variables. 10. Limit theorems. 11. Some aspects of statistical inference. 12. On a software tool for statistics with vague data. (220 References)

Reviewer: W.Näther

**MSC:**

62-02 Research exposition (monographs, survey articles) pertaining to statistics
60F05 Central limit and other weak theorems
60A99 Foundations of probability theory
03E72 Theory of fuzzy sets, etc.



**Keywords:**

bibliography; uncertainty; randomness; vagueness; random sets; linguistic random variables; vague data; fuzzy random variable; Topological properties of fuzzy set spaces; Descriptive statistics; Limit theorems; statistical inference; software tool