

Preface

Order statistics and related general models of ordered random variables are important in statistical theory and its applications. The independent and identically distributed random variables, that can be interpreted as results of an experiment measuring values of a certain random variable arranged in order of magnitude, are called order statistics. In statistical model of many experiments, for instance in reliability analysis, life time studies, in testing of strength of materials, etc., the realizations arise in nondecreasing order, therefore the use of order statistics is necessary. Furthermore, order statistics are extensively used in statistical inferences; in the estimation theory and hypothesis testing. Together with rank statistics, order statistics are among the most fundamental tools in non-parametric statistics.

From the classical statistical theory, it is well known that the natural estimation of an unknown distribution function is the empirical distribution function which is a function of order statistics. Therefore, many important statistics in estimation theory and hypothesis testing appear to be an integral functional of the empirical distribution function and can be expressed in terms of order statistics. Order statistics do not change their order under probability integral transformation. Due to their unique distribution free properties they are widely used in nonparametric interval estimation and hypothesis testing. For example, the tolerance intervals and invariant intervals are merely order statistics, the Kolmogorov–Smirnov test statistic based on the distance between two empirical distribution functions also is constructed by using order statistics. There are many characterizations of probability distributions through properties of order statistics. The distribution theory of order statistics has been widely described in several monographs written by outstanding statisticians and there are numerous papers devoted to the theory of order statistics and its applications as well as asymptotic results and inferences based on order statistics.

The theory of records is very closely connected with the theory of extreme order statistics. There appeared numerous papers and several monographs since K.N. Chandler presented the basic definitions and the first theoretical results on records in 1952. Several interesting models of ordered random variables that appear when censored data are considered can be described in terms of order statistics. For instance, the Progressively Type I- and II-censored order statistics give rise to applications in reliability theory, survival analysis, and clinical trials. Many fundamental results in this interesting and attractive topic were founded by N. Balakrishnan and his students and co-authors. In 1995, U. Kamps introduced the generalized order statistics and showed that all known models of ordered random variables are contained in the model of generalized

order statistics in the distributional and theoretical sense. There is no doubt that generalized order statistics and different models of ordered random variables will continue to arouse interest of many researchers working in the fields of theoretical statistics, applications, and statistical mathematics. This volume consists of the selected papers presented at the international conference “Ordered Statistical Data: Approximations, Bounds, and Characterizations”, 15–18 June, 2005, Izmir. The Izmir conference brought together approximately 100 researchers having interest in the area. We hope that the volume will be useful to many scientists working in the area of theory of statistics and its applications.

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