Preface

Ordered random variables have attracted several researchers due to their applicability in many areas, like extreme values. These variables occur as a natural choice when dealing with extremes like floods, earthquakes, etc. The use of ordered random variables also appears as a natural choice when dealing with records. In this book we have discussed various models of ordered random variables with both theoretical and application points of view. The introductory chapter of the book provides a brief overview of various models which are available to model the ordered data.

In Chap. 2 we have discussed, in detail, the oldest model of ordered data, namely order statistics. We have given the distribution theory of order statistics when sample is available from some distribution function F(x). Some popular results regarding the properties of order statistics have been discussed in this chapter. This chapter also provides a brief about reversed order statistics which is a mirror image of order statistics. We have also discussed recurrence relations for moments of order statistics for various distributions in this chapter.

Chapter 3 of the book is dedicated to another important model of ordered variables, known as record values introduced by Chandler (1952). Record values naturally appear when dealing with records. This chapter discusses in detail the model when we are dealing with larger records and is known as upper record values. The chapter contains distribution theory for this model alongside some other important results. The chapter also presents recurrence relations for moments of record values for some popular probability distributions.

Kamps (1995) introduced a unified model for ordered variables, known as generalized order statistics (GOS). This model contains several models of ordered data as a special case. In Chap. 4, we have discussed, in detail, this unified model of ordered data. This chapter provides a brief about distribution theory of GOS and its special cases. The chapter also contains some important properties of the model, like Markov chains property and recurrence relations for moments of GOS for some selected distributions.

In Chap. 5 the model of reversed order random variables known as dual generalized order statistics (DGOS) is discussed. The model was introduced

by Burkschat et al. (2003) as a unified model to study the properties of variables arranged in decreasing order. The model contains reversed order statistics and lower record values as a special case. We have given some important distributional properties for the model in Chap. 5. We have also discussed recurrence relations for moments of DGOS when sample is available from some distribution F(x). The chapter also provides relationship between GOS and DGOS.

Ordered random variables have found tremendous applications in many areas such as estimation and concomitants. Chapter 6 of the book presents some popular uses of ordered random variables. The chapter presents use of ordered random variables in maximum likelihood and Bayesian estimation.

Chapters 7 and 8 of the book present some popular results about probability distributions which are based on ordered random variables. In Chap. 7 we have discussed some important results regarding the characterization of probability distributions based on ordered random variables. We have discussed characterizations of probability distributions based on order statistics, record values, and generalized order statistics. Chapter 8 contains some important results which connect ordered random variables with extreme value distribution. We have discussed the domains of attractions for several random variables for various types of extreme values distributions.

Finally, we would like to thank our colleagues and friends for their support and encouragement during compilations of this book. We would like to thank Prof. Chris Tsokos for valuable suggestions which help in improving the quality of the book. Authors 1 and 3 would like to thank Prof. Muhammad Hanif and Prof. Valary Nevzorov for healthy comments during compilation of this book. Authors 1, 3, and 4 would also like to thank Statistics Department, King Abdulaziz University, for providing excellent support during compilation of the book. Author 2 would like to thank Rider University for their excellent facilities which helped in completing the book.

Jeddah, Saudi Arabia — Muhammad Qaiser Shahbaz
Lawrenceville, USA — Mohammad Ahsanullah
Jeddah, Saudi Arabia — Saman Hanif Shahbaz
Jeddah, Saudi Arabia — Bander M. Al-Zahrani

http://www.springer.com/978-94-6239-224-3

Ordered Random Variables: Theory and Applications

Shahbaz, M.Q.; Ahsanullah, M.; Hanif Shahbaz, S.;
Al-Zahrani, B.M.

2016, XII, 294 p. 3 illus., Hardcover
ISBN: 978-94-6239-224-3
A product of Atlantis Press