

Preface

Nowadays one can hardly find any field where statistics is not used. With a given sample, one can infer about the population. The role of estimation and inferential statistics remains pivotal in the study of statistics. Statistical inference is concerned with problems of estimation of population parameters and test of hypotheses. In statistical inference, drawing a conclusion about the population takes place on the basis of a portion of the population. This book is written, keeping in mind the need of the users, present availability of literature to cater to these needs, their merits and demerits under a constantly changing scenario. Theories are followed by relevant worked-out examples which help the user grasp not only the theory but also practice them.

This work is a result of the experience of the authors in teaching and research work for more than 20 years. The wider scope and coverage of the book will help not only the students, researchers and professionals in the field of statistics but also several others in various allied disciplines. All efforts are made to present the “estimation and statistical inference”, its meaning, intention and usefulness. This book reflects current methodological techniques used in interdisciplinary research, as illustrated with many relevant research examples. Statistical tools have been presented in such a manner, with the help of real-life examples, that the fear factor about the otherwise complicated subject of statistics will vanish. In its seven chapters, theories followed by examples will make the readers to find most suitable applications.

Starting from the meaning of the statistical inference, its development, different parts and types have been discussed eloquently. How someone can use statistical inference in everyday life has remained the main point of discussion in examples. How someone can draw conclusions about the population under varied situations, even without studying each and every unit of the population, has been discussed taking numerous examples. All sorts of inferential problems have been discussed, at one place supported by examples, to help the students not only in meeting their examination need and research requirement, but also in daily life. One can hardly get such a compilation of statistical inference in one place. The step-by-step

procedure will immensely help not only the graduate and Ph.D. students but also other researchers and professionals. Graduate and postgraduate students, researchers and the professionals in various fields will be the user of the book. Researchers in medical and social and other disciplines will be greatly benefitted from the book. The book would also help students in various competitive examinations.

Written in a lucid language, the book will be useful to graduate, postgraduate and research students and practitioners in diverse fields including medical, social and other sciences. This book will also cater the need for preparation in different competitive examinations. One can find hardly a single book, in which all topics related to estimation and inference are included. Numerous relevant examples for related theories are added features of this book. An introduction chapter and an annexure are special features of this book which will help readers in getting basic ideas and plugging the loopholes of the readers. Chapter-wise summary of the content of the proposed book is presented below.

Estimation and Inferential Statistics

- Chapter 1: The chapter relates to introduction to the theory of point estimation and inferential statistics. Different criteria for a good estimator are discussed. The chapters also present real-life worked-out problems that help the reader understand the subject. Compared to partial coverage of this topic in most books on statistical inference, this book aims at elaborate coverage about the subject of point estimation.
- Chapter 2: This chapter deals with different methods of estimation like least square method, method of moments, method of minimum χ^2 and method of maximum likelihood estimation. Not all these methods are equally good and applicable in all situations. Merits, demerits and applicability of these methods have been discussed in one place, which otherwise have remained mostly dispersed or scattered in the competing literature.
- Chapter 3: Testing of hypotheses has been discussed in this chapter. This chapter is characterized by typical examples in different forms and spheres including Type A1 testing, which is mostly overlooked in many of the available literature. This has been done in this book.
- Chapter 4: The essence and technique of likelihood ratio test has been discussed in this chapter. Irrespective of the nature of tests for hypotheses (simple and composite), this chapter emphasizes how easily the test could be performed, supported by a good number of examples. Merits and drawbacks have also been discussed. Some typical examples are discussed in this chapter that one can hardly find in any other competing literature.

- Chapter 5: This chapter deals with interval estimation, techniques of interval estimation under different situations, problems and prospects of different approaches of interval estimation has been discussed with numerous examples in one place.
- Chapter 6: This chapter deals with non-parametric methods of testing hypotheses. All types of non-parametric tests have been put together and discussed in detail. In each case, suitable examples are the special feature of this chapter.
- Chapter 7: This chapter is devoted to the discussion of decision theory. This discussion is particularly useful to students and researchers interested in inferential statistics. In this chapter, attempt has been made to present the decision theory in an exhaustive manner, keeping in mind the requirement and the purpose of the reader for whom the book is aimed at. Bayes and mini-max method of estimation have been discussed in the Annexure. Most of the available literature on inferential statistics lack due attention on these important aspects of inference. In this chapter, the importance and utilities of the above methods have been discussed in detail, supported with relevant examples.
- Annexure: The authors feel that the Annexure portion would be an asset to varied types of readers of this book. Related topics, proofs, examples, etc., which could not be provided in the text itself, during the discussion of various chapter for the sake of maintenance of continuity and flow are provided in this section. Besides many useful proofs and derivations, this section includes transformation of statistics, large sample theories, exact tests related to binomial, Poisson population, etc. This added section will be of much help to the readers.

In each chapter, theories are followed by examples from applied fields, which will help the readers of this book to understand the theories and applications of specific tools. Attempts have been made to familiarize the problems with examples on each topic in a lucid manner. During the preparation of this book, a good number of books and articles from different national and international journals have been consulted. Efforts have been made to acknowledge and provide these in the bibliography section. An inquisitive reader may find more material from the literature cited.

The primary purpose of the book is to help students of statistics and allied fields. Sincere efforts have been made to present the material in the simplest and easy-to-understand form. Encouragements, suggestions and help received from our colleagues at the Department of Agricultural Statistics, Bidhan Chandra Krishi Viswavidyalaya are sincerely acknowledged. Their valuable suggestions towards improvement of the content helped a lot and are sincerely acknowledged. The authors thankfully acknowledge the constructive suggestions received from the reviewers towards the improvement of the book. Thanks are also due to Springer

for the publication of this book and for continuous monitoring, help and suggestion during this book project. The authors acknowledge the help, cooperation, encouragement received from various corners, which are not mentioned here. The effort will be successful, if this book is well accepted by the students, teachers, researchers and other users to whom this book is aimed at. Every effort has been made to avoid errors. Constructive suggestions from the readers in improving the quality of this book will be highly appreciated.

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