

Preface

This book is intended to provide a collection of topics outlining pretest and Stein-type shrinkage estimation techniques in a variety of regression modeling problems. Since the inception of the shrinkage estimation, there has been much progress in developing improved estimation strategies both in terms of theoretical developments and their applications in solving real-life problems.

Recently, LASSO and related penalty-type estimation have become popular in problems related to variable selection and predictive modeling. In this book, selected penalty estimation techniques have been compared with the full model, submodel, pretest, and shrinkage estimators in some regression models. Further, one chapter is dedicated to estimation problem in pooling data from several sources. Several real data examples have been presented along with Monte Carlo simulations to appraise the performance of the estimators in real settings. The book is suitable as reference book for a graduate course in regression analysis and combining data from several sources. The selection of topics and the coverage will be equally useful for the researchers and practitioners in this field.

This book is organized into six chapters. The chapters are standalone so that anyone interested in a particular topic or area of application may read that specific chapter. Those new to this area may read the first two chapters and then skip to the topic of their interest. Here is a brief outline of the contents.

In [Chap. 1](#), we briefly describe pretest, shrinkage and penalty estimation strategies for estimating regression parameters in a multiple regression model.

In [Chap. 2](#), linear shrinkage, and shrinkage pretest strategies for estimating the normal and Poisson means from a single sample have been presented. Large sample properties of the estimators are appraised and compared with the classical estimators.

Combining several sources of information can lead to improved estimates of the parameters of interest. In [Chap. 3](#), efficient estimation strategies based on pretest and James-Stein principles for pooling data from several sources have been discussed. Simultaneous estimation of several coefficients of variation has been considered to illustrate the usefulness of pretest and shrinkage estimates.

In [Chap. 4](#), shrinkage and pretest estimation in a multiple regression model have been discussed. Several penalty estimators such as LASSO, adaptive LASSO, and SCAD estimators have been presented. Monte Carlo simulation studies are

provided and applications of suggested estimators using real data examples are given.

In **Chap. 5**, shrinkage, pretest, and penalty estimation strategies have been extended to partially linear regression models. The properties of the risk of the estimators have been studied both theoretically and through Monte Carlo studies.

In **Chap. 6**, shrinkage and penalty estimation strategies have been studied in a Poisson regression model. The performances of the estimators have been appraised through real data example as well as Monte Carlo simulation experiments.

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