

<<非参数和半参数模型中的经验似然>>

图书基本信息

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## 前言

Recent years, the empirical likelihood method has received great attention when we deal with statistical inference for nonparametric and semiparametric regression models. These models include fully nonparametric regression, single-index, partially linear single-index, varying coefficient models, so on so forth. However, how to efficiently apply the empirical likelihood to these models is of particular interest and challenging. This is because for such models, classical empirical likelihood is not asymptotically distribution-free any more. The main reason that causes this difficulty is that in such models, there are two unknowns: the parameters of interest and some nonparametric link functions or additive functions, of which we need to regard them as infinite-dimensional nuisance parameters. Clearly, when we consider constructing confidence regions for the parameters of interest in these models, plug-in estimators are needed to replace the unknown nonparametric link functions. This is a commonly used method in the literatures, but it causes why the classic empirical likelihood does not have tractable limiting distribution. We in recent years have been studying this problem and proposed several bias correction methods to make the empirical likelihood more useful for these models. Owen (2001) is the only comprehensive book in the empirical likelihood. As the pioneer in this area, Owen did the fundamental work and collected many important works in his book. However, for confidence region construction and hypothesis testing, Owen's book does not contain the materials about nonparametric and semiparametric regression models, especially bias correction approaches. Our book will present these different methods and the applications. Specifically, we will describe and illustrate the empirical likelihood method with "bias-correction" for constructing empirical likelihood ratios.

This book is composed of ten chapters. The first chapter will contain some pre-liminary knowledge. Chapters 2 and 3 will analyze the cross-section data using the single-index model and the partially linear single-index model. Chapters 4 through 6 will investigate the longitudinal data using the partially linear model, the varying coefficient model and a nonparametric regression model. Chapter 7 will discuss nonlinear errors-in-covariables models with validation data. Chapters 8 through 10 will investigate missing data using the linear model, a nonparametric regression model and the partially linear model. Each chapter, except for Chapter 1, of this book will be self-contained so that the reader could focus on any chapter without much effect on the understanding of the others.

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### 内容概要

This book is composed of ten chapters. The first chapter contains the preliminary knowledge about empirical likelihood and other relevant nonparametric methods. Chapters 2 and 3 analyze the section-data using the single-index model and the partially linear single-index model. Chapters 4 through 6 investigate the longitudinal data using the partially linear model, the varying coefficient model and a nonparametric regression model. Chapter 7 discusses nonlinear errors-in-covariables models with validation data. Chapters 8 through 10 investigate missing data under the framework of the linear model, a nonparametric regression model and the partially linear model. Every chapter, except for Chapter 1, of this book is self-contained so that the reader could focus on any chapter without much effect on the understanding of the others, and hence can read any chapters according to reader's own interest. The emphasis of this book is on methodologies rather than on theory, with a particular focus on applications of the empirical likelihood techniques to various semiparametric regression models. Key technical arguments are presented in the "proofs sections" at the end of each chapter. This gives interested researchers an idea of how the theoretical results are obtained. Also from the style of material organization, this book is more likely a lecture note, rather than a textbook. Most materials come from authors' research articles. This book intends to provide a useful reference for researchers and to serve as a lecture note to postgraduate students. It is especially for the people working in the nonparametric and semiparametric statistics areas or applying the empirical likelihood method to other areas.

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章节摘录

In clinical trials and observational studies, complete response data are often not available for every object. Missing response data may arise due to many circumstances, including treatment drop-out, study drop-out, mistimed measurements, study subjects failing to report to a clinic for monthly evaluations, respondents refusing to answer certain items on a questionnaire, loss of information caused by uncontrollable factors, and so forth. In such circumstances, the usual inference procedures for complete data sets cannot be applied directly. The most common technique used by data analysis is to naively exclude subjects with missing data, then perform a regression analysis with the remaining data. This is called a complete-case analysis. Because subjects with any missing variables are excluded, it is well known that the complete-case analysis can give highly inefficient estimates (Little and Rubin 1987). To increase efficiency, one impute (i.e., fill in) a plausible value for each missing datum and then analyze the results as if they were complete data. Commonly used imputation methods for missing response values include linear regression imputation (Healy and Weatmacott 1956, Wang and Rao 2001, 2002c), nonparametric regression imputation (Cheng 1994, Wang and Rao 2002b, Chen, et al. 2006), ratio imputation (Rao 1996), semiparametric partially linear regression imputation (Wang, Linton and Hrdle 2004, Liang, and Wang and Carroll 2007, among others).

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