

Enhancing Small Area Estimation Methods Applications to Istat's Survey Data

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Small Area Estimation Methods And Applications

Clifford Lane



Small Area Estimation Methods And Applications:

Robust Small Area Estimation Jiming Jiang,J. Sunil Rao,2025-08-20 In recent years there has been substantial and growing interest in small area estimation SAE that is largely driven by practical demands Here the term small area typically refers to a subpopulation or domain of interest for which a reliable direct estimate based only on the domain specific sample cannot be produced due to small sample size in the domain Keywords in SAE are borrowing strength Because there are insufficient samples from the small areas to produce reliable direct estimates statistical methods are sought to utilize other sources of information to do better than the direct estimates A typical way of borrowing strength is via statistical modelling On the other hand there is no free lunch Yes one can do better by borrowing strength but there is a cost This is the main topic discussed in this text Features A comprehensive account of methods applications as well as some open problems related to robust SAE Methods illustrated by worked examples and case studies using real data Discusses some advanced topics including benchmarking Bayesian approaches machine learning methods missing data and classified mixed model prediction Supplemented with code and data via a website Robust Small Area Estimation Methods Applications and Open Problems is primarily aimed at researchers and graduate students of statistics and data science and would also be suitable for geography and survey methodology researchers The practical approach should help persuade practitioners such as those in government agencies to more readily adopt robust SAE methods It could be used to teach a graduate level course to students with a background in mathematical statistics

Small area estimation in forest inventories: New needs, methods, and tools Barry Wilson,John Coulston,Steve Prisley,Philip Radtke,2023-04-17

Research Handbook on Measuring Poverty and Deprivation Jacques Silber,2023-03-02 Encompassing chapters that address both unidimensional and multidimensional poverty this timely Research Handbook explores all aspects of poverty and deprivation measurement not only detailing broad issues but also scrutinising specific domains and aspects of poverty such as health energy and housing Its succinct and highly focussed chapters written by a diverse range of authors employ a combination of theoretical and empirical methodologies to offer well rounded explorations of complex topics

Statistical Methods and Applications in Forestry and Environmental Sciences Girish Chandra,Raman Nautiyal,Hukum Chandra,2020-01-04 This book presents recent developments in statistical methodologies with particular relevance to applications in forestry and environmental sciences It discusses important methodologies like ranked set sampling adaptive cluster sampling small area estimation calibration approach based estimators design of experiments multivariate techniques Internet of Things and ridge regression methods It also covers the history of the implementation of statistical techniques in Indian forestry and the National Forest Inventory of India The book is a valuable resource for applied statisticians students researchers and practitioners in the forestry and environment sector It includes real world examples and case studies to help readers apply the techniques discussed It also motivates academicians and researchers to use new technologies in the areas of forestry and

environmental sciences with the help of software like R MATLAB Statistica and Mathematica

A Course on Small Area Estimation and Mixed Models Domingo Morales, María Dolores Esteban, Agustín Pérez, Tomáš Hobza, 2021-03-12 This advanced textbook explores small area estimation techniques covers the underlying mathematical and statistical theory and offers hands on support with their implementation It presents the theory in a rigorous way and compares and contrasts various statistical methodologies helping readers understand how to develop new methodologies for small area estimation It also includes numerous sample applications of small area estimation techniques The underlying R code is provided in the text and applied to four datasets that mimic data from labor markets and living conditions surveys where the socioeconomic indicators include the small area estimation of total unemployment unemployment rates average annual household incomes and poverty indicators Given its scope the book will be useful for master and PhD students and for official and other applied statisticians

Sample Surveys: Design, Methods and Applications ,2009-08-31 This new handbook contains the most comprehensive account of sample surveys theory and practice to date It is a second volume on sample surveys with the goal of updating and extending the sampling volume published as volume 6 of the Handbook of Statistics in 1988 The present handbook is divided into two volumes 29A and 29B with a total of 41 chapters covering current developments in almost every aspect of sample surveys with references to important contributions and available software It can serve as a self contained guide to researchers and practitioners with appropriate balance between theory and real life applications Each of the two volumes is divided into three parts with each part preceded by an introduction summarizing the main developments in the areas covered in that part Volume 29A deals with methods of sample selection and data processing with the later including editing and imputation handling of outliers and measurement errors and methods of disclosure control The volume contains also a large variety of applications in specialized areas such as household and business surveys marketing research opinion polls and censuses Volume 29B is concerned with inference distinguishing between design based and model based methods and focusing on specific problems such as small area estimation analysis of longitudinal data categorical data analysis and inference on distribution functions The volume contains also chapters dealing with case control studies asymptotic properties of estimators and decision theoretic aspects Comprehensive account of recent developments in sample survey theory and practice Discusses a wide variety of diverse applications Comprehensive bibliography

[Spatial Econometric Methods in Agricultural Economics Using R](#) Paolo Postiglione, Roberto Benedetti, Federica Piersimoni, 2021-12-22 Modern tools such as GIS and remote sensing are increasingly used in the monitoring of agricultural resources The developments in GIS technology offer growing opportunities to agricultural economics analysts dealing with large and detailed spatial databases allowing them to combine spatial information from different sources and to produce different models The availability of these valuable sources of information makes the advanced models suggested in the spatial statistic and econometric literature applicable to agricultural economics This book aims at supporting stakeholders to design spatial surveys for agricultural data

and or to analyse the geographically collected data This book attempts to describe the main typology of agricultural data and the most appropriate methods for the analysis together with a detailed description of the available data sources and their collection methods Topics such as spatial interpolation point patterns spatial autocorrelation survey data analysis small area estimation regional data modelling and spatial econometrics techniques are covered jointly with issues arising from the integration of several data types The theory of spatial methods is complemented by real and or simulated examples implemented through the open source software R

Robust and Multivariate Statistical Methods Mengxi Yi,Klaus Nordhausen,2023-04-19 This book presents recent developments in multivariate and robust statistical methods Featuring contributions by leading experts in the field it covers various topics including multivariate and high dimensional methods time series graphical models robust estimation supervised learning and normal extremes It will appeal to statistics and data science researchers PhD students and practitioners who are interested in modern multivariate and robust statistics The book is dedicated to David E Tyler on the occasion of his pending retirement and also includes a review contribution on the popular Tyler s shape matrix

Small Area Estimation J. N. K. Rao,Isabel Molina,2015-08-10 Praise for the First Edition This pioneering work in which Rao provides a comprehensive and up to date treatment of small area estimation will become a classic I believe that it has the potential to turn small area estimation into a larger area of importance to both researchers and practitioners Journal of the American Statistical Association Written by two experts in the field Small Area Estimation Second Edition provides a comprehensive and up to date account of the methods and theory of small area estimation SAE particularly indirect estimation based on explicit small area linking models The model based approach to small area estimation offers several advantages including increased precision the derivation of optimal estimates and associated measures of variability under an assumed model and the validation of models from the sample data Emphasizing real data throughout the Second Edition maintains a self contained account of crucial theoretical and methodological developments in the field of SAE The new edition provides extensive accounts of new and updated research which often involves complex theory to handle model misspecifications and other complexities Including information on survey design issues and traditional methods employing indirect estimates based on implicit linking models Small Area Estimation Second Edition also features Additional sections describing the use of R code data sets for readers to use when replicating applications Numerous examples of SAE applications throughout each chapter including recent applications in U S Federal programs New topical coverage on extended design issues synthetic estimation further refinements and solutions to the Fay Herriot area level model basic unit level models and spatial and time series models A discussion of the advantages and limitations of various SAE methods for model selection from data as well as comparisons of estimates derived from models to reliable values obtained from external sources such as previous census or administrative data Small Area Estimation Second Edition is an excellent reference for practicing statisticians and survey methodologists as well as practitioners interested in learning SAE

methods The Second Edition is also an ideal textbook for graduate level courses in SAE and reliable small area statistics

Small Area Estimation J. N. K. Rao, 2005-02-25 An accessible introduction to indirect estimation methods both traditional and model based Readers will also find the latest methods for measuring the variability of the estimates as well as the techniques for model validation Uses a basic area level linear model to illustrate the methods Presents the various extensions including binary response data through generalized linear models and time series data through linear models that combine cross sectional and time series features Provides recent applications of SAE including several in U S Federal programs Offers a comprehensive discussion of the design issues that impact SAE

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