Book and Software Review

Changbao Wu and Mary E. Thompson (2020)
Sampling Theory and Practice, Springer, ISBN 978-3-030-44244-6

Jae-Kwang Kim

Iowa State University, USA

Survey sampling is a fundamental area in statistics. This book, with foreword by J.N.K. Rao, provides a nice balance between theory and practice, and between classical topics and modern developments. The book consists of three parts: (1) classical topics in survey sampling, (2) selected advanced topics in survey sampling, and (3) practical issues and special topics in survey sampling.

Part one consists of five chapters. It contains basic concepts in survey sampling (Ch. 1), simple single-state sampling methods (Ch. 2), stratified sampling and cluster sampling (Ch. 3), general theory and methods of unequal probability sampling (Ch. 4), and model-based prediction and model-assisted estimation (Ch.5). These topics are overlapping with other textbooks in survey sampling but the presentation is more concise. The materials in the first part can be used for a one-term introductory course in survey sampling for students with a solid background in statistics.

Part two consists of six chapters. It includes calibration weighting and estimation (Ch. 6), regression analysis and estimating equations (Ch. 7), empirical likelihood methods (Ch. 8), methods for handling missing data (Ch. 9), resampling and replication methods (Ch. 10), and Bayesian empirical likelihood methods (Ch. 11). These topics reflect the research areas of the authors and the materials form a cohesive body that is not available from other textbooks in survey sampling. In addition, several computational algorithms are implemented in R with codes provided in the appendix. The materials in part two, supplemented by some basic materials from part one, can be used for a one-term advanced survey sampling course for senior undergraduate students or graduate students in statistics.

Part three consists of six chapters. It covers area frame household surveys (Ch. 12), telephone and web surveys (Ch. 13), natural resource inventory surveys (Ch. 14), adaptive and network surveys (Ch 15), dual frame and multiple frame surveys (Ch. 16), and non-probability survey samples (Ch. 17). The materials in part three provide a nice introduction to survey sampling practices and some specialized topics of practical and theoretical importance, which makes the book very unique and useful for both survey sampling researchers and survey practitioners. The materials in parts two and three can be used for a seminar course for the graduate students in statistics.

The book contains a concise introduction to basic sampling theory and methods, a detailed coverage of selected topics that reflect the current state of the art in survey methodology research, and a useful resource and pragmatic guide to survey design and implementations as well as survey data production and analysis. I plan to use it as a textbook for the survey sampling course at Iowa State University.