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Semiparametric statistics. (English) Zbl 1013.62031

Bolthausen, Erwin et al., Lectures on probability theory and statistics. Ecole d'été de probabilités de Saint-Flour XXIX - 1999, Saint-Flour, France, July 8-24, 1999. Berlin: Springer. Lect. Notes Math. 1781, 331-457 (2002).

This book is designed to provide ten detailed, well written versions of the author's lectures at the St. Flour meeting of 1999 on the subject of semiparametric models for replicated experiments, the theory for functionals that are estimable at a rate equal to the square root of the numbers of replications.

In particular, the aim of the book is to give a consistent and self-contained overview of semiparametric statistics including digressions into empirical theory, new examples and a number of more recent developments overlapping the material published earlier in the books: *A.W. van der Vaart* and *J.A. Wellner*, Weak convergence and empirical processes. With applications to statistics. (1996; Zbl 0862.60002) and *A.W. van der Vaart*, Asymptotic Statistics. (1998; Zbl 0910.62001).

More analytically, Lecture 1 is devoted to the introduction of basic notations, to the description of a number of examples of semiparametric models and to the definition of the tangent set of a model.

Lecture 2 as well as Lecture 4 state a number of theorems giving lower bounds on the asymptotic performance of estimators and tests and making these concrete for the estimation of a parameter θ in a strict semiparametric model.

Lecture 3 introduces a "calculus of scores", a useful way of finding efficient influence functions in parametrized models.

Lectures 5 and 6 are devoted to the application of empirical processes to the derivation of asymptotic properties of estimators in semiparametric models such as the entropy numbers, Glivenko-Cantelli classes and their application to proving consistency of M- and Z-estimators, the central limit theorem and the uniformity in convergence in distribution and its applications to deriving the asymptotic distribution of Z- estimators.

Lecture 7 is devoted to the construction of efficient estimators in semiparametric models using the efficient score equation or the related one-step method and its applications to the linear errors-in-variables model and the symmetric location model.

Lecture 8 is devoted to the application of maximal inequalities for empirical processes in order to obtain rates of convergence of minimum contrast estimators, in particular in semiparametric models.

The book concludes with a study of ordinary (indexed by infinite-dimensional parameters), empirical likelihood methods for semiparametric models and the consideration of infinite-dimension systems of estimating equations in order to find asymptotically normal solutions in the case of an appropriately differentiable system and moreover to prove asymptotic normality of maximum likelihood estimators in semiparametric models, such as the Cox model.

For the entire collection see [Zbl 0996.00039].

Reviewer: C.Ganatsiou

MSC:

62G05 Nonparametric estimation
62-02 Research exposition (monographs, survey articles) pertaining to statistics
62G20 Asymptotic properties of nonparametric inference
62G30 Order statistics; empirical distribution functions

Keywords:

semiparametric statistics; lower bounds; calculus of scores; empirical processes; L-estimates; profile likelihood

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