

STATISTICAL INFERENCE FOR ERGODIC DIFFUSION PROCESSES

Yury A. Kutoyans

Springer-Verlag, London, 2004
481 pages

This book presents an introduction to the large sample theory of statistical inference for one-dimensional homogeneous ergodic diffusion processes. That is, given the model

$$dX_t = S(X_t)dt + \sigma(X_t)dW_t$$

the book considers several problems of estimation of the trend coefficient $S(x)$. The diffusion coefficient σ is supposed to be always known and positive.

Then it is a book on statistical inference for continuous time stochastic processes. This has to be seen as a branch of Mathematical Statistics, and clearly attracts every year more and more attention of researchers, interested in its wide range of applications that covers biomedical sciences, economics, genetic analysis, mechanics, physics and especially financial mathematics.

This book contains many recent results and most of them appear for the first time in a book. The statements of the problems are in the spirit of classical mathematical statistics and special attention is paid to asymptotically efficient procedures.

In practice, in estimating continuous time models we have two types of errors. One due to the statistical nature of continuous time observations and the other is a consequence of approximation of continuous data by discrete data. If discrete observations are taken sufficiently dense, the second error is negligible with respect to the first one. Then this fact justifies this inference theory.

Chapter 1, Diffusion Processes and Statistical Problems is a summary of the required basic concepts of Diffusion Processes, Limit Theorems and Statistical Inference.

Chapter 2, Parameter Estimation is devoted to parametric estimation: maximum likelihood, bayesian, minimum distance, moments,...

Chapter 3, Special Models, studies in detail partial observed systems and cusp, delay and change point estimation.

Chapter 4, Nonparametric estimation, is devoted to distribution function and density estimation, and also semiparametric estimation.

Chapter 5, Hypothesis Testing, is devoted to parametric and nonparametric tests, and includes also goodness of fit test.

The book also contains historical remarks and a good list of references.

Josep Vives
Departament de Matemàtiques
Universitat Autònoma de Barcelona
Spain