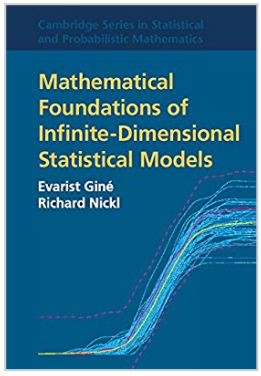

Mathematical Foundations of Infinite-Dimensional Statistical Models (Cambridge Series in Statistical and Probabilistic Mathematics)

By Evarist Giné, Richard Nickl

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In nonparametric and high-dimensional statistical models, the classical Gauss-Fisher-Le Cam theory of the optimality of maximum likelihood estimators and Bayesian posterior inference does not apply, and new foundations and ideas have been developed in the past several decades. This book gives a coherent account of the statistical theory in infinite-dimensional parameter spaces. The mathematical foundations include self-contained 'mini-courses' on the theory of Gaussian and empirical processes, on approximation and wavelet theory, and on the basic theory of function spaces. The theory of statistical inference in such models - hypothesis testing, estimation and confidence sets - is then presented within the minimax paradigm of decision theory. This includes the basic theory of convolution kernel and projection estimation, but also Bayesian nonparametrics and nonparametric maximum likelihood estimation. In the final chapter, the theory of adaptive inference in nonparametric models is developed, including Lepski's method, wavelet thresholding, and adaptive inference for self-similar functions.

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Editorial Review

Review
"Finally - a book that goes all the way in the mathematics of nonparametric statistics. It is reasonably self-contained, despite its depth and breadth, including accessible overviews of the necessary analysis and approximation theory."
Aad van der Vaart, Leiden University

"This remarkable book provides a detailed account of a great wealth of mathematical ideas and tools that are crucial in modern statistical inference, including Gaussian and empirical processes (where the first author, Evarist Giné, was one of the key contributors), concentration inequalities and methods of approximation theory. Building upon these ideas, the authors develop and discuss a broad spectrum of statistical applications such as minimax lower bounds and adaptive inference, nonparametric likelihood methods and Bayesian nonparametrics. The book will be exceptionally useful for a great number of researchers interested in nonparametric problems in statistics and machine learning, including graduate students."
Vladimir Koltchinskii, Georgia Institute of Technology

"This is a very welcome contribution. The wealth of material on the empirical processes and nonparametric statistics is quite exceptional. It is a masterly written treatise offering an unprecedented coverage of the classical theory of nonparametric inference, with glimpses into advanced research topics. For the first time in the monographic literature, estimation, testing and confidence sets are treated in a unified way from the nonparametric perspective with a comprehensive insight into adaptation issues. A delightful major reading that I warmly recommend to anyone wanting to explore the mathematical foundations of these fields."
Alexandre Tsybakov, ENSAE ParisTech

About the Author
Evarist Giné (1944-2015) was Head of the Department of Mathematics at the University of Connecticut. Giné was a distinguished mathematician who worked on mathematical statistics and probability in infinite dimensions. He was the author of two books and more than 100 articles.

Richard Nickl is a Reader in Mathematical Statistics in the Statistical Laboratory within the Department of Pure Mathematics and Mathematical Statistics at the University of Cambridge.

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