Preface

The *Theory of Empirical Processes* constitutes in some way the companion tool-box of mathematical techniques for people interested in asymptotic statistics. It has evolved in a parallel way to the evolution of the statistical methodologies to such an extent that constitutes the best indicator of the vast transformation that Probability and Statistics reached along the past century. Beginning with the Functional Central Limit Theorem and the Invariance Principle, the theory collected from the 50's a number of techniques, results and points of view which have shown their ability to solve a great diversity of problems related to the asymptotic behaviour of statistical procedures as well as to motivate new proposals.

The three lectures that compose this book allow to get a sound idea of the main techniques and results that today comprise the Empirical Processes toolbox. They give not only a wide panorama of the points of view adopted by the main schools of contributors to the theory. Moreover, through these lectures one can even analyze the gains that the adoption of one or other point of view could give when addressing a particular problem. Techniques developed through the Probability in Banach spaces framework, strong approximations in the Hungarian-style, tools from the general Stochastic Processes theory and others appear in this book in connection with main historical applications as well as others that are being presently developed.

The idea of this book was born in Laredo (Spain) where we organized an EMS Summer School on Empirical Processes on September 2004. The event was organized under the auspices of the European Mathematical Society, the Universidad de Valladolid and the Summer Courses of the Universidad de Cantabria. It was sponsored by Banco Santander-Central-Hispano, UNESCO Roste and Laredo's town. The aim of the school was to disseminate the power of the theory through courses given by representative members of the main working groups which have contributed and contribute to the development of the theory. The courses should also give a vision of the present perspectives of study as well as the more significant statistical applications of the theory. Goodness of fit, bootstrap, density estimation or general M-estimators were the application-settings selected to highlight the power of the theory, and *Eustasio del Barrio*, *Evarist Giné*, *Paul Deheuvels* and *Sara van de Geer* gave the lectures.

Here the reader can access the enlarged material based on the lectures by three of these authors. Professor Giné declined the possibility of incorporating his

material which, to a large extent, would coincide with the contents of papers, some
of them already published. This is one of the reasons why this book does not cover
the bootstrap setting, whose study is a masterpiece of the empirical processes
applications. In any case, we want to express our gratitude to the authors for their
enthusiastic disposition to participate in the Summer School and to elaborate this
final revision anyone can access now thanks to the EMS Series of Lectures in
Mathematics. In our opinion this book constitutes an excellent overview of the
broad scope of the theory of empirical processes, which will be an invaluable aid
for those interested in an advanced and well-documented approach to the topics
selected by the authors.

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