

Preface

This volume, dedicated to recent advances in statistical methodology and applications, has two parts. The first is devoted to functional statistics, which involves taking a mathematical function (usually a real vector function of real scalar or vector variables, like time and/or space) as an entity to globally estimate and test in a suitable functional space. The approach is often nonparametric and involves the approximation of the studied function by the element of a functional kernel, then the calculation of some characteristics (temporal and/or spatial) of this approximant, considered as estimators of the homologous characteristics of the studied function and, finally, to study the asymptotic distribution and convergence properties of these estimators. This first part includes the following themes: the M-estimation of the regression function for quasi-associated processes, by Said Attaoui, Ali Laksaci, and Elias Ould Said; the kernel estimation of extreme conditional quantiles, by Stéphane Girard and Sana Louhichi; the estimation of a linear regression operator for functional covariates, by Amina Naceri, Ali Laksaci, and Mustapha Rachdi; and the estimation of a loss function for spherically symmetric distribution, by Idir Ouassou.

For the second part, three application areas are preferred. First area comes from the tradition of signal analysis inaugurated by J. Fourier (see Fig. 1) in Grenoble two centuries ago in his famous paper on the propagation of heat in solid bodies, published in the *Nouveau Bulletin des Sciences de la Société Philomatique de Paris* (1, 112–116, 1808). After his return to France from the Egyptian campaign in 1802, Napoleon appointed J. Fourier as “préfet” of Grenoble and he recreates in 1810 as rector, the University of Grenoble, who had already started in 1339 under the auspices of Dauphin Humbert II, with the approval of Pope Benedict XII (14th founded medieval European University). J. Fourier will host in this university as Professor JF Champollion, the father of Egyptology. This first area concerns the following contributions: the approximation of strictly stationary Banach-valued random sequence by Fourier integral, by Tawfik Benchikh; the proposal of a new tool for biological signal processing, the Dynalets, a natural generalization of the Fourier and wavelet transforms, by Jacques Demongeot, Ali Hamie, Olivier Hansen,

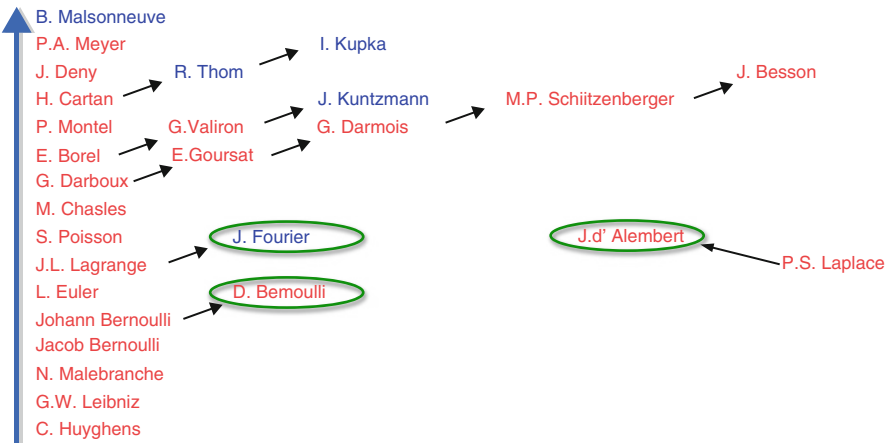


Fig. 1 Genealogy (from AMS Mathematics Genealogy Project) of B. Maisonneuve, author of the regenerative systems theory (PhD supervisor is located on the line below his student name, with, in blue, Grenoble scientists)

and Mustapha Rachdi; and Estimation of the block shrink wavelet density in φ -mixing framework, by M. Badaoui and N. Rhomari.

The second application area revisits the classic approach initiated by D. Bernoulli, mathematician and physician, prominent member of the large family of Swiss mathematicians, the Bernoulli family, and J. d’Alembert (son of the famous Madame du Tencin from Grenoble), by using copula theory, for estimating some characteristics of the temporal evolution of subpopulations involved in the epidemic spread of a vector-borne disease in the copula approach in epidemiologic modeling, by J. Demongeot, M. Ghassani, H. Hazgui, and M. Rachdi.

The third application domain concerns estimation problems in queuing theory in the contribution to the impact of nonparametric density estimation on the approximation of the G/G/1 Queue, by A. Bareche and D. Aissani, and stochastic analysis of an M/G/1 Retrial Queue, by M. Boualem, M. Cherfaoui, N. Djellab, and D. Aissani.

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