

Preface	p. VII
List of Abbreviations and Symbols	p. XVII
List of Figures	p. XIX
Statistical Background for Nonparametric Statistics and Functional Data	
Introduction to Functional Nonparametric Statistics	p. 5
What is a Functional Variable?	p. 5
What are Functional Datasets?	p. 6
What are Nonparametric Statistics for Functional Data	p. 7
Some Notation	p. 9
Scope of the Book	p. 10
Some Functional Datasets and Associated Statistical Problematics	p. 11
Functional Chemometric Data	p. 11
Description of Spectrometric Data	p. 12
First Study and Statistical Problems	p. 13
Speech Recognition Data	p. 15
What are Speech Recognition Data?	p. 15
First Study and Problematics	p. 15
Electricity Consumption Data	p. 17
The Data	p. 17
The Forecasting Problematic	p. 18
What is a Well-Adapted Space for Functional Data?	p. 21
Closeness Notions	p. 21
Semi-Metrics as Explanatory Tool	p. 22
What about the Curse of Dimensionality?	p. 25
Semi-Metrics in Practice	p. 28
Functional PCA: a Tool to Build Semi-Metrics	p. 28
PLS: a New Way to Build Semi-Metrics	p. 30
Semi-metrics Based on Derivatives	p. 32
R and S+ Implementations	p. 33
What About Unbalanced Functional Data?	p. 33
Semi-Metric Space: a Well-Adapted Framework	p. 35
Local Weighting of Functional Variables	p. 37
Why Use Kernel Methods for Functional Data?	p. 37
Real Case	p. 38
Multivariate Case	p. 39
Functional Case	p. 41
Local Weighting and Small Ball Probabilities	p. 42
A Few Basic Theoretical Advances	p. 43
Nonparametric Prediction from Functional Data	
Functional Nonparametric Prediction Methodologies	p. 49
Introduction	p. 49

Various Approaches to the Prediction Problem	p. 50
Functional Nonparametric Modelling for Prediction	p. 52
Kernel Estimators	p. 55
Some Selected Asymptotics	p. 61
Introduction	p. 61
Almost Complete Convergence	p. 62
Regression Estimation	p. 62
Conditional Median Estimation	p. 66
Conditional Mode Estimation	p. 70
Conditional Quantile Estimation	p. 76
Complements	p. 76
Rates of Convergence	p. 79
Regression Estimation	p. 79
Conditional Median Estimation	p. 80
Conditional Mode Estimation	p. 87
Conditional Quantile Estimation	p. 90
Complements	p. 92
Discussion, Bibliography and Open Problems	p. 93
Bibliography	p. 93
Going Back to Finite Dimensional Setting	p. 94
Some Tracks for the Future	p. 95
Computational Issues	p. 99
Computing Estimators	p. 99
Prediction via Regression	p. 100
Prediction via Functional Conditional Quantiles	p. 103
Prediction via Functional Conditional Mode	p. 104
Predicting Fat Content From Spectrometric Curves	p. 105
Chemometric Data and the Aim of the Problem	p. 105
Functional Prediction in Action	p. 106
Conclusion	p. 107
Nonparametric Classification of Functional Data	
Functional Nonparametric Supervised Classification	p. 113
Introduction and Problematic	p. 113
Method	p. 114
Computational Issues	p. 116
kNN Estimator	p. 116
Automatic Selection of the kNN Parameter	p. 117
Implementation: R/S+ Routines	p. 118
Functional Nonparametric Discrimination in Action	p. 119
Speech Recognition Problem	p. 119
Chemometric Data	p. 122

Asymptotic Advances	p. 122
Additional Bibliography and Comments	p. 123
Functional Nonparametric Unsupervised Classification	p. 125
Introduction and Problematic	p. 125
Centrality Notions for Functional Variables	p. 127
Mean	p. 127
Median	p. 129
Mode	p. 130
Measuring Heterogeneity	p. 131
A General Descending Hierarchical Method	p. 131
How to Build a Partitioning Heterogeneity Index?	p. 132
How to Build a Partition?	p. 132
Classification Algorithm	p. 134
Implementation: R/S+ Routines	p. 135
Nonparametric Unsupervised Classification in Action	p. 135
Theoretical Advances on the Functional Mode	p. 137
Hypotheses on the Distribution	p. 138
The Kernel Functional Mode Estimator	p. 140
Construction of the Estimates	p. 140
Density Pseudo-Estimator: a.co. Convergence	p. 141
Mode Estimator: a.co. Convergence	p. 144
Comments and Bibliography	p. 145
Conclusions	p. 146
Nonparametric Methods for Dependent Functional Data	
Mixing, Nonparametric and Functional Statistics	p. 153
Mixing: a Short Introduction	p. 153
The Finite-Dimensional Setting: a Short Overview	p. 154
Mixing in Functional Context	p. 155
Mixing and Nonparametric Functional Statistics	p. 156
Some Selected Asymptotics	p. 159
Introduction	p. 159
Prediction with Kernel Regression Estimator	p. 160
Introduction and Notation	p. 160
Complete Convergence Properties	p. 161
An Application to the Geometrically Mixing Case	p. 163
An Application to the Arithmetically Mixing Case	p. 166
Prediction with Functional Conditional Quantiles	p. 167
Introduction and Notation	p. 167
Complete Convergence Properties	p. 168
Application to the Geometrically Mixing Case	p. 171
Application to the Arithmetically Mixing Case	p. 175

Prediction with Conditional Mode	p. 177
Introduction and Notation	p. 177
Complete Convergence Properties	p. 178
Application to the Geometrically Mixing Case	p. 183
Application to the Arithmetically Mixing Case	p. 184
Complements on Conditional Distribution Estimation	p. 185
Convergence Results	p. 185
Rates of Convergence	p. 187
Nonparametric Discrimination of Dependent Curves	p. 189
Introduction and Notation	p. 189
Complete Convergence Properties	p. 190
Discussion	p. 192
Bibliography	p. 192
Back to Finite Dimensional Setting	p. 192
Some Open Problems	p. 193
Application to Continuous Time Processes Prediction	p. 195
Time Series and Nonparametric Statistics	p. 195
Functional Approach to Time Series Prediction	p. 197
Computational Issues	p. 198
Forecasting Electricity Consumption	p. 198
Presentation of the Study	p. 198
The Forecasted Electrical Consumption	p. 200
Conclusions	p. 201
Conclusions	
Small Ball Probabilities and Semi-metrics	p. 205
Introduction	p. 205
The Role of Small Ball Probabilities	p. 206
Some Special Infinite Dimensional Processes	p. 207
Fractal-type Processes	p. 207
Exponential-type Processes	p. 209
Links with Semi-metric Choice	p. 212
Back to the One-dimensional Setting	p. 214
Back to the Multi- (but Finite) -Dimensional Setting	p. 219
The Semi-metric: a Crucial Parameter	p. 223
Some Perspectives	p. 225
Appendix: Some Probabilistic Tools	p. 227
Almost Complete Convergence	p. 228
Exponential Inequalities for Independent r.r.v.	p. 233
Inequalities for Mixing r.r.v.	p. 235
References	p. 239
Index	p. 255

Table of Contents provided by Blackwell's Book Services and R.R. Bowker. Used with permission.