Functional data analysis

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Ramsay, J. O. (
James O.)

Springer,
c1997

Electronic books

Monografía

Scientists and others today often collect samples of curves and other functional observations. This monograph presents many ideas and techniques for such data. Included are expressions in the functional domain of such classics as linear regression, principal components analysis, linear modeling, and canonical correlation analysis, as well as specifically functional techniques such as curve registration and principal differential analysis. Data arising in real applications are used throughout for both motivation and illustration, showing how functional approaches allow us to see new things, especially by exploiting the smoothness of the processes generating the data. The data sets exemplify the wide scope of functional data analysis; they are drawn from growth analysis, meteorology, biomechanics, equine science, economics, and medicine. The book presents novel statistical technology, much of it based on the authors' own research work, while keeping the mathematical level widely accessible. It is designed to appeal to students, to applied data analysts, and to experienced researchers; it will have value both within statistics and across a broad spectrum of other fields. This second edition is aimed at a wider range of readers, and especially those who would like to apply these techniques to their research problems. It complements the authors' other recent volume Applied Functional Data Analysis: Methods and Case Studies. In particular, there is an extended coverage of data smoothing and other matters arising in the preliminaries to a functional data analysis. The chapters on the functional linear model and modeling of the dynamics of systems through the use of differential equations and principal differential analysis have been completely rewritten and extended to include new developments. Other chapters have been revised substantially, often to give more weight to examples and practical considerations. Jim Ramsay is Professor of Psychology at McGill University and is an international authority on many aspects of multivariate analysis. He was President of the Statistical Society of Canada in 2002-3 and holds the Society's Gold Medal for his work in functional data analysis. Bernard Silverman is Master of St Peter's College and Professor of Statistics at Oxford University. He was President of the Institute of Mathematical Statistics in 2000–1. He is a Fellow of the Royal Society. His main specialty is in computational statistics, and he is the author or editor of several highly regarded books in this area. .

Título: Functional data analysis electronic resource] J.O. Ramsay, B.W. Silverman

Edición: 2nd ed. 2005

Editorial: New York Springer c1997

Descripción física: 1 online resource (xix, 426 pages) illustrations

Mención de serie: Springer series in statistics

Nota general: Bibliographic Level Mode of Issuance: Monograph

Bibliografía: Includes bibliographical references (p. [293]-302) and index

Contenido: Tools for exploring functional data -- From functional data to smooth functions -- Smoothing functional data by least squares -- Smoothing functional data with a roughness penalty -- Constrained functions -- The registration and display of functional data -- Principal components analysis for functional data -- Regularized principal components analysis -- Principal components analysis of mixed data -- Canonical correlation and discriminant analysis -- Functional linear models -- Modelling functional responses with multivariate covariates -- Functional responses, functional covariates and the concurrent model -- Functional linear models for scalar responses -- Functional linear models for functional responses -- Derivatives and functional linear models -- Differential equations and operators -- Fitting differential equations to functional data: Principal differential analysis -- Green's functions and reproducing kernels -- More general roughness penalties -- Some perspectives on FDA

Lengua: English

ISBN: 9786610612420 0-387-40080-X 1-60119-309-2 1-280-00685-4 1-280-61242-8 9786610006854 0-387-22751-2

Materia: Multivariate analysis

Autores: Silverman, B. W. (1952-)

Enlace a serie principal: Springer Series in Statistics (CKB)110978978376339 (DLC)sn84001128 2197-568X

Enlace a formato físico adicional: 1-4419-2300-4 0-387-94956-9

Punto acceso adicional serie-Título: Springer series in statistics

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