Springer

1st edition

1st ed. 2016, XXV, 372 p. 57 illus., 13 illus. in color.

Printed book
Hardcover

Printed book
Hardcover
ISBN 978-3-319-33944-3
£ 59,99 | CHF 82,50 | 69,99 € | 76,99 € (A) | 74,89 € (D)
Available

Discount group
Standard (0)

Product category
Professional book

Series
Statistics for Biology and Health

Other renditions
Softcover
ISBN 978-3-319-81638-8
Softcover
ISBN 978-3-319-33945-0

Statistics : Statistics for Life Sciences, Medicine, Health Sciences

Knafl, George J., Ding, Kai

Adaptive Regression for Modeling Nonlinear Relationships

- Provides insight into modeling of nonlinear relationships and also justifications for when to use them, thereby providing novel insights about relationships
- Addresses not only adaptive generation of additive models but also of models based on nonlinear interactions
- Discusses adaptive modeling of variances/dispersions as well as of means
- Highlights both univariate and multivariate outcomes, rather than solely univariate outcomes

This book presents methods for investigating whether relationships are linear or nonlinear and for adaptively fitting appropriate models when they are nonlinear. Data analysts will learn how to incorporate nonlinearity in one or more predictor variables into regression models for different types of outcome variables. Such nonlinear dependence is often not considered in applied research, yet nonlinear relationships are common and so need to be addressed. A standard linear analysis can produce misleading conclusions, while a nonlinear analysis can provide novel insights into data, not otherwise possible. A variety of examples of the benefits of modeling nonlinear relationships are presented throughout the book. Methods are covered using what are called fractional polynomials based on real-valued power transformations of primary predictor variables combined with model selection based on likelihood cross-validation. The book covers how to formulate and conduct such adaptive fractional polynomial modeling in the standard, logistic, and Poisson regression contexts with continuous, discrete, and counts outcomes, respectively, either univariate or multivariate. The book also provides a comparison of adaptive modeling to generalized additive modeling (GAM) and multiple adaptive regression splines (MARS) for univariate outcomes.

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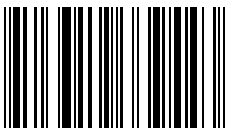

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ISBN 978-3-319-33944-3 / BIC: PBT / SPRINGER NATURE: SCS17030