Prerequisite for reading the book is a sound knowledge of probability, statistics and some software applications. The book contains four main parts, each consisting of articles by 30 contributors including the three authors. The contributors are either from universities or from financial institutions. Part I is about value at risk. The three chapters in this part deal with statistical approximations of value at risk in conditional Gaussian models, the calculation of value at risk by using copulas and the quantification of spread risk by means of simulation.

The second part is on credit risk and has two chapters, one on the analysis of rating migration probabilities and the other on sensitivity analysis of credit portfolio models where two widely used approaches—the factor structure and the direct specification of a copula within the framework of a default-based credit risk model—are studied. Part III is on implied volatility and has four chapters. In the first of these chapters, the Black–Scholes formula is solved for the constant volatility parameter by using observed option prices to derive implied volatilities. Then the implied volatilities are analysed with two variants of principal components and the results are interpreted in the context of risk management. In the next chapter the construction of implied binomial trees is described and they are applied to estimate state price densities. In the third chapter in part III, a local polynomial model of the implied volatility and its derivatives is used to estimate state price densities. In the fourth chapter of this part, the methods proposed are used to analyse the German DAX index and the performance of skewness and kurtosis trades are investigated. Part IV of the book is on econometrics wherein some recently developed econometric methods are discussed. This part has nine chapters. In Chapter 10 on multivariate volatility models, multivariate generalized autoregressive conditional heteroscedastic models are introduced and are applied to a study of exchange rates. Statistical process control methods that are used to monitor sequential data are discussed in Chapter 11. In Chapter 12, the empirical likelihood technique is used to construct test procedures for the goodness of fit of a diffusion model. Combining hedonic regression with Kalman filtering, a simple state space model is developed in Chapter 13 which is used to infer the common component in the movement of prices of single-family homes sold in a district of Berlin. The influence of long memory effects on financial time series is the subject of Chapter 14, wherein Hurst analysis is applied to a study of a trading strategy for German voting and non-voting stocks. An adaptive estimation algorithm for time series is discussed in Chapter 15 with applications to data for two financial time series. This method helps to detect time intervals where the model approximately holds. Chapter

Freda Kemp
St Andrews University

Applied Quantitative Finance: Theory and Computational Tools
W. Härdle, T. Kleinow and G. Stahl, 2002
Berlin, Springer
xxii + 402 pp., £49.00
ISBN 3-540-43460-7

The book under review is based on the Center for Applied Statistics and Economics course at Humboldt University in Berlin and is designed for researchers who wish to develop professional skill in modern quantitative applications in finance. This is an electronic book and is designed as an interactive document with a stream of text and information with various hints and links to additional tools and features. The reader can access practical examples without purchasing additional software or material to be downloaded.

Chapter 5 gives a systematic overview of data mining algorithms. Chapter 6 swings back to the statistical approach by considering the fundamentals of stochastic modelling. Discussions about score functions for data mining algorithms in Chapter 7 and search and optimization methods in Chapter 8 end the second part of the book. The organization of data and the management of databases are considered later on, in Chapter 12.

The third part of the book is much the longest. It includes material on descriptive modelling (Chapter 9), predictive modelling for classification (Chapter 10), predictive modelling for regression (Chapter 11) and finding patterns and rules (Chapter 13). The final chapter concentrates on the technical problems that are associated with the retrieval of information such as the retrieval of text, images and sequences. The difficulties when evaluating the performance of retrieval are stressed.

This is a handsome book—the text is well organized and it is supported by very many examples and diagrams. The typography is excellent (though some of the diagrams are printed too faintly for clarity).

I hope that this will form the basis for a ‘bible’ on data mining, with update editions and companion volumes as the subject develops and modifies. It deserves to be in every computational science and statistical science department, as well as in university libraries generally.
16 introduces Monte Carlo and quasi-Monte-Carlo techniques for pricing exotic options. Using de-convolution kernel estimates, a nonparametric estimation approach of generalized autoregressive conditional heteroscedastic models is discussed in Chapter 17. The last chapter presents and demonstrates a net-based spreadsheet solution for modern statistical and econometric analysis using which one can have access to the XploRe programs that are developed in the book with standard software. Each chapter in the book ends with a bibliography which includes the list of references in that chapter.

The book will definitely be useful for beginners who are curious to know what is happening in computational mathematical finance. To acquire a better understanding of the underlying principles the reader should have sound knowledge of probability and statistics. There are many misprints and errors; a list of some of these is available from the reviewer.

This electronic book will be welcomed by all who are interested in computational mathematical finance and students may derive much practical training working with the data sets and the XploRe programs. This book can be recommended to undergraduate libraries in statistics, econometrics and finance.

Ravi Sreenivasan
University of Mysore

The Elements of Statistical Learning
T. HASTIE, R. TIBSHIRANI AND J. FRIEDMAN, 2001
New York, Springer
xvi + 534 pp., £56.00

During the past decade, there has been an explosion in computation and information technology. With it has come vast amounts of data in a variety of fields such as medicine, biology, finance and marketing. The challenge of understanding these data has led to the development of new tools in the field of statistics and has spawned new areas such as data mining, machine learning and bioinformatics. Many of these tools have common underpinnings but are often expressed with different terminology.

This book describes the important ideas in these areas in a common conceptual framework. Its coverage is broad, from supervised learning where the classes are unknown a priori and need to be ‘discovered’ from the data (class prediction) to unsupervised learning where the classes are predefined and the task is to understand the basis for the classification from a set of labelled objects (class discovery). The many topics include neural networks, support vector machines, classification trees and boosting. The emphasis is on concepts rather than mathematics, and several examples are given as illustration. The book consists of 14 chapters. Chapter 1 (‘Introduction’) briefly explains the role of statistical learning and presents some real life learning problems that are discussed throughout the book. Chapter 2 (‘Overview of supervised learning’) presents an overview of supervised learning problems, whereas Chapter 3 (‘Linear methods for regression’) and Chapter 4 (‘Linear methods for classification’) discuss some linear methods for regression and classification. Chapter 5 (‘Basis expansions and regularization’) presents splines, wavelets and regularization or penalization methods for a single predictor, whereas Chapter 6 (‘Kernel methods’) discusses kernel methods and local regression. Chapter 7 (‘Model assessment and selection’) studies the concepts of bias and variance, overfitting and methods like cross-validation for choosing models, whereas Chapter 8 (‘Model inference and averaging’) presents an overview of maximum likelihood, Bayesian inference, bootstrapping, the EM algorithm, Gibbs sampling and bagging. A related procedure called boosting is the focus of Chapter 10 (‘Boosting and additive trees’); this is the first comprehensive treatment of the topic in any book so far. Chapter 9 (‘Additive models, trees, and related methods’), Chapter 10 (‘Boosting and additive trees’), Chapter 11 (‘Neural networks’), Chapter 12 (‘Support vector machines and flexible discriminants’) and Chapter 13 (‘Prototype methods and nearest-neighbors’) describe a series of structured methods for supervised learning for regression and classification problems. Finally, Chapter 14 (‘Unsupervised learning’) describes some methods for unsupervised learning. The book also contains about 14 pages of relevant references. Author and subject indexes are also provided.

This book is designed for researchers and students in a broad variety of fields such as statistics, artificial intelligence, engineering and finance. It should be a valuable resource for those who are interested in data mining in science or industry. I believe that it will be a very useful addition to any scholarly library.

Theofanis Sapatinas
University of Cyprus
Nicosia

Logistic Regression: a Self-learning Text, 2nd edn
D. G. KLEINBAUM AND M. KLEIN, 2002
New York: Springer
xiv + 514 pp., £56

Ideal preparation for this book is claimed to be