

Statistical Methods For Forecasting

Statistical Methods for Forecasting John Wiley & Sons

This is a complete revision of a classic, seminal, and authoritative text that has been the model for most books on the topic written since 1970. It explores the building of stochastic (statistical) models for time series and their use in important areas of application -forecasting, model specification, estimation, and checking, transfer function modeling of dynamic relationships, modeling the effects of intervention events, and process control.

Classical statistical techniques, such as multiple regression with variable selection and principal component analysis, were employed to define combinations of parameters from meteorological observations which optimally discriminate between the occurrence and nonoccurrence of thunderstorms. Routine observations of weather elements at five levels in the troposphere during two spring and summer seasons were analyzed objectively onto a 65-km grid which spanned much of the central United States. A thunderstorm occurrence was defined from manually digitized radar (MDR) observations with an MDR code of four or greater as the basis. The binary variable one or zero for occurrence or non-occurrence, respectively, was the predictand. Parameters which are measures of atmospheric moisture content, stability, and trigger mechanisms were calculated from gridded fields of surface and upper-air observed elements for different times each morning. These parameters were candidate predictors in the variable-selection procedures. Data from all grid points and for each day were pooled in order to provide an adequate sample of thunderstorm observations. Errors which result from usual assumptions in a regression model were quaintly analyzed.

Presents a wide range of forecasting methods useful for undergraduate or graduate students majoring in business management, economics, or engineering. Develops skills for selecting the proper methodology. Integrates forecasting with the planning and decision-making activities within an organization. Methods of forecasting include: decomposition, regression analysis, and econometrics. Stresses the strengths and weaknesses of the individual methods in various types of organizational areas. Numerous examples are included.

This remarkable volume highlights the importance of Production and Operations Management (POM) as a field of study and research contributing to substantial business and social growth. The editors emphasize how POM works with a range of systems—agriculture, disaster management, e-commerce, healthcare, hospitality, military systems, not-for-profit, retail, sports, sustainability, telecommunications, and transport—and how it contributes to the growth of each. Martin K. Starr and Sushil K. Gupta gather an international team of experts to provide researchers and students with a panoramic vision of the field. Divided into eight parts, the book presents the history of POM, and establishes the foundation upon which POM has been built while also revisiting and revitalizing topics that have long been essential. It examines the significance of processes and projects to the fundamental growth of the POM field. Critical emerging themes and new research are examined with open minds and this is followed by opportunities to interface with other business functions. Finally, the next era is discussed in ways that combine practical skill with philosophy in its analysis of POM, including traditional and nontraditional applications, before concluding with the editors' thoughts on the future of the discipline. Students of POM will find this a comprehensive, definitive resource on the state of the discipline and its future directions.

In 1984, the University of Bonn (FRG) and the International Institute for Applied System Analysis (IIASA) in Laxenburg (Austria), created a joint research group to analyze the relationship between economic growth and structural change. The research team was to examine the commodity composition as well as the size and direction of commodity and credit flows among countries and regions. Krelle (1988) reports on the results of this "Bonn-IIASA" research project. At the same time, an informal IIASA Working Group was initiated to deal with problems of the statistical analysis of economic data in the context of structural change: What tools do we have to identify nonconstancy of model parameters? What type of models are particularly applicable to nonconstant structure? How is forecasting affected by the presence of nonconstant structure? What problems should be anticipated in applying these tools and models? Some 50 experts, mainly statisticians or econometricians from about 15 countries, came together in Lodz, Poland (May 1985); Berlin, GDR (June 1986); and Sulejov, Poland (September 1986) to present and discuss their findings. This volume contains a selected set of those conference contributions as well as several specially invited chapters.

This book offers solutions to such topical problems as developing mathematical models and descriptions of typical distortions in applied forecasting problems; evaluating robustness for traditional forecasting procedures under distortionism and more.

This book offers an in-depth and up-to-date review of different statistical tools that can be used to analyze and forecast the dynamics of two crucial for every energy company processes—electricity prices and loads. It provides coverage of seasonal decomposition, mean reversion, heavy-tailed distributions, exponential smoothing, spike preprocessing, autoregressive time series including models with exogenous variables and heteroskedastic (GARCH) components, regime-switching models, interval forecasts, jump-diffusion models, derivatives pricing and the market price of risk. Modeling and Forecasting Electricity Loads and Prices is packaged with a CD containing both the data and detailed examples of implementation of different techniques in Matlab, with additional examples in SAS. A reader can retrace all the intermediate steps of a practical implementation of a model and test his understanding of the method and correctness of the computer code using the same input data. The book will be of particular interest to the quants employed by the utilities, independent power generators and marketers, energy trading desks of the hedge funds and financial institutions, and the executives attending courses designed to help them to brush up on their technical skills. The text will be also of use to graduate students in electrical engineering, econometrics and finance wanting to get a grip on advanced statistical tools applied in this hot area. In fact, there are sixteen Case Studies in the book making it a self-contained tutorial to electricity load and price modeling and forecasting.

Introduces the latest developments in forecasting in advanced quantitative data analysis This book presents advanced univariate multiple regressions, which can directly be used to forecast their dependent variables, evaluate their in-sample forecast values, and compute forecast values beyond the sample period. Various alternative multiple regressions models are presented based on a single time series, bivariate, and triple time-series, which are developed by taking into account specific growth patterns of each dependent variables, starting with the simplest model up to the most advanced model. Graphs of the observed scores and the forecast evaluation of each of the models are offered to show the worst and the best forecast models among

each set of the models of a specific independent variable. *Advanced Time Series Data Analysis: Forecasting Using EViews* provides readers with a number of modern, advanced forecast models not featured in any other book. They include various interaction models, models with alternative trends (including the models with heterogeneous trends), and complete heterogeneous models for monthly time series, quarterly time series, and annually time series. Each of the models can be applied by all quantitative researchers. Presents models that are all classroom tested Contains real-life data samples Contains over 350 equation specifications of various time series models Contains over 200 illustrative examples with special notes and comments Applicable for time series data of all quantitative studies *Advanced Time Series Data Analysis: Forecasting Using EViews* will appeal to researchers and practitioners in forecasting models, as well as those studying quantitative data analysis. It is suitable for those wishing to obtain a better knowledge and understanding on forecasting, specifically the uncertainty of forecast values. *Statistical Postprocessing of Ensemble Forecasts* brings together chapters contributed by international subject-matter experts describing the current state of the art in the statistical postprocessing of ensemble forecasts. The book illustrates the use of these methods in several important applications including weather, hydrological and climate forecasts, and renewable energy forecasting. After an introductory section on ensemble forecasts and prediction systems, the second section of the book is devoted to exposition of the methods available for statistical postprocessing of ensemble forecasts: univariate and multivariate ensemble postprocessing are first reviewed by Wilks (Chapters 3), then Schefzik and Möller (Chapter 4), and the more specialized perspective necessary for postprocessing forecasts for extremes is presented by Friederichs, Wahl, and Buschow (Chapter 5). The second section concludes with a discussion of forecast verification methods devised specifically for evaluation of ensemble forecasts (Chapter 6 by Thorarinsdottir and Schuhen). The third section of this book is devoted to applications of ensemble postprocessing. Practical aspects of ensemble postprocessing are first detailed in Chapter 7 (Hamill), including an extended and illustrative case study. Chapters 8 (Hemri), 9 (Pinson and Messner), and 10 (Van Schaeybroeck and Vannitsem) discuss ensemble postprocessing specifically for hydrological applications, postprocessing in support of renewable energy applications, and postprocessing of long-range forecasts from months to decades. Finally, Chapter 11 (Messner) provides a guide to the ensemble-postprocessing software available in the R programming language, which should greatly help readers implement many of the ideas presented in this book. Edited by three experts with strong and complementary expertise in statistical postprocessing of ensemble forecasts, this book assesses the new and rapidly developing field of ensemble forecast postprocessing as an extension of the use of statistical corrections to traditional deterministic forecasts. *Statistical Postprocessing of Ensemble Forecasts* is an essential resource for researchers, operational practitioners, and students in weather, seasonal, and climate forecasting, as well as users of such forecasts in fields involving renewable energy, conventional energy, hydrology, environmental engineering, and agriculture. Consolidates, for the first time, the methodologies and applications of ensemble forecasts in one succinct place Provides real-world examples of methods used to formulate forecasts Presents the tools needed to make the best use of multiple model forecasts in a timely and efficient manner

Praise for the First Edition "...[t]he book is great for readers who need to apply the methods and models presented but have little background in mathematics and statistics." -MAA Reviews Thoroughly updated throughout, *Introduction to Time Series Analysis and Forecasting, Second Edition* presents the underlying theories of time series analysis that are needed to analyze time-oriented data and construct real-world short- to medium-term statistical forecasts. Authored by highly-experienced academics and professionals in engineering statistics, the Second Edition features discussions on both popular and modern time series methodologies as well as an introduction to Bayesian methods in forecasting. *Introduction to Time Series Analysis and Forecasting, Second Edition* also includes: Over 300 exercises from diverse disciplines including health care, environmental studies, engineering, and finance More than 50 programming algorithms using JMP®, SAS®, and R that illustrate the theory and practicality of forecasting techniques in the context of time-oriented data New material on frequency domain and spatial temporal data analysis Expanded coverage of the variogram and spectrum with applications as well as transfer and intervention model functions A supplementary website featuring PowerPoint® slides, data sets, and select solutions to the problems *Introduction to Time Series Analysis and Forecasting, Second Edition* is an ideal textbook upper-undergraduate and graduate-levels courses in forecasting and time series. The book is also an excellent reference for practitioners and researchers who need to model and analyze time series data to generate forecasts.

The emergence of less restricted fare structures in the airline industry reduced the capability of airlines to segment demand through restrictions such as Saturday night minimum stay, advance purchase, non-refundability, and cancellation fees. As a result, new forecasting techniques such as Hybrid Forecasting and optimization methods such as Fare Adjustment were developed to account for passenger willingness-to-pay. This thesis explores statistical methods for estimating sell-up, or the likelihood of a passenger to purchase a higher fare class than they originally intended, based solely on historical booking data available in revenue management databases. Due to the inherent sparseness of sell-up data over the booking period, sell-up estimation is often difficult to perform on a per-market basis. On the other hand, estimating sell-up over an entire airline network creates estimates that are too broad and over-generalized. We apply the K-Means clustering algorithm to cluster markets with similar sell-up estimates in an attempt to address this problem, creating a middle ground between system-wide and per-market sell-up estimation. This thesis also formally introduces a new regression-based forecasting method known as Rational Choice. Rational Choice Forecasting creates passenger type categories based on potential willingness-to-pay levels and the lowest open fare class. Using this information, sell-up is accounted for within the passenger type categories, making Rational Choice Forecasting less complex than Hybrid Forecasting. This thesis uses the Passenger Origin-Destination Simulator to analyze the impact of these forecasting and sell-up methods in a controlled, competitive airline environment. The simulation results indicate that determining an appropriate level of market sell-up aggregation through clustering both increases revenue and generates sell-up estimates with a sufficient number of observations. In addition, the findings show that Hybrid Forecasting creates aggressive forecasts that result in more low fare class closures, leaving room for not only sell-up, but for recapture and spill-in passengers in higher fare classes. On the contrary, Rational Choice Forecasting, while simpler than Hybrid Forecasting with sell-up estimation, consistently generates lower revenues than Hybrid Forecasting (but still better than standard pick-up forecasting). To gain a better understanding of why different markets are grouped into different clusters, this thesis uses regression analysis to determine the relationship between a market's characteristics and its estimated sell-up rate. These results indicate that several market factors, in addition to the actual historical bookings, may predict to some degree passenger willingness-to-pay within a market. Consequently, this research illustrates the importance of

passenger willingness-to-pay estimation and its relationship to forecasting in airline revenue management.

Demographic Forecasting introduces new statistical tools that can greatly improve forecasts of population death rates. Mortality forecasting is used in a wide variety of academic fields, and for policymaking in global health, social security and retirement planning, and other areas. Federico Girosi and Gary King provide an innovative framework for forecasting age-sex-country-cause-specific variables that makes it possible to incorporate more information than standard approaches. These new methods more generally make it possible to include different explanatory variables in a time-series regression for each cross section while still borrowing strength from one regression to improve the estimation of all. The authors show that many existing Bayesian models with explanatory variables use prior densities that incorrectly formalize prior knowledge, and they show how to avoid these problems. They also explain how to incorporate a great deal of demographic knowledge into models with many fewer adjustable parameters than classic Bayesian approaches, and develop models with Bayesian priors in the presence of partial prior ignorance. By showing how to include more information in statistical models, Demographic Forecasting carries broad statistical implications for social scientists, statisticians, demographers, public-health experts, policymakers, and industry analysts. Introduces methods to improve forecasts of mortality rates and similar variables Provides innovative tools for more effective statistical modeling Makes available free open-source software and replication data Includes full-color graphics, a complete glossary of symbols, a self-contained math refresher, and more Praise for the First Edition "...[t]he book is great for readers who need to apply the methods and models presented but have little background in mathematics and statistics." -MAA Reviews Thoroughly updated throughout, Introduction to Time Series Analysis and Forecasting, Second Edition presents the underlying theories of time series analysis that are needed to analyze time-oriented data and construct real-world short- to medium-term statistical forecasts. Authored by highly-experienced academics and professionals in engineering statistics, the Second Edition features discussions on both popular and modern time series methodologies as well as an introduction to Bayesian methods in forecasting. Introduction to Time Series Analysis and Forecasting, Second Edition also includes: Over 300 exercises from diverse disciplines including health care, environmental studies, engineering, and finance More than 50 programming algorithms using JMP®, SAS®, and R that illustrate the theory and practicality of forecasting techniques in the context of time-oriented data New material on frequency domain and spatial temporal data analysis Expanded coverage of the variogram and spectrum with applications as well as transfer and intervention model functions A supplementary website featuring PowerPoint® slides, data sets, and select solutions to the problems Introduction to Time Series Analysis and Forecasting, Second Edition is an ideal textbook upper-undergraduate and graduate-levels courses in forecasting and time series. The book is also an excellent reference for practitioners and researchers who need to model and analyze time series data to generate forecasts.

This is an introduction to time series that emphasizes methods and analysis of data sets. The logic and tools of model-building for stationary and non-stationary time series are developed and numerous exercises, many of which make use of the included computer package, provide the reader with ample opportunity to develop skills. Statisticians and students will learn the latest methods in time series and forecasting, along with modern computational models and algorithms.

Build efficient forecasting models using traditional time series models and machine learning algorithms. Key Features Perform time series analysis and forecasting using R packages such as Forecast and h2o Develop models and find patterns to create visualizations using the TSstudio and plotly packages Master statistics and implement time-series methods using examples mentioned Book Description Time series analysis is the art of extracting meaningful insights from, and revealing patterns in, time series data using statistical and data visualization approaches. These insights and patterns can then be utilized to explore past events and forecast future values in the series. This book explores the basics of time series analysis with R and lays the foundations you need to build forecasting models. You will learn how to preprocess raw time series data and clean and manipulate data with packages such as stats, lubridate, xts, and zoo. You will analyze data and extract meaningful information from it using both descriptive statistics and rich data visualization tools in R such as the TSstudio, plotly, and ggplot2 packages. The later section of the book delves into traditional forecasting models such as time series linear regression, exponential smoothing (Holt, Holt-Winter, and more) and Auto-Regressive Integrated Moving Average (ARIMA) models with the stats and forecast packages. You'll also cover advanced time series regression models with machine learning algorithms such as Random Forest and Gradient Boosting Machine using the h2o package. By the end of this book, you will have the skills needed to explore your data, identify patterns, and build a forecasting model using various traditional and machine learning methods. What you will learn Visualize time series data and derive better insights Explore auto-correlation and master statistical techniques Use time series analysis tools from the stats, TSstudio, and forecast packages Explore and identify seasonal and correlation patterns Work with different time series formats in R Explore time series models such as ARIMA, Holt-Winters, and more Evaluate high-performance forecasting solutions Who this book is for Hands-On Time Series Analysis with R is ideal for data analysts, data scientists, and all R developers who are looking to perform time series analysis to predict outcomes effectively. A basic knowledge of statistics is required; some knowledge in R is expected, but not mandatory.

Provides a unique introduction to demographic problems in a familiar language. Presents a unified statistical outlook on both classical methods of demography and recent developments. Exercises are included to facilitate its classroom use. Both authors have contributed extensively to statistical demography and served in advisory roles and as statistical consultants in the field. Providing a clear explanation of the fundamental theory of time series analysis and forecasting, this book couples theory with applications of two popular statistical packages--SAS and SPSS. The text examines moving average, exponential smoothing, Census X-11 deseasonalization, ARIMA, intervention, transfer function, and autoregressive error models and has brief discussions of ARCH and GARCH models. The book features treatments of forecast improvement with regression and autoregression combination models and model and forecast evaluation, along with a sample size analysis for common time series models to attain adequate statistical power. To enhance the book's value as a teaching tool, the data sets and programs used in the book are made available on the Academic Press Web site. The careful linkage of the theoretical constructs with the practical considerations involved in utilizing the statistical packages makes it easy for the user to properly apply these techniques. Key Features * Describes principal approaches to time series analysis and forecasting * Presents examples from public opinion research, policy analysis, political science, economics, and sociology * Free Web site contains the data used in most chapters, facilitating learning * Math level pitched to general social science usage *

Glossary makes the material accessible for readers at all levels

This revised and expanded text explains the latest statistical methods that are being used to describe, analyze, test, and forecast atmospheric data. It features numerous worked examples, illustrations, equations, and exercises with separate solutions. The book will help advanced students and professionals understand and communicate what their data sets have to say, and make sense of the scientific literature in meteorology, climatology, and related disciplines.

This handbook summarises knowledge from experts and empirical studies. It provides guidelines that can be applied in fields such as economics, sociology, and psychology. Includes a comprehensive forecasting dictionary.

This book presents selected peer-reviewed contributions from the International Work-Conference on Time Series, ITISE 2017, held in Granada, Spain, September 18-20, 2017. It discusses topics in time series analysis and forecasting, including advanced mathematical methodology, computational intelligence methods for time series, dimensionality reduction and similarity measures, econometric models, energy time series forecasting, forecasting in real problems, online learning in time series as well as high-dimensional and complex/big data time series. The series of ITISE conferences provides a forum for scientists, engineers, educators and students to discuss the latest ideas and implementations in the foundations, theory, models and applications in the field of time series analysis and forecasting. It focuses on interdisciplinary and multidisciplinary research encompassing computer science, mathematics, statistics and econometrics.

An intuition-based approach enables you to master time series analysis with ease Time Series Analysis and Forecasting by Example provides the fundamental techniques in time series analysis using various examples. By introducing necessary theory through examples that showcase the discussed topics, the authors successfully help readers develop an intuitive understanding of seemingly complicated time series models and their implications. The book presents methodologies for time series analysis in a simplified, example-based approach. Using graphics, the authors discuss each presented example in detail and explain the relevant theory while also focusing on the interpretation of results in data analysis. Following a discussion of why autocorrelation is often observed when data is collected in time, subsequent chapters explore related topics, including: Graphical tools in time series analysis Procedures for developing stationary, non-stationary, and seasonal models How to choose the best time series model Constant term and cancellation of terms in ARIMA models Forecasting using transfer function-noise models The final chapter is dedicated to key topics such as spurious relationships, autocorrelation in regression, and multiple time series. Throughout the book, real-world examples illustrate step-by-step procedures and instructions using statistical software packages such as SAS®, JMP, Minitab, SCA, and R. A related Web site features PowerPoint slides to accompany each chapter as well as the book's data sets. With its extensive use of graphics and examples to explain key concepts, Time Series Analysis and Forecasting by Example is an excellent book for courses on time series analysis at the upper-undergraduate and graduate levels. It also serves as a valuable resource for practitioners and researchers who carry out data and time series analysis in the fields of engineering, business, and economics.

This selection of papers encompasses recent methodological advances in several important areas, such as multivariate failure time data and interval censored data, as well as innovative applications of the existing theory and methods. Using a rigorous account of statistical forecasting efforts that led to the successful resolution of the John-Manville asbestos litigation, the models in this volume can be adapted to forecast industry-wide asbestos liability. More generally, because the models are not overly dependent on the U.S. legal system and the role of asbestos, this volume will be of interest in other product liability cases, as well as similar forecasting situations for a range of insurable or compensational events. Throughout the text, the emphasis is on the iterative nature of model building and the uncertainty generated by lack of complete knowledge of the injury process. This uncertainty is balanced against the court's need for a definitive settlement, and how these opposing principles can be reconciled. A valuable reference for researchers and practitioners in the field of survival analysis.

Forecasting is required in many situations. Stocking an inventory may require forecasts of demand months in advance. Telecommunication routing requires traffic forecasts a few minutes ahead. Whatever the circumstances or time horizons involved, forecasting is an important aid in effective and efficient planning. This textbook provides a comprehensive introduction to forecasting methods and presents enough information about each method for readers to use them sensibly.

To use statistical methods and SAS applications to forecast the future values of data taken over time, you need only follow this thoroughly updated classic on the subject. With this third edition of SAS for Forecasting Time Series, intermediate-to-advanced SAS users—such as statisticians, economists, and data scientists—can now match the most sophisticated forecasting methods to the most current SAS applications. Starting with fundamentals, this new edition presents methods for modeling both univariate and multivariate data taken over time. From the well-known ARIMA models to unobserved components, methods that span the range from simple to complex are discussed and illustrated. Many of the newer methods are variations on the basic ARIMA structures. Completely updated, this new edition includes fresh, interesting business situations and data sets, and new sections on these up-to-date statistical methods: ARIMA models Vector autoregressive models Exponential smoothing models Unobserved component and state-space models Seasonal adjustment Spectral analysis Focusing on application, this guide teaches a wide range of forecasting techniques by example. The examples provide the statistical underpinnings necessary to put the methods into practice. The following up-to-date SAS applications are covered in this edition: The ARIMA procedure The AUTOREG procedure The VARMAX procedure The ESM procedure The UCM and SSM procedures The X13 procedure The SPECTRA procedure SAS Forecast Studio Each SAS application is presented with explanation of its strengths, weaknesses, and best uses. Even users of automated forecasting systems will benefit from this knowledge of what is done and why. Moreover, the accompanying examples can serve as templates that you easily adjust to fit your specific forecasting needs. This book is part of the SAS Press program.

Most decisions and plans in a firm require a forecast. Not matching supply with demand can make or break any business, and that's why forecasting is so invaluable. Forecasting can appear as a frightening topic with many arcane equations to master. For this reason, the authors start out from the very basics and provide a non-technical overview of common forecasting techniques as well as organizational aspects of creating a robust forecasting process. The book also discusses how to measure forecast accuracy to hold people accountable and guide continuous

improvement. This book does not require prior knowledge of higher mathematics, statistics, or operations research. It is designed to serve as a first introduction to the non-expert, such as a manager overseeing a forecasting group, or an MBA student who needs to be familiar with the broad outlines of forecasting without specializing in it.

This is the second of a two-part guide to quantitative analysis using the IBM SPSS Statistics software package; this volume focuses on multivariate statistical methods and advanced forecasting techniques. More often than not, regression models involve more than one independent variable. For example, forecasting methods are commonly applied to aggregates such as inflation rates, unemployment, exchange rates, etc., that have complex relationships with determining variables. This book introduces multivariate regression models and provides examples to help understand theory underpinning the model. The book presents the fundamentals of multivariate regression and then moves on to examine several related techniques that have application in business-orientated fields such as logistic and multinomial regression. Forecasting tools such as the Box-Jenkins approach to time series modeling are introduced, as well as exponential smoothing and naïve techniques. This part also covers hot topics such as Factor Analysis, Discriminant Analysis and Multidimensional Scaling (MDS).

From the author of the bestselling "Analysis of Time Series," Time-Series Forecasting offers a comprehensive, up-to-date review of forecasting methods. It provides a summary of time-series modelling procedures, followed by a brief catalogue of many different time-series forecasting methods, ranging from ad-hoc methods through ARIMA and state-space modelling to multivariate methods and including recent arrivals, such as GARCH models, neural networks, and cointegrated models. The author compares the more important methods in terms of their theoretical inter-relationships and their practical merits. He also considers two other general forecasting topics that have been somewhat neglected in the literature: the computation of prediction intervals and the effect of model uncertainty on forecast accuracy. Although the search for a "best" method continues, it is now well established that no single method will outperform all other methods in all situations-the context is crucial. Time-Series Forecasting provides an outstanding reference source for the more generally applicable methods particularly useful to researchers and practitioners in forecasting in the areas of economics, government, industry, and commerce.

The Wiley-Interscience Paperback Series consists of selected books that have been made more accessible to consumers in an effort to increase global appeal and general circulation. With these new unabridged softcover volumes, Wiley hopes to extend the lives of these works by making them available to future generations of statisticians, mathematicians, and scientists. "This book, it must be said, lives up to the words on its advertising cover: 'Bridging the gap between introductory, descriptive approaches and highly advanced theoretical treatises, it provides a practical, intermediate level discussion of a variety of forecasting tools, and explains how they relate to one another, both in theory and practice.' It does just that!" -Journal of the Royal Statistical Society "A well-written work that deals with statistical methods and models that can be used to produce short-term forecasts, this book has wide-ranging applications. It could be used in the context of a study of regression, forecasting, and time series analysis by PhD students; or to support a concentration in quantitative methods for MBA students; or as a work in applied statistics for advanced undergraduates." -Choice Statistical Methods for Forecasting is a comprehensive, readable treatment of statistical methods and models used to produce short-term forecasts. The interconnections between the forecasting models and methods are thoroughly explained, and the gap between theory and practice is successfully bridged. Special topics are discussed, such as transfer function modeling; Kalman filtering; state space models; Bayesian forecasting; and methods for forecast evaluation, comparison, and control. The book provides time series, autocorrelation, and partial autocorrelation plots, as well as examples and exercises using real data. Statistical Methods for Forecasting serves as an outstanding textbook for advanced undergraduate and graduate courses in statistics, business, engineering, and the social sciences, as well as a working reference for professionals in business, industry, and government.

Data analysis as an area of importance has grown exponentially, especially during the past couple of decades. This can be attributed to a rapidly growing computer industry and the wide applicability of computational techniques, in conjunction with new advances of analytic tools. This being the case, the need for literature that addresses this is self-evident. New publications are appearing, covering the need for information from all fields of science and engineering, thanks to the universal relevance of data analysis and statistics packages. This book is a collective work by a number of leading scientists, analysts, engineers, mathematicians and statisticians who have been working at the forefront of data analysis. The chapters included in this volume represent a cross-section of current concerns and research interests in these scientific areas. The material is divided into three parts: Financial Data Analysis and Methods, Statistics and Stochastic Data Analysis and Methods, and Demographic Methods and Data Analysis- providing the reader with both theoretical and applied information on data analysis methods, models and techniques and appropriate applications.

The Space Environment Services Center (SESC) of the National Oceanic and Atmospheric Administration provides probability forecasts of regional solar flare disturbances. This report describes a statistical method useful to obtain 24 hour solar flare forecasts which, historically, have been subjectively formulated. In Section 1 of this report flare classifications of the SESC and the particular probability forecasts to be considered are defined. In Section 2 we describe the solar flare data base and outline general principles for effective data management. Three statistical techniques for solar flare probability forecasting are discussed in Section 3, viz, discriminant analysis, logistic regression, and multiple linear regression. We also review two scoring measures and suggest the logistic regression approach for obtaining 24 hour forecasts. In Section 4 a heuristic procedure is used to select nine basic predictors from the many available explanatory variables. Using these nine variables logistic regression is demonstrated by example in Section 5. We conclude in Section 6 with broad suggestions regarding continued development of objective methods for solar flare probability forecasting. (Author).

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