

# Applied Predictive Modeling Max Kuhn

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## R for Data Science Lulu.com

Step-by-step guide to build high performing predictive applications  
Key Features Use the Python data analytics ecosystem to implement end-to-end predictive analytics projects Explore advanced predictive modeling algorithms with an emphasis on theory with intuitive explanations Learn to deploy a predictive model's results as an interactive application  
Book Description Predictive analytics is an applied field that employs a variety of quantitative methods using data to make predictions. It involves much more than just throwing data onto a computer to build a model. This book provides practical coverage to help you understand the most important concepts of predictive analytics. Using practical, step-by-step examples, we build predictive analytics solutions while using cutting-edge Python tools and packages. The book's step-by-step approach starts by defining the problem and moves on to identifying relevant data. We will also be performing data preparation, exploring and visualizing relationships, building models, tuning, evaluating, and deploying model. Each stage has relevant practical examples and efficient Python code. You will work with models such as KNN, Random Forests, and neural networks using the most important libraries in Python's data science stack: NumPy, Pandas, Matplotlib, Seaborn, Keras, Dash, and so on. In addition to hands-on code examples, you will find intuitive explanations of the inner workings of the main techniques and algorithms used in predictive analytics. By the end of this book, you will be all set to build high-performance predictive analytics solutions using Python programming. What you will learn Get to grips with the main concepts and principles of predictive analytics Learn about the stages involved in producing complete predictive analytics solutions Understand how to define a problem,

propose a solution, and prepare a dataset Use visualizations to explore relationships and gain insights into the dataset Learn to build regression and classification models using scikit-learn Use Keras to build powerful neural network models that produce accurate predictions Learn to serve a model's predictions as a web application Who this book is for This book is for data analysts, data scientists, data engineers, and Python developers who want to learn about predictive modeling and would like to implement predictive analytics solutions using Python's data stack. People from other backgrounds who would like to enter this exciting field will greatly benefit from reading this book. All you need is to be proficient in Python programming and have a basic understanding of statistics and college-level algebra.

## Predictive Analytics Packt Publishing Ltd

An Introduction to Statistical Learning provides an accessible overview of the field of statistical learning, an essential toolset for making sense of the vast and complex data sets that have emerged in fields ranging from biology to finance to marketing to astrophysics in the past twenty years. This book presents some of the most important modeling and prediction techniques, along with relevant applications. Topics include linear regression, classification, resampling methods, shrinkage approaches, tree-based methods, support vector machines, clustering, and more. Color graphics and real-world examples are used to illustrate the methods presented. Since the goal of this textbook is to facilitate the use of these statistical learning techniques by practitioners in science, industry, and other fields, each chapter contains a tutorial on implementing the analyses and methods presented in R, an extremely popular open source statistical software platform. Two of the authors co-wrote The Elements of Statistical Learning (Hastie, Tibshirani and Friedman, 2nd edition 2009), a popular

reference book for statistics and machine learning researchers. An Introduction to Statistical Learning covers many of the same topics, but at a level accessible to a much broader audience. This book is targeted at statisticians and non-statisticians alike who wish to use cutting-edge statistical learning techniques to analyze their data. The text assumes only a previous course in linear regression and no knowledge of matrix algebra.

## Learning from Imbalanced Data Sets Springer

An accessible introduction for applied mathematicians to concepts and techniques for describing, quantifying, and understanding dynamics under uncertainty.

## Explore, Explain, and Examine Predictive Models Machine Learning Mastery

At the beginning of the twentieth century, H. G. Wells predicted that statistical thinking would be as necessary for citizenship in a technological world as the ability to read and write. But in the twenty-first century, we are often overwhelmed by a baffling array of percentages and probabilities as we try to navigate in a world dominated by statistics. Cognitive scientist Gerd Gigerenzer says that because we haven't learned statistical thinking, we don't understand risk and uncertainty. In order to assess risk -- everything from the risk of an automobile accident to the certainty or uncertainty of some common medical screening tests -- we need a basic understanding of statistics. Astonishingly, doctors and lawyers don't understand risk any better than anyone else. Gigerenzer reports a study in which doctors were told the results of breast cancer screenings and then were asked to explain the risks of contracting breast cancer to a woman who received a positive result from a screening. The actual risk was small because the test gives many false positives. But nearly every physician in the study overstated the risk. Yet many people will have to make important health decisions based on such information and the interpretation of that information by their doctors. Gigerenzer explains that a major obstacle to our understanding of numbers is that we live with an illusion of certainty. Many of us

believe that HIV tests, DNA fingerprinting, and the growing number of genetic tests are absolutely certain. But even DNA evidence can produce spurious matches. We cling to our illusion of certainty because the medical industry, insurance companies, investment advisers, and election campaigns have become purveyors of certainty, marketing it like a commodity. To avoid confusion, says Gigerenzer, we should rely on more understandable representations of risk, such as absolute risks. For example, it is said that a mammography screening reduces the risk of breast cancer by 25 percent. But in absolute risks, that means that out of every 1,000 women who do not participate in screening, 4 will die; while out of 1,000 women who do, 3 will die. A 25 percent risk reduction sounds much more significant than a benefit that 1 out of 1,000 women will reap. This eye-opening book explains how we can overcome our ignorance of numbers and better understand the risks we may be taking with our money, our health, and our lives.

*Principles and Techniques for Data Scientists* Simon and Schuster Applied Predictive Modeling Springer Science & Business Media **with Applications in R** Springer Science & Business Media Data Science gets thrown around in the press like it's magic. Major retailers are predicting everything from when their customers are pregnant to when they want a new pair of Chuck Taylors. It's a brave new world where seemingly meaningless data can be transformed into valuable insight to drive smart business decisions. But how does one exactly do data science? Do you have to hire one of these priests of the dark arts, the "data scientist," to extract this gold from your data? Nope. Data science is little more than using straightforward steps to process raw data into actionable insight. And in *DataSmart*, author and data scientist John Foreman will show you how that's done within the familiar environment of a spreadsheet. Why a spreadsheet? It's comfortable! You get to look at the data every step of the way, building confidence as you learn the tricks of the trade. Plus, spreadsheets are a vendor-neutral place to learn data science without the hype. But don't let the Excel sheets fool you. This is a book for those serious about learning the analytic techniques, the math and the magic, behind big data. Each chapter will cover a different technique in a spreadsheet so you can follow along: Mathematical optimization, including non-linear programming and genetic algorithms Clustering via k-means, spherical k-means, and graph modularity Data mining in graphs, such as outlier detection Supervised AI through logistic regression, ensemble models, and bag-of-words models Forecasting, seasonal adjustments, and prediction intervals through monte carlo simulation Moving from spreadsheets into the R programming language You get your hands dirty as you work alongside John through each technique. But never fear, the topics are readily applicable and the author laces humor throughout. You'll even learn what a dead squirrel has to do with optimization modeling, which you no

doubt are dying to know.

**Data Analysis and Prediction Algorithms with R** Springer Now , a leader of Northwestern University's prestigious analytics program presents a fully-integrated treatment of both the business and academic elements of marketing applications in predictive analytics. Writing for both managers and students, Thomas W. Miller explains essential concepts, principles, and theory in the context of real-world applications. Building on Miller's pioneering program, *Marketing Data Science* thoroughly addresses segmentation, target marketing, brand and product positioning, new product development, choice modeling, recommender systems, pricing research, retail site selection, demand estimation, sales forecasting, customer retention, and lifetime value analysis. Starting where Miller's widely-praised *Modeling Techniques in Predictive Analytics* left off, he integrates crucial information and insights that were previously segregated in texts on web analytics, network science, information technology, and programming. Coverage includes: The role of analytics in delivering effective messages on the web Understanding the web by understanding its hidden structures Being recognized on the web – and watching your own competitors Visualizing networks and understanding communities within them Measuring sentiment and making recommendations Leveraging key data science methods: databases/data preparation, classical/Bayesian statistics, regression/classification, machine learning, and text analytics Six complete case studies address exceptionally relevant issues such as: separating legitimate email from spam; identifying legally-relevant information for lawsuit discovery; gleaning insights from anonymous web surfing data, and more. This text's extensive set of web and network problems draw on rich public-domain data sources; many are accompanied by solutions in Python and/or R. *Marketing Data Science* will be an invaluable resource for all students, faculty, and professional marketers who want to use business analytics to improve marketing performance.

*Statistics in Plain English* Cambridge University Press Build machine learning algorithms, prepare data, and dig deep into data prediction techniques with R About This Book Harness the power of R for statistical computing and data science Explore, forecast, and classify data with R Use R to apply common machine learning algorithms to real-world scenarios Who This Book Is For Perhaps you already know a bit about machine learning but have never used R, or perhaps you know a little R but are new to

machine learning. In either case, this book will get you up and running quickly. It would be helpful to have a bit of familiarity with basic programming concepts, but no prior experience is required. What You Will Learn Harness the power of R to build common machine learning algorithms with real-world data science applications Get to grips with techniques in R to clean and prepare your data for analysis and visualize your results Discover the different types of machine learning models and learn what is best to meet your data needs and solve data analysis problems Classify your data with Bayesian and nearest neighbour methods Predict values using R to build decision trees, rules, and support vector machines Forecast numeric values with linear regression and model your data with neural networks Evaluate and improve the performance of machine learning models Learn specialized machine learning techniques for text mining, social network data, and big data In Detail Machine learning, at its core, is concerned with transforming data into actionable knowledge. This makes machine learning well suited to the present-day era of big data. Given the growing prominence of R's cross-platform, zero-cost statistical programming environment, there has never been a better time to start applying machine learning to your data. Machine learning with R offers a powerful set of methods to quickly and easily gain insight from your data to both, veterans and beginners in data analytics. Want to turn your data into actionable knowledge, predict outcomes that make real impact, and have constantly developing insights? R gives you access to all the power you need to master exceptional machine learning techniques. The second edition of *Machine Learning with R* provides you with an introduction to the essential skills required in data science. Without shying away from technical theory, it is written to provide focused and practical knowledge to get you building algorithms and crunching your data, with minimal previous experience. With this book, you'll discover all the analytical tools you need to gain insights from complex data and learn to choose the correct algorithm for your specific needs. Through full engagement with the sort of real-world problems data-wranglers face, you'll learn to apply machine learning methods to deal with common

tasks, including classification, prediction, forecasting, market analysis, and clustering. Transform the way you think about data; discover machine learning with R. Style and approach How can we use machine learning to transform data into action? This book uses a series of simple steps to show you. Using practical examples, the book illustrates how to prepare data for analysis, choose a machine learning method, and measure its success.

*Using Data Science to Transform Information into Insight* CRC Press

Learn how to use R to turn raw data into insight, knowledge, and understanding. This book introduces you to R, RStudio, and the tidyverse, a collection of R packages designed to work together to make data science fast, fluent, and fun. Suitable for readers with no previous programming experience, *R for Data Science* is designed to get you doing data science as quickly as possible. Authors Hadley Wickham and Garrett Grolemund guide you through the steps of importing, wrangling, exploring, and modeling your data and communicating the results. You'll get a complete, big-picture understanding of the data science cycle, along with basic tools you need to manage the details. Each section of the book is paired with exercises to help you practice what you've learned along the way. You'll learn how to: Wrangle—transform your datasets into a form convenient for analysis Program—learn powerful R tools for solving data problems with greater clarity and ease Explore—examine your data, generate hypotheses, and quickly test them Model—provide a low-dimensional summary that captures true "signals" in your dataset Communicate—learn R Markdown for integrating prose, code, and results

### **Machine Learning in Insurance** Springer

An introduction to a broad range of topics in deep learning, covering mathematical and conceptual background, deep learning techniques used in industry, and research perspectives. "Written by three experts in the field, *Deep Learning* is the only comprehensive book on the subject." —Elon Musk, cochair of OpenAI; cofounder and CEO of Tesla and SpaceX Deep learning is a form of machine learning that enables computers to learn from experience and understand the world in terms of a hierarchy of concepts. Because the computer gathers knowledge from experience, there is no need for a human computer operator to formally specify all the knowledge

that the computer needs. The hierarchy of concepts allows the computer to learn complicated concepts by building them out of simpler ones; a graph of these hierarchies would be many layers deep. This book introduces a broad range of topics in deep learning. The text offers mathematical and conceptual background, covering relevant concepts in linear algebra, probability theory and information theory, numerical computation, and machine learning. It describes deep learning techniques used by practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology; and it surveys such applications as natural language processing, speech recognition, computer vision, online recommendation systems, bioinformatics, and videogames. Finally, the book offers research perspectives, covering such theoretical topics as linear factor models, autoencoders, representation learning, structured probabilistic models, Monte Carlo methods, the partition function, approximate inference, and deep generative models. Deep Learning can be used by undergraduate or graduate students planning careers in either industry or research, and by software engineers who want to begin using deep learning in their products or platforms. A website offers supplementary material for both readers and instructors.

### Machine Learning with R Springer

This textbook on practical data analytics unites fundamental principles, algorithms, and data. Algorithms are the keystone of data analytics and the focal point of this textbook. Clear and intuitive explanations of the mathematical and statistical foundations make the algorithms transparent. But practical data analytics requires more than just the foundations. Problems and data are enormously variable and only the most elementary of algorithms can be used without modification. Programming fluency and experience with real and challenging data is indispensable and so the reader is immersed in Python and R and real data analysis. By the end of the book, the reader will have gained the ability to adapt algorithms to new problems and carry out innovative analyses. This book has three parts:(a) Data Reduction: Begins with the concepts of data reduction, data maps, and information extraction. The second chapter introduces associative statistics, the

mathematical foundation of scalable algorithms and distributed computing. Practical aspects of distributed computing is the subject of the Hadoop and MapReduce chapter.(b) Extracting Information from Data: Linear regression and data visualization are the principal topics of Part II. The authors dedicate a chapter to the critical domain of Healthcare Analytics for an extended example of practical data analytics. The algorithms and analytics will be of much interest to practitioners interested in utilizing the large and unwieldy data sets of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System.(c) Predictive Analytics Two foundational and widely used algorithms, k-nearest neighbors and naive Bayes, are developed in detail. A chapter is dedicated to forecasting. The last chapter focuses on streaming data and uses publicly accessible data streams originating from the Twitter API and the NASDAQ stock market in the tutorials. This book is intended for a one- or two-semester course in data analytics for upper-division undergraduate and graduate students in mathematics, statistics, and computer science. The prerequisites are kept low, and students with one or two courses in probability or statistics, an exposure to vectors and matrices, and a programming course will have no difficulty. The core material of every chapter is accessible to all with these prerequisites. The chapters often expand at the close with innovations of interest to practitioners of data science. Each chapter includes exercises of varying levels of difficulty. The text is eminently suitable for self-study and an exceptional resource for practitioners.

### **Business Problems and Solutions with R** Springer

Feature engineering is a crucial step in the machine-learning pipeline, yet this topic is rarely examined on its own. With this practical book, you'll learn techniques for extracting and transforming features—the numeric representations of raw data—into formats for machine-learning models. Each chapter guides you through a single data problem, such as how to represent text or image data. Together, these examples illustrate the main principles of feature engineering. Rather than simply teach these principles, authors Alice Zheng and Amanda Casari focus on practical application with exercises throughout the book. The closing chapter brings everything together by tackling a real-world, structured dataset with several feature-engineering techniques. Python packages including numpy, Pandas, Scikit-learn, and Matplotlib are

used in code examples. You'll examine: Feature engineering for numeric data: filtering, binning, scaling, log transforms, and power transforms Natural text techniques: bag-of-words, n-grams, and phrase detection Frequency-based filtering and feature scaling for eliminating uninformative features Encoding techniques of categorical variables, including feature hashing and bin-counting Model-based feature engineering with principal component analysis The concept of model stacking, using k-means as a featurization technique Image feature extraction with manual and deep-learning techniques

#### **Clinical Prediction Models** Packt Publishing Ltd

*Applied Predictive Modeling* covers the overall predictive modeling process, beginning with the crucial steps of data preprocessing, data splitting and foundations of model tuning. The text then provides intuitive explanations of numerous common and modern regression and classification techniques, always with an emphasis on illustrating and solving real data problems. The text illustrates all parts of the modeling process through many hands-on, real-life examples, and every chapter contains extensive R code for each step of the process. This multi-purpose text can be used as an introduction to predictive models and the overall modeling process, a practitioner's reference handbook, or as a text for advanced undergraduate or graduate level predictive modeling courses. To that end, each chapter contains problem sets to help solidify the covered concepts and uses data available in the book's R package. This text is intended for a broad audience as both an introduction to predictive models as well as a guide to applying them. Non-mathematical readers will appreciate the intuitive explanations of the techniques while an emphasis on problem-solving with real data across a wide variety of applications will aid practitioners who wish to extend their expertise. Readers should have knowledge of basic statistical ideas, such as correlation and linear regression analysis. While the text is biased against complex equations, a mathematical background is needed for advanced topics.

#### **Hands-On Machine Learning with R** CRC Press

A practical guide for data scientists who want to improve the performance of any machine learning solution with feature engineering.

#### **Data Smart** John Wiley & Sons

*Hands-on Machine Learning with R* provides a practical and applied approach to learning and developing intuition

into today's most popular machine learning methods. This book serves as a practitioner's guide to the machine learning process and is meant to help the reader learn to apply the machine learning stack within R, which includes using various R packages such as glmnet, h2o, ranger, xgboost, keras, and others to effectively model and gain insight from their data. The book favors a hands-on approach, providing an intuitive understanding of machine learning concepts through concrete examples and just a little bit of theory. Throughout this book, the reader will be exposed to the entire machine learning process including feature engineering, resampling, hyperparameter tuning, model evaluation, and interpretation. The reader will be exposed to powerful algorithms such as regularized regression, random forests, gradient boosting machines, deep learning, generalized low rank models, and more! By favoring a hands-on approach and using real word data, the reader will gain an intuitive understanding of the architectures and engines that drive these algorithms and packages, understand when and how to tune the various hyperparameters, and be able to interpret model results. By the end of this book, the reader should have a firm grasp of R's machine learning stack and be able to implement a systematic approach for producing high quality modeling results. Features: · Offers a practical and applied introduction to the most popular machine learning methods. · Topics covered include feature engineering, resampling, deep learning and more. · Uses a hands-on approach and real world data.

#### *Learning Predictive Analytics with Python* Packt Publishing Ltd

*Explanatory Model Analysis* Explore, Explain and Examine Predictive Models is a set of methods and tools designed to build better predictive models and to monitor their behaviour in a changing environment. Today, the true bottleneck in predictive modelling is neither the lack of data, nor the lack of computational power, nor inadequate algorithms, nor the lack of flexible models. It is the lack of tools for model exploration (extraction of relationships learned by the model), model explanation (understanding the key factors influencing model decisions) and model examination (identification of model weaknesses and

evaluation of model's performance). This book presents a collection of model agnostic methods that may be used for any black-box model together with real-world applications to classification and regression problems.

#### **The Power to Predict Who Will Click, Buy, Lie, or Die** John Wiley & Sons

*Bayesian Networks: With Examples in R, Second Edition* introduces Bayesian networks using a hands-on approach. Simple yet meaningful examples illustrate each step of the modelling process and discuss side by side the underlying theory and its application using R code. The examples start from the simplest notions and gradually increase in complexity. In particular, this new edition contains significant new material on topics from modern machine-learning practice: dynamic networks, networks with heterogeneous variables, and model validation. The first three chapters explain the whole process of Bayesian network modelling, from structure learning to parameter learning to inference. These chapters cover discrete, Gaussian, and conditional Gaussian Bayesian networks. The following two chapters delve into dynamic networks (to model temporal data) and into networks including arbitrary random variables (using Stan). The book then gives a concise but rigorous treatment of the fundamentals of Bayesian networks and offers an introduction to causal Bayesian networks. It also presents an overview of R packages and other software implementing Bayesian networks. The final chapter evaluates two real-world examples: a landmark causal protein-signalling network published in Science and a probabilistic graphical model for predicting the composition of different body parts. Covering theoretical and practical aspects of Bayesian networks, this book provides you with an introductory overview of the field. It gives you a clear, practical understanding of the key points behind this modelling approach and, at the same time, it makes you familiar with the most relevant packages used to implement real-world analyses in R. The examples covered in the book span several application fields, data-driven models and expert systems, probabilistic and causal perspectives, thus giving you a starting point to work in a variety of scenarios. Online supplementary materials include the data sets and the code used in the book, which will all be made available from <https://www.bnlearn.com/book-crc-2ed/>

#### *Algorithms for Data Science* Psychology Press

This book provides a clear and thorough introduction to meta-analysis, the process of synthesizing data from a series of separate studies. Meta-analysis has become a critically important tool in fields as diverse as medicine, pharmacology, epidemiology, education, psychology, business, and ecology. *Introduction to Meta-Analysis*: Outlines the role of meta-analysis in the research process Shows how to compute effects sizes and treatment effects Explains the fixed-effect and random-effects models for synthesizing data

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Demonstrates how to assess and interpret variation in effect size across studies Clarifies concepts using text and figures, followed by formulas and examples Explains how to avoid common mistakes in meta-analysis Discusses controversies in meta-analysis Features a web site with additional material and exercises A superb combination of lucid prose and informative graphics, written by four of the world's leading experts on all aspects of meta-analysis. Borenstein, Hedges, Higgins, and Rothstein provide a refreshing departure from cookbook approaches with their clear explanations of the what and why of meta-analysis. The book is ideal as a course textbook or for self-study. My students, who used pre-publication versions of some of the chapters, raved about the clarity of the explanations and examples. David Rindskopf, Distinguished Professor of Educational Psychology, City University of New York, Graduate School and University Center, & Editor of the Journal of Educational and Behavioral Statistics. The approach taken by Introduction to Meta-analysis is intended to be primarily conceptual, and it is amazingly successful at achieving that goal. The reader can comfortably skip the formulas and still understand their application and underlying motivation. For the more statistically sophisticated reader, the relevant formulas and worked examples provide a superb practical guide to performing a meta-analysis. The book provides an eclectic mix of examples from education, social science, biomedical studies, and even ecology. For anyone considering leading a course in meta-analysis, or pursuing self-directed study, Introduction to Meta-analysis would be a clear first choice. Jesse A. Berlin, ScD Introduction to Meta-Analysis is an excellent resource for novices and experts alike. The book provides a clear and comprehensive presentation of all basic and most advanced approaches to meta-analysis. This book will be referenced for decades. Michael A. McDaniel, Professor of Human Resources and Organizational Behavior, Virginia Commonwealth University Modeling Techniques in Predictive Analytics CRC Press

Written as a tutorial to explore and understand the power of R for machine learning. This practical guide that covers all of the need to know topics in a very systematic way. For each machine learning approach, each step in the process is detailed, from preparing the data for analysis to evaluating the results. These steps will build the knowledge you need to apply them to your own data science tasks. Intended for those who want to learn how to use R's machine learning capabilities and gain insight from your data. Perhaps you already know a bit about machine learning, but have never used R; or perhaps you know a little R but are new to machine learning. In either case, this book will get you up and running quickly. It would be helpful to have a bit of familiarity with basic programming concepts, but no prior experience is required.

*Bayesian Networks* Pearson Education

Effectively Assess Intervention Options for Controlling Infectious Diseases Our experiences with the human

immunodeficiency virus (HIV), severe acute respiratory syndrome (SARS), and Ebola virus disease (EVD) remind us of the continuing need to be vigilant against the emergence of new infectious diseases. Mathematical modeling is increasingly used i