Machine Learning A Probabilistic Perspective Kevin P Murphy

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Machine Learning Springer Science & Business Media
Probability is the bedrock of machine learning. You cannot develop a deep understanding and application of machine learning without it. Cut through the equations, Greek letters, and confusion, and discover the topics in probability that you need to know. Using clear explanations, standard Python libraries, and step-by-step tutorial lessons, you will discover the importance of probability to machine learning, Bayesian probability, entropy, density estimation, maximum likelihood, and much more.

Game-Theoretic Learning and Distributed Optimization in Memoryless Multi-Agent Systems Cambridge University Press
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.

Chance Encounters: Probability in Education Springer
Traditional books on machine learning can be divided into two groups- those aimed at advanced undergraduates or early postgraduates with reasonable mathematical knowledge and those that are primers on how to code algorithms. The field is ready for a text that not only demonstrates how to use the algorithms that make up machine learning methods, but

Probability for Statistics and Machine Learning Machine Learning Mastery
This book presents new efficient methods for optimization in realistic large-scale, multi-agent systems. These methods do not require the agents to have the full information about the system, but instead allow them to make their local decisions based only on the local information, possibly obtained during communication with their local neighbors. The book, primarily aimed at researchers in optimization and control, considers three different information settings in multi-agent systems: oracle-based, communication-based, and payoff-based. For each of these information types, an efficient optimization algorithm is developed, which leads the system to an optimal state. The optimization problems are set without such restrictive assumptions as convexity of the objective functions, complicated communication topologies, closed-form expressions for costs and utilities, and finiteness of the system’s state space.

Probabilistic Graphical Models Springer Science & Business Media
Machine learning allows computers to learn and discern patterns without actually being programmed. When Statistical techniques and machine learning are combined together they are a powerful tool for analysing various kinds of data in many computer science/engineering areas including, image processing, speech processing, natural language processing, robot control, as well as in fundamental sciences such as biology, medicine, astronomy, physics, and materials. Introduction to Statistical Machine Learning provides a general introduction to machine learning that covers a wide range of topics concisely and will help you bridge the gap between theory and practice. Part I discusses the fundamental concepts of statistics and probability that are used in describing machine learning algorithms. Part II and Part III explain the two major approaches of machine learning techniques; generative methods and discriminative methods. While Part III provides an in-depth look at advanced topics that play essential roles in making machine learning algorithms more useful in practice. The accompanying MATLAB/Octave programs provide you with the necessary practical skills needed to accomplish a wide range of data analysis tasks. Provides the necessary background material to understand machine learning such as statistics, probability, linear algebra, and calculus. Complete coverage of the generative approach to statistical pattern recognition and the discriminative approach to statistical machine learning. Includes MATLAB/Octave programs so that readers can test the algorithms numerically and acquire both mathematical and practical skills in a wide range of data analysis tasks Discusses a wide range of applications in machine learning and statistics and provides examples drawn from image processing, speech processing, natural language processing, robot control, as well as biology, medicine, astronomy, physics, and materials.

Generative Deep Learning MIT Press
This book has been written to fIll a substantial gap in the current literature in mathemat ical education. Throughout the world, school mathematical curricula have incorporated probability and statistics as new topics. There have been many research papers written on specifIc aspects of teaching, presenting novel and unusual approaches to introducing ideas in the classroom; however, there has been no book giving an overview. Here we have decided to focus on probability, making reference to inferential statistics where appropriate; we have deliberately avoided descriptive statistics as it is a separate area and would have made ideas less coherent and the book excessively long. A general lead has been taken from the fIrst book in this series written by the man who, probably more than everyone else, has established mathematical education as an aca demic discipline. However, in his exposition of didactical phenomenology, Freudenthal does not analyze probability. Thus, in this book, we show how probability is able to organize the world of chance and idealized chance phenomena based on its development and applications. In preparing these chapters we and our co-authors have reflected on our own acquisition of probabilistic ideas, analyzed textbooks, and observed and reflect ed upon the learning processes involved when children and adults struggle to acquire the relevant concepts.

Machine Learning MIT Press
Machine learning (ML) is a subfield of AI that allows computers to "learn" from the data and improve over time without being explicitly programmed. Algorithms that use machine learning may analyze data for patterns and use that knowledge to generate predictions. To sum up, machine learning algorithms & models acquire knowledge from previous data. Traditional programming entails a computer engineer crafting a set of rules that tell a computer how to take raw data and produce a certain result. Most commands follow an IF-THEN format: the computer acts only if the specified condition holds. The opposite is true with machine learning, which is the automated process that allows computers to solve issues with little or no human intervention and to respond following what they have learned from previous experiences. The terms "artificial intelligence" & "machine learning" are often used interchangeably, although they refer to two distinct processes. Machine learning is a branch of artificial intelligence that allows intelligent systems to autonomously learn new things from data, while artificial intelligence as a whole refers to robots that can make choices, acquire new skills, and solve problems. You may train machine learning algorithms to conduct computations, process data, and recognize patterns without explicitly programming them to do so by providing them with samples of labeled data.

Introduction to Machine Learning Lulu.com
The core of this paper is a general set of variational principles for the problems of computing marginal probabilities and modes, applicable to multivariate statistical models in the exponential family.

Machine Learning in Action Springer Science & Business Media
This book is meant as a text for a first-year graduate course in analysis. In a sense, it covers the same topics as elementary calculus but treats them in a manner suitable for people who will be using it in further mathematical investigations. The organization avoids long chains of logical interdependence, so that chapters are mostly independent. This allows a course to omit material from some chapters without compromising the exposition of material from later chapters.

Mobile Health CRC Press
Recent advances in RbD have identified a number of key issues for ensuring a generic approach to the transfer of skills across various agents and contexts. This book focuses on the two generic questions of what to imitate and how to imitate and proposes active teaching methods.

Artificial Intelligence Mit Press
A general framework for constructing and using probabilistic models of complex systems that would enable a computer to use available information for making decisions. Most tasks require a person or an automated system to reason—to reach conclusions based on available information. The framework of probabilistic graphical models, presented in this book, provides a general approach for this task. The approach is model-based, allowing interpretable models to be constructed and then manipulated by reasoning algorithms. These models can also be learned automatically from data, allowing the approach to be used in cases where manually constructing a model is difficult or even impossible. Because uncertainty is an inescapable aspect of most real-world applications, the book focuses on probabilistic models, which make the uncertainty explicit and provide models that are more faithful to reality. Probabilistic Graphical Models discusses a variety of models, spanning Bayesian networks, undirected Markov networks, discrete and continuous models, and extensions to deal with dynamical systems and relational data. For each class of models, the text describes the three fundamental cornerstones: representation, inference, and learning, presenting both basic concepts and advanced techniques. Finally, the book considers the use of the proposed framework for causal reasoning and decision making under uncertainty. The main text in each chapter provides the detailed technical development of the key ideas. Most chapters also include boxes with additional material: skill boxes, which describe techniques; case study boxes, which discuss empirical cases related to the approach described in the text, including applications in computer vision, robotics, natural language understanding, and computational biology; and concept boxes, which present significant concepts drawn from the material in the chapter. Instructors (and readers) can group chapters in various combinations, from core topics to more technically advanced material, to suit their particular needs.

Python for Probability, Statistics, and Machine Learning Springer
If you ’ re an experienced programmer interested in crunching data, this book will get you started with machine learning—a toolkit of algorithms that enables computers to train themselves to automate useful tasks. Authors Drew Conway and John Myles White help you understand machine learning and statistics tools through a series of hands-on case studies, instead of a traditional math-heavy presentation. Each chapter focuses on a specific problem in machine learning, such as classification, prediction, optimization, and recommendation. Using the R programming language, you ’ ll learn how to analyze sample datasets and write simple machine learning algorithms. Machine Learning for Hackers is ideal for programmers from any background, including business, government, and academic research. Develop a na ï ve Bayesian classifier to determine if an email is spam, based only on its text Use linear regression to predict the number of page views for the top 1,000 websites Learn optimization techniques by attempting to break a simple letter cipher Compare and contrast U.S. Senators statistically, based

on their voting records Build a “ whom to follow ” recommendation system from Twitter data

Gaussian Processes for Machine Learning Cambridge University Press

Explains the major paradigms for machine learning: inductive approaches, explanation-based learning, genetic algorithms and connectionist learning methods.

Principles of Constraint Programming Manning Publications

"A First Course in Machine Learning by Simon Rogers and Mark Girolami is the best introductory book for ML currently available. It combines rigor and precision with accessibility, starts from a detailed explanation of the basic foundations of Bayesian analysis in the simplest of settings, and goes all the way to the frontiers of the subject such as infinite mixture models, GPs, and MCMC." —Devdatt Dubhashi, Professor, Department of Computer Science and Engineering, Chalmers University, Sweden "This textbook manages to be easier to read than other comparable books in the subject while retaining all the rigorous treatment needed. The new chapters put it at the forefront of the field by covering topics that have become mainstream in machine learning over the last decade." —Daniel Barbara, George Mason University, Fairfax, Virginia, USA "The new edition of A First Course in Machine Learning by Rogers and Girolami is an excellent introduction to the use of statistical methods in machine learning. The book introduces concepts such as mathematical modeling, inference, and prediction, providing ‘ just in time ’ the essential background on linear algebra, calculus, and probability theory that the reader needs to understand these concepts." —Daniel Ortiz-Arroyo, Associate Professor, Aalborg University Esbjerg, Denmark "I was impressed by how closely the material aligns with the needs of an introductory course on machine learning, which is its greatest strength...Overall, this is a pragmatic and helpful book, which is well-aligned to the needs of an introductory course and one that I will be looking at for my own students in coming months." —David Clifton, University of Oxford, UK "The first edition of this book was already an excellent introductory text on machine learning for an advanced undergraduate or taught masters level course, or indeed for anybody who wants to learn about an interesting and important field of computer science. The additional chapters of advanced material on Gaussian process, MCMC and mixture modeling provide an ideal basis for practical projects, without disturbing the very clear and readable exposition of the basics contained in the first part of the book." —Gavin Cawley, Senior Lecturer, School of Computing Sciences, University of East Anglia, UK "This book could be used for junior/senior undergraduate students or first-year graduate students, as well as individuals who want to explore the field of machine learning...The book introduces not only the concepts but the underlying ideas on algorithm implementation from a critical thinking perspective." —Guangzhi Qu, Oakland University, Rochester, Michigan, USA

Machine Learning: A Probabilistic Perspective Springer

Probabilistic Deep Learning is a hands-on guide to the principles that support neural networks. Learn to improve network performance with the right distribution for different data types, and discover Bayesian variants that can state their own uncertainty to increase accuracy. This book provides easy-to-apply code and uses popular frameworks to keep you focused on practical applications. Summary Probabilistic Deep Learning: With Python, Keras and TensorFlow Probability teaches the increasingly popular probabilistic approach to deep learning that allows you to refine your results more quickly and accurately without much trial-and-error testing. Emphasizing practical techniques that use the Python-based Tensorflow Probability Framework, you ’ ll learn to build highly-performant deep learning applications that can reliably handle the noise and uncertainty of real-world data. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology The world is a noisy and uncertain place. Probabilistic deep learning models capture that noise and uncertainty, pulling it into real-world scenarios. Crucial for self-driving cars and scientific testing, these techniques help deep learning engineers assess the accuracy of their results, spot errors, and improve their understanding of how algorithms work. About the book Probabilistic Deep Learning is a hands-on guide to the principles that support neural networks. Learn to improve network performance with the right distribution for different data types, and discover Bayesian variants that can state their own uncertainty to increase accuracy. This book provides easy-to-apply code and uses popular frameworks to keep you focused on practical applications. What's inside Explore maximum likelihood and the statistical basis of deep learning Discover probabilistic models that can indicate possible outcomes Learn to use normalizing flows for modeling and generating complex distributions Use Bayesian neural networks to access the uncertainty in the model About the reader For experienced machine learning developers. About the author Oliver D ü rr is a professor at the University of Applied Sciences in Konstanz, Germany. Beate Sick holds a chair for applied statistics at ZHAW and works as a researcher and lecturer at the University of Zurich. Elvis Murina is a data scientist. Table of Contents PART 1 - BASICS OF DEEP LEARNING 1 Introduction to probabilistic deep learning 2 Neural network architectures 3 Principles of curve fitting PART 2 - MAXIMUM LIKELIHOOD APPROACHES FOR PROBABILISTIC DL MODELS 4 Building loss functions with the likelihood approach 5 Probabilistic deep learning models with TensorFlow Probability 6 Probabilistic deep learning models in the wild PART 3 - BAYESIAN APPROACHES FOR PROBABILISTIC DL MODELS 7 Bayesian learning 8 Bayesian neural networks

Mathematics for Machine Learning Createspace Independent Publishing Platform

A detailed and up-to-date introduction to machine learning, presented through the unifying lens of probabilistic modeling and Bayesian decision theory. This book offers a detailed and up-to-date introduction to machine learning (including deep learning) through the unifying lens of probabilistic modeling and Bayesian decision theory. The book covers mathematical background (including linear algebra and optimization), basic supervised learning (including linear and logistic regression and deep neural networks), as well as more advanced topics (including transfer learning and unsupervised learning). End-of-chapter exercises allow students to apply what they have learned, and an appendix covers notation. Probabilistic Machine Learning grew out of the author ’ s 2012 book, Machine Learning: A Probabilistic Perspective. More than just a simple update, this is a completely new book that reflects the dramatic developments in the field since 2012, most notably deep learning. In addition, the new book is accompanied by online Python code, using libraries such as scikit-learn, JAX, PyTorch, and Tensorflow, which can be used to reproduce nearly all the figures; this code can be run inside a web browser using cloud-based notebooks, and provides a practical complement to the theoretical topics discussed in the book. This introductory text will be followed by a sequel that covers more advanced topics, taking the same probabilistic approach.

Probabilistic Machine Learning for Civil Engineers Morgan Kaufmann

This book covers probability and statistics from the machine learning perspective. The chapters of this book belong to three categories: 1. The basics of probability and statistics: These chapters focus on the basics of probability and statistics, and cover the key principles of these topics. Chapter 1 provides an overview of the area of probability and statistics as well as its relationship to machine learning. The fundamentals of probability and statistics are covered in Chapters 2 through 5. 2. From probability to machine learning: Many machine learning applications are addressed using probabilistic models, whose parameters are then learned in a data-driven manner. Chapters 6 through 9 explore how different models from probability and statistics are applied to machine learning. Perhaps the most important tool that bridges the gap from data to probability is maximum-likelihood estimation, which is a foundational concept from the perspective of machine learning. This concept is explored repeatedly in these chapters. 3. Advanced topics: Chapter 10 is devoted to discrete-state Markov processes. It explores the application of probability and statistics to a temporal and sequential setting, although the applications extend to more complex settings such as graphical data. Chapter 11 covers a number of probabilistic inequalities and approximations. The style of writing promotes the

learning of probability and statistics simultaneously with a probabilistic perspective on the modeling of machine learning applications. The book contains over 200 worked examples in order to elucidate key concepts. Exercises are included both within the text of the chapters and at the end of the chapters. The book is written for a broad audience, including graduate students, researchers, and practitioners.

Probabilistic Machine Learning Springer

Check out preview content for Essentials of Economics here. Essentials of Economics brings the same captivating writing and innovative features of Krugman/Wells to the one-term economics course. Adapted by Kathryn Graddy, it is the ideal text for teaching basic economic principles, with enough real-world applications to help students see the applicability, but not so much detail as to overwhelm them. Watch a video interview of Paul Krugman here.

Probability and Statistics for Machine Learning "O'Reilly Media, Inc."

This very well written and accessible book emphasizes the reasons for studying measure theory, which is the foundation of much of probability. By focusing on measure, many illustrative examples and applications, including a thorough discussion of standard probability distributions and densities, are opened. The book also includes many problems and their fully worked solutions.

Planning with Markov Decision Processes MIT Press

Covering all the main approaches in state-of-the-art machine learning research, this will set a new standard as an introductory textbook.