

Deep Learning Adaptive Computation And Machine Learning Series

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Artificial Intelligence - Stuart Russell 2019-07

"Updated edition of popular textbook on Artificial Intelligence. This edition specific looks at ways of keeping artificial intelligence under control"--

Deep Learning - John D.

Kelleher 2019-09-10

An accessible introduction to the artificial intelligence technology that enables computer vision, speech recognition, machine translation, and driverless cars. Deep learning is an artificial intelligence technology that

enables computer vision, speech recognition in mobile phones, machine translation, AI games, driverless cars, and other applications. When we use consumer products from Google, Microsoft, Facebook, Apple, or Baidu, we are often interacting with a deep learning system. In this volume in the MIT Press Essential Knowledge series, computer scientist John Kelleher offers an accessible and concise but comprehensive introduction to the fundamental technology at the heart of the artificial intelligence revolution. Kelleher explains that deep learning enables data-driven decisions by identifying and extracting patterns from large datasets; its ability to learn from complex data makes deep learning ideally suited to take advantage of the rapid growth in big data and computational power. Kelleher also explains some of the basic concepts in deep learning, presents a history of advances in the field, and discusses the current state of the art. He describes the most important deep learning

architectures, including autoencoders, recurrent neural networks, and long short-term networks, as well as such recent developments as Generative Adversarial Networks and capsule networks. He also provides a comprehensive (and comprehensible) introduction to the two fundamental algorithms in deep learning: gradient descent and backpropagation. Finally, Kelleher considers the future of deep learning—major trends, possible developments, and significant challenges.

Reinforcement Learning, second edition - Richard S. Sutton 2018-11-13

The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational approach to learning whereby an agent tries to maximize the total amount of reward it receives

while interacting with a complex, uncertain environment. In *Reinforcement Learning*, Richard Sutton and Andrew Barto provide a clear and simple account of the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms, with the more mathematical material set off in shaded boxes. Part I covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-policy learning and policy-

gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing, and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.

Bioinformatics - Pierre Baldi
1998

An unprecedented wealth of data is being generated by genome sequencing projects and other experimental efforts to determine the structure and function of biological molecules. The demands and opportunities for interpreting these data are expanding more than ever. Biotechnology, pharmacology, and medicine will be particularly affected by the new results and the increased understanding of life at the molecular level.

Bioinformatics is the development and application of computer methods for analysis, interpretation, and prediction, as well as for the design of

experiments. It has emerged as a strategic frontier between biology and computer science. Machine learning approaches (e.g., neural networks, hidden Markov models, and belief networks) are ideally suited for areas where there is a lot of data but little theory—and this is exactly the situation in molecular biology. As with its predecessor, statistical model fitting, the goal in machine learning is to extract useful information from a body of data by building good probabilistic models. The particular twist behind machine learning, however, is to automate the process as much as possible. In this book, Pierre Baldi and Soren Brunak present the key machine learning approaches and apply them to the computational problems encountered in the analysis of biological data. The book is aimed at two types of researchers and students. First are the biologists and biochemists who need to understand new data-driven algorithms, such as neural networks and hidden Markov

models, in the context of biological sequences and their molecular structure and function. Second are those with a primary background in physics, mathematics, statistics, or computer science who need to know more about specific applications in molecular biology.

Machine Learning Algorithms and Applications

- Mettu Srinivas 2021-08-10
Machine Learning Algorithms is for current and ambitious machine learning specialists looking to implement solutions to real-world machine learning problems. It talks entirely about the various applications of machine and deep learning techniques, with each chapter dealing with a novel approach of machine learning architecture for a specific application, and then compares the results with previous algorithms. The book discusses many methods based in different fields, including statistics, pattern recognition, neural networks, artificial intelligence, sentiment analysis, control, and data

mining, in order to present a unified treatment of machine learning problems and solutions. All learning algorithms are explained so that the user can easily move from the equations in the book to a computer program.

Elements of Causal Inference - Jonas Peters
2017-11-29

A concise and self-contained introduction to causal inference, increasingly important in data science and machine learning. The mathematization of causality is a relatively recent development, and has become increasingly important in data science and machine learning. This book offers a self-contained and concise introduction to causal models and how to learn them from data. After explaining the need for causal models and discussing some of the principles underlying causal inference, the book teaches readers how to use causal models: how to compute intervention distributions, how to infer causal models from

observational and interventional data, and how causal ideas could be exploited for classical machine learning problems. All of these topics are discussed first in terms of two variables and then in the more general multivariate case. The bivariate case turns out to be a particularly hard problem for causal learning because there are no conditional independences as used by classical methods for solving multivariate cases. The authors consider analyzing statistical asymmetries between cause and effect to be highly instructive, and they report on their decade of intensive research into this problem. The book is accessible to readers with a background in machine learning or statistics, and can be used in graduate courses or as a reference for researchers. The text includes code snippets that can be copied and pasted, exercises, and an appendix with a summary of the most important technical concepts.

Computer Vision - Simon J. D. Prince
2012-06-18

A modern treatment focusing on learning and inference, with minimal prerequisites, real-world examples and implementable algorithms.

Deep Learning Essentials -

Anurag Bhardwaj 2018-01-30

Get to grips with the essentials of deep learning by leveraging the power of Python Key

Features Your one-stop

solution to get started with the essentials of deep learning and neural network modeling Train

different kinds of neural

networks to tackle various problems in Natural Language

Processing, computer vision, speech recognition, and more

Covers popular Python libraries such as Tensorflow, Keras, and more, along with tips on

training, deploying and optimizing your deep learning

models in the best possible

manner Book Description Deep

Learning a trending topic in the field of Artificial

Intelligence today and can be considered to be an advanced form of machine learning,

which is quite tricky to master.

This book will help you take your first steps in training

efficient deep learning models and applying them in various

practical scenarios. You will model, train, and deploy

different kinds of neural

networks such as Convolutional

Neural Network, Recurrent

Neural Network, and will see

some of their applications in real-world domains including

computer vision, natural

language processing, speech

recognition, and so on. You will

build practical projects such as

chatbots, implement

reinforcement learning to build

smart games, and develop

expert systems for image

captioning and processing.

Popular Python library such as

TensorFlow is used in this book

to build the models. This book

also covers solutions for

different problems you might

come across while training

models, such as noisy datasets,

small datasets, and more. This

book does not assume any prior

knowledge of deep learning. By

the end of this book, you will

have a firm understanding of

the basics of deep learning and

neural network modeling,

along with their practical

applications. What you will learn Get to grips with the core concepts of deep learning and neural networks Set up deep learning library such as TensorFlow Fine-tune your deep learning models for NLP and Computer Vision applications Unify different information sources, such as images, text, and speech through deep learning Optimize and fine-tune your deep learning models for better performance Train a deep reinforcement learning model that plays a game better than humans Learn how to make your models get the best out of your GPU or CPU Who this book is for Aspiring data scientists and machine learning experts who have limited or no exposure to deep learning will find this book to be very useful. If you are looking for a resource that gets you up and running with the fundamentals of deep learning and neural networks, this book is for you. As the models in the book are trained using the popular Python-based libraries such as Tensorflow and Keras, it would

be useful to have sound programming knowledge of Python.

Practical Machine Learning with H2O - Darren Cook
2016-12-05

Machine learning has finally come of age. With H2O software, you can perform machine learning and data analysis using a simple open source framework that's easy to use, has a wide range of OS and language support, and scales for big data. This hands-on guide teaches you how to use H2O with only minimal math and theory behind the learning algorithms. If you're familiar with R or Python, know a bit of statistics, and have some experience manipulating data, author Darren Cook will take you through H2O basics and help you conduct machine-learning experiments on different sample data sets. You'll explore several modern machine-learning techniques such as deep learning, random forests, unsupervised learning, and ensemble learning. Learn how to import, manipulate, and export data with H2O Explore

key machine-learning concepts, such as cross-validation and validation data sets Work with three diverse data sets, including a regression, a multinomial classification, and a binomial classification Use H2O to analyze each sample data set with four supervised machine-learning algorithms Understand how cluster analysis and other unsupervised machine-learning algorithms work

Gaussian Processes for Machine Learning - Carl Edward Rasmussen 2005-11-23

A comprehensive and self-contained introduction to Gaussian processes, which provide a principled, practical, probabilistic approach to learning in kernel machines. Gaussian processes (GPs) provide a principled, practical, probabilistic approach to learning in kernel machines. GPs have received increased attention in the machine-learning community over the past decade, and this book provides a long-needed systematic and unified treatment of theoretical and

practical aspects of GPs in machine learning. The treatment is comprehensive and self-contained, targeted at researchers and students in machine learning and applied statistics. The book deals with the supervised-learning problem for both regression and classification, and includes detailed algorithms. A wide variety of covariance (kernel) functions are presented and their properties discussed. Model selection is discussed both from a Bayesian and a classical perspective. Many connections to other well-known techniques from machine learning and statistics are discussed, including support-vector machines, neural networks, splines, regularization networks, relevance vector machines and others. Theoretical issues including learning curves and the PAC-Bayesian framework are treated, and several approximation methods for learning with large datasets are discussed. The book contains illustrative examples and exercises, and code and

datasets are available on the Web. Appendixes provide mathematical background and a discussion of Gaussian Markov processes.

Deep Learning with PyTorch - Luca Pietro Giovanni Antiga 2020-07-01

“We finally have the definitive treatise on PyTorch! It covers the basics and abstractions in great detail. I hope this book becomes your extended reference document.”

—Soumith Chintala, co-creator of PyTorch
Key Features
Written by PyTorch’s creator and key contributors
Develop deep learning models in a familiar Pythonic way
Use PyTorch to build an image classifier for cancer detection
Diagnose problems with your neural network and improve training with data augmentation
Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications.
About The Book
Every other day we hear about new ways to put deep learning to good use: improved medical imaging, accurate credit card

fraud detection, long range weather forecasting, and more.

PyTorch puts these superpowers in your hands. Instantly familiar to anyone who knows Python data tools like NumPy and Scikit-learn, PyTorch simplifies deep learning without sacrificing advanced features. It’s great for building quick models, and it scales smoothly from laptop to enterprise. Deep Learning with PyTorch teaches you to create deep learning and neural network systems with PyTorch. This practical book gets you to work right away building a tumor image classifier from scratch. After covering the basics, you’ll learn best practices for the entire deep learning pipeline, tackling advanced projects as your PyTorch skills become more sophisticated. All code samples are easy to explore in downloadable Jupyter notebooks. What You Will Learn
Understanding deep learning data structures such as tensors and neural networks
Best practices for the PyTorch Tensor API, loading data in

Python, and visualizing results
Implementing modules and loss
functions Utilizing pretrained
models from PyTorch Hub
Methods for training networks
with limited inputs Sifting
through unreliable results to
diagnose and fix problems in
your neural network Improve
your results with augmented
data, better model
architecture, and fine tuning
This Book Is Written For For
Python programmers with an
interest in machine learning.
No experience with PyTorch or
other deep learning
frameworks is required. About
The Authors Eli Stevens has
worked in Silicon Valley for the
past 15 years as a software
engineer, and the past 7 years
as Chief Technical Officer of a
startup making medical device
software. Luca Antiga is co-
founder and CEO of an AI
engineering company located
in Bergamo, Italy, and a
regular contributor to PyTorch.
Thomas Viehmann is a Machine
Learning and PyTorch
speciality trainer and
consultant based in Munich,
Germany and a PyTorch core

developer. Table of Contents
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images 8 Using convolutions to
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**Introduction to Machine
Learning** - Ethem Alpaydin
2014-08-22
Introduction -- Supervised
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Multilayer perceptrons -- Local
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models -- Bayesian estimation --
Combining multiple learners --
Reinforcement learning --
Design and analysis of machine
learning experiments.

Deep Learning - Ian Goodfellow
2016-11-18

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 Intelligence -

Suresh Samudrala 2019-01-11
Artificial intelligence and machine learning are considered as hot technologies of this century. As these technologies move from research labs to enterprise data centers, the need for skilled professionals is continuously on the rise. This book is intended for IT and

business professionals looking to gain proficiency in these technologies but are turned off by the complex mathematical equations. This book is also useful for students in the area of artificial intelligence and machine learning to gain a conceptual understanding of the algorithms and get an industry perspective. This book is an ideal place to start your journey as

- Core concepts of machine learning algorithms are explained in plain English using illustrations, data tables and examples
- Intuitive meaning of the mathematics behind popular machine learning algorithms explained
- Covers classical machine learning, neural networks and deep learning algorithms

At a time when the IT industry is focusing on reskilling its vast human resources, Machine intelligence is a very timely publication. It has a simple approach that builds up from basics, which would help software engineers and students looking to learn about the field as well as those who might have started off without

the benefit of a structured introduction or sound basics. Highly recommended. - Siddhartha S, Founder and CEO of Intain - Financial technology startup Suresh has written a very accessible book for practitioners. The book has depth yet avoids excessive mathematics. The coverage of the subject is very good and has most of the concepts required for understanding machine learning if someone is looking for depth. For senior management, it will provide a good overview. It is well written. I highly recommend it.

- Whee Teck ONG, CEO of Trusted Source and VP of Singapore Computer Society
Probabilistic Machine Learning - Kevin P. Murphy
2022-03-01

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.

Trends in Deep Learning Methodologies - Vincenzo Piuri
2020-11-30

Trends in Deep Learning Methodologies: Algorithms, Applications, and Systems covers deep learning approaches such as neural networks, deep belief networks, recurrent neural networks, convolutional neural networks, deep auto-encoder, and deep generative networks, which have emerged as powerful computational models. Chapters elaborate on these models which have shown significant success in dealing with massive data for a large number of applications, given their capacity to extract complex hidden features and learn efficient representation in unsupervised settings. Chapters investigate deep

learning-based algorithms in a variety of application, including biomedical and health informatics, computer vision, image processing, and more. In recent years, many powerful algorithms have been developed for matching patterns in data and making predictions about future events. The major advantage of deep learning is to process big data analytics for better analysis and self-adaptive algorithms to handle more data. Deep learning methods can deal with multiple levels of representation in which the system learns to abstract higher level representations of raw data. Earlier, it was a common requirement to have a domain expert to develop a specific model for each specific application, however, recent advancements in representation learning algorithms allow researchers across various subject domains to automatically learn the patterns and representation of the given data for the development of specific models. Provides insights into

the theory, algorithms, implementation and the application of deep learning techniques Covers a wide range of applications of deep learning across smart healthcare and smart engineering Investigates the development of new models and how they can be exploited to find appropriate solutions

Foundations of Machine Learning, second edition - Mehryar Mohri 2018-12-25

A new edition of a graduate-level machine learning textbook that focuses on the analysis and theory of algorithms. This book is a general introduction to machine learning that can serve as a textbook for graduate students and a reference for researchers. It covers fundamental modern topics in machine learning while providing the theoretical basis and conceptual tools needed for the discussion and justification of algorithms. It also describes several key aspects of the application of these algorithms. The authors aim to present novel

theoretical tools and concepts while giving concise proofs even for relatively advanced topics. Foundations of Machine Learning is unique in its focus on the analysis and theory of algorithms. The first four chapters lay the theoretical foundation for what follows; subsequent chapters are mostly self-contained. Topics covered include the Probably Approximately Correct (PAC) learning framework; generalization bounds based on Rademacher complexity and VC-dimension; Support Vector Machines (SVMs); kernel methods; boosting; on-line learning; multi-class classification; ranking; regression; algorithmic stability; dimensionality reduction; learning automata and languages; and reinforcement learning. Each chapter ends with a set of exercises. Appendixes provide additional material including concise probability review. This second edition offers three new chapters, on model selection, maximum entropy models, and conditional entropy models.

New material in the appendixes includes a major section on Fenchel duality, expanded coverage of concentration inequalities, and an entirely new entry on information theory. More than half of the exercises are new to this edition.

Deep Learning with Python -

Francois Chollet 2017-11-30

Summary Deep Learning with Python introduces the field of deep learning using the Python language and the powerful Keras library. Written by Keras creator and Google AI researcher François Chollet, this book builds your understanding through intuitive explanations and practical examples. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Machine learning has made remarkable progress in recent years. We went from near-unusable speech and image recognition, to near-human accuracy. We went from machines that couldn't beat a serious Go player, to defeating

a world champion. Behind this progress is deep learning—a combination of engineering advances, best practices, and theory that enables a wealth of previously impossible smart applications. About the Book Deep Learning with Python introduces the field of deep learning using the Python language and the powerful Keras library. Written by Keras creator and Google AI researcher François Chollet, this book builds your understanding through intuitive explanations and practical examples. You'll explore challenging concepts and practice with applications in computer vision, natural-language processing, and generative models. By the time you finish, you'll have the knowledge and hands-on skills to apply deep learning in your own projects. What's Inside Deep learning from first principles Setting up your own deep-learning environment Image-classification models Deep learning for text and sequences Neural style transfer, text generation, and

image generation About the Reader Readers need intermediate Python skills. No previous experience with Keras, TensorFlow, or machine learning is required. About the Author François Chollet works on deep learning at Google in Mountain View, CA. He is the creator of the Keras deep-learning library, as well as a contributor to the TensorFlow machine-learning framework. He also does deep-learning research, with a focus on computer vision and the application of machine learning to formal reasoning. His papers have been published at major conferences in the field, including the Conference on Computer Vision and Pattern Recognition (CVPR), the Conference and Workshop on Neural Information Processing Systems (NIPS), the International Conference on Learning Representations (ICLR), and others. Table of Contents PART 1 - FUNDAMENTALS OF DEEP LEARNING What is deep learning? Before we begin: the mathematical building blocks

of neural networks Getting started with neural networks Fundamentals of machine learning PART 2 - DEEP LEARNING IN PRACTICE Deep learning for computer vision Deep learning for text and sequences Advanced deep-learning best practices Generative deep learning Conclusions appendix A - Installing Keras and its dependencies on Ubuntu appendix B - Running Jupyter notebooks on an EC2 GPU instance

Deep Learning - Ian Goodfellow 2016-11-10

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.

Mathematics for Machine Learning - Marc Peter

Deisenroth 2020-04-23

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics.

These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Semi-Supervised Learning -

Olivier Chapelle 2010-01-22

A comprehensive review of an area of machine learning that deals with the use of unlabeled data in classification problems: state-of-the-art algorithms, a taxonomy of the field, applications, benchmark experiments, and directions for future research. In the field of machine learning, semi-supervised learning (SSL) occupies the middle ground, between supervised learning (in which all training examples are labeled) and unsupervised learning (in which no label data are given). Interest in SSL has increased in recent years, particularly because of application domains in which unlabeled data are plentiful, such as images, text, and bioinformatics. This first comprehensive overview of SSL presents state-of-the-art algorithms, a taxonomy of the field, selected applications, benchmark experiments, and perspectives on ongoing and future research. Semi-Supervised Learning first presents the key assumptions and ideas underlying the field:

smoothness, cluster or low-density separation, manifold structure, and transduction. The core of the book is the presentation of SSL methods, organized according to algorithmic strategies. After an examination of generative models, the book describes algorithms that implement the low-density separation assumption, graph-based methods, and algorithms that perform two-step learning. The book then discusses SSL applications and offers guidelines for SSL practitioners by analyzing the results of extensive benchmark experiments. Finally, the book looks at interesting directions for SSL research. The book closes with a discussion of the relationship between semi-supervised learning and transduction.

Probabilistic Machine Learning - Kevin P. Murphy
2022-03-01

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.

Deep Learning - Ian Goodfellow 2013

Learning Computer Architecture with Raspberry Pi - Eben Upton 2016-09-13

Use your Raspberry Pi to get smart about computing fundamentals In the 1980s, the tech revolution was kickstarted by a flood of relatively inexpensive, highly programmable computers like the Commodore. Now, a second revolution in computing is beginning with the Raspberry Pi. *Learning Computer Architecture with the Raspberry Pi* is the premier guide to understanding the

components of the most exciting tech product available. Thanks to this book, every Raspberry Pi owner can understand how the computer works and how to access all of its hardware and software capabilities. Now, students, hackers, and casual users alike can discover how computers work with *Learning Computer Architecture with the Raspberry Pi*. This book explains what each and every hardware component does, how they relate to one another, and how they correspond to the components of other computing systems. You'll also learn how programming works and how the operating system relates to the Raspberry Pi's physical components. Co-authored by Eben Upton, one of the creators of the Raspberry Pi, this is a companion volume to the *Raspberry Pi User Guide* An affordable solution for learning about computer system design considerations and experimenting with low-level programming Understandable descriptions of the functions of

memory storage, Ethernet, cameras, processors, and more. Gain knowledge of computer design and operation in general by exploring the basic structure of the Raspberry Pi. The Raspberry Pi was created to bring forth a new generation of computer scientists, developers, and architects who understand the inner workings of the computers that have become essential to our daily lives. Learning Computer Architecture with the Raspberry Pi is your gateway to the world of computer system design.

Machine Learning - Kevin P. Murphy 2012-08-24

A comprehensive introduction to machine learning that uses probabilistic models and inference as a unifying approach. Today's Web-enabled deluge of electronic data calls for automated methods of data analysis. Machine learning provides these, developing methods that can automatically detect patterns in data and then use the uncovered patterns to predict future data. This

textbook offers a comprehensive and self-contained introduction to the field of machine learning, based on a unified, probabilistic approach. The coverage combines breadth and depth, offering necessary background material on such topics as probability, optimization, and linear algebra as well as discussion of recent developments in the field, including conditional random fields, L1 regularization, and deep learning. The book is written in an informal, accessible style, complete with pseudo-code for the most important algorithms. All topics are copiously illustrated with color images and worked examples drawn from such application domains as biology, text processing, computer vision, and robotics. Rather than providing a cookbook of different heuristic methods, the book stresses a principled model-based approach, often using the language of graphical models to specify models in a concise and intuitive way. Almost all

the models described have been implemented in a MATLAB software package—PMTK (probabilistic modeling toolkit)—that is freely available online. The book is suitable for upper-level undergraduates with an introductory-level college math background and beginning graduate students.

Probabilistic Graphical Models

- Daphne Koller 2009-07-31

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.

Introduction to Natural Language Processing - Jacob Eisenstein 2019-10-01

A survey of computational methods for understanding, generating, and manipulating human language, which offers a synthesis of classical representations and algorithms with contemporary machine learning techniques. This textbook provides a technical perspective on natural language processing—methods for building computer software

that understands, generates, and manipulates human language. It emphasizes contemporary data-driven approaches, focusing on techniques from supervised and unsupervised machine learning. The first section establishes a foundation in machine learning by building a set of tools that will be used throughout the book and applying them to word-based textual analysis. The second section introduces structured representations of language, including sequences, trees, and graphs. The third section explores different approaches to the representation and analysis of linguistic meaning, ranging from formal logic to neural word embeddings. The final section offers chapter-length treatments of three transformative applications of natural language processing: information extraction, machine translation, and text generation. End-of-chapter exercises include both paper-and-pencil analysis and software implementation. The text synthesizes and distills a

broad and diverse research literature, linking contemporary machine learning techniques with the field's linguistic and computational foundations. It is suitable for use in advanced undergraduate and graduate-level courses and as a reference for software engineers and data scientists. Readers should have a background in computer programming and college-level mathematics. After mastering the material presented, students will have the technical skill to build and analyze novel natural language processing systems and to understand the latest research in the field.

Machine Learning for Data

Streams - Albert Bifet

2018-03-16

A hands-on approach to tasks and techniques in data stream mining and real-time analytics, with examples in MOA, a popular freely available open-source software framework. Today many information sources—including sensor networks, financial markets, social networks, and healthcare

monitoring—are so-called data streams, arriving sequentially and at high speed. Analysis must take place in real time, with partial data and without the capacity to store the entire data set. This book presents algorithms and techniques used in data stream mining and real-time analytics. Taking a hands-on approach, the book demonstrates the techniques using MOA (Massive Online Analysis), a popular, freely available open-source software framework, allowing readers to try out the techniques after reading the explanations. The book first offers a brief introduction to the topic, covering big data mining, basic methodologies for mining data streams, and a simple example of MOA. More detailed discussions follow, with chapters on sketching techniques, change, classification, ensemble methods, regression, clustering, and frequent pattern mining. Most of these chapters include exercises, an MOA-based lab session, or both. Finally, the book

discusses the MOA software, covering the MOA graphical user interface, the command line, use of its API, and the development of new methods within MOA. The book will be an essential reference for readers who want to use data stream mining as a tool, researchers in innovation or data stream mining, and programmers who want to create new algorithms for MOA.

Deep Learning Illustrated -

Jon Krohn 2019-08-05

"The authors' clear visual style provides a comprehensive look at what's currently possible with artificial neural networks as well as a glimpse of the magic that's to come." -Tim Urban, author of Wait But Why Fully Practical, Insightful Guide to Modern Deep Learning Deep learning is transforming software, facilitating powerful new artificial intelligence capabilities, and driving unprecedented algorithm performance. Deep Learning Illustrated is uniquely intuitive and offers a complete

introduction to the discipline's techniques. Packed with full-color figures and easy-to-follow code, it sweeps away the complexity of building deep learning models, making the subject approachable and fun to learn. World-class instructor and practitioner Jon Krohn-with visionary content from Grant Beyleveld and beautiful illustrations by Aglaé Bassens-presents straightforward analogies to explain what deep learning is, why it has become so popular, and how it relates to other machine learning approaches. Krohn has created a practical reference and tutorial for developers, data scientists, researchers, analysts, and students who want to start applying it. He illuminates theory with hands-on Python code in accompanying Jupyter notebooks. To help you progress quickly, he focuses on the versatile deep learning library Keras to nimbly construct efficient TensorFlow models; PyTorch, the leading alternative library, is also covered. You'll gain a

pragmatic understanding of all major deep learning approaches and their uses in applications ranging from machine vision and natural language processing to image generation and game-playing algorithms. Discover what makes deep learning systems unique, and the implications for practitioners Explore new tools that make deep learning models easier to build, use, and improve Master essential theory: artificial neurons, training, optimization, convolutional nets, recurrent nets, generative adversarial networks (GANs), deep reinforcement learning, and more Walk through building interactive deep learning applications, and move forward with your own artificial intelligence projects Register your book for convenient access to downloads, updates, and/or corrections as they become available. See inside book for details.

Art in the Age of Machine Learning - Sofian Audry

2021-11-23

An examination of machine

learning art and its practice in new media art and music. Over the past decade, an artistic movement has emerged that draws on machine learning as both inspiration and medium. In this book, transdisciplinary artist-researcher Sofian Audry examines artistic practices at the intersection of machine learning and new media art, providing conceptual tools and historical perspectives for new media artists, musicians, composers, writers, curators, and theorists. Audry looks at works from a broad range of practices, including new media installation, robotic art, visual art, electronic music and sound, and electronic literature, connecting machine learning art to such earlier artistic practices as cybernetics art, artificial life art, and evolutionary art. Machine learning underlies computational systems that are biologically inspired, statistically driven, agent-based networked entities that program themselves. Audry explains the fundamental design of machine learning

algorithmic structures in terms accessible to the nonspecialist while framing these technologies within larger historical and conceptual spaces. Audry debunks myths about machine learning art, including the ideas that machine learning can create art without artists and that machine learning will soon bring about superhuman intelligence and creativity. Audry considers learning procedures, describing how artists hijack the training process by playing with evaluative functions; discusses trainable machines and models, explaining how different types of machine learning systems enable different kinds of artistic practices; and reviews the role of data in machine learning art, showing how artists use data as a raw material to steer learning systems and arguing that machine learning allows for novel forms of algorithmic remixes.

[Introduction to Machine Learning, fourth edition](#) -
Ethem Alpaydin 2020-03-24

A substantially revised fourth edition of a comprehensive textbook, including new coverage of recent advances in deep learning and neural networks. The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Machine learning underlies such exciting new technologies as self-driving cars, speech recognition, and translation applications. This substantially revised fourth edition of a comprehensive, widely used machine learning textbook offers new coverage of recent advances in the field in both theory and practice, including developments in deep learning and neural networks. The book covers a broad array of topics not usually included in introductory machine learning texts, including supervised learning, Bayesian decision theory, parametric methods, semiparametric methods, nonparametric methods, multivariate analysis, hidden Markov models, reinforcement learning, kernel machines,

graphical models, Bayesian estimation, and statistical testing. The fourth edition offers a new chapter on deep learning that discusses training, regularizing, and structuring deep neural networks such as convolutional and generative adversarial networks; new material in the chapter on reinforcement learning that covers the use of deep networks, the policy gradient methods, and deep reinforcement learning; new material in the chapter on multilayer perceptrons on autoencoders and the word2vec network; and discussion of a popular method of dimensionality reduction, t-SNE. New appendixes offer background material on linear algebra and optimization. End-of-chapter exercises help readers to apply concepts learned. Introduction to Machine Learning can be used in courses for advanced undergraduate and graduate students and as a reference for professionals.

Neural Networks and Deep Learning - Charu C. Aggarwal

2018-08-25

This book covers both classical and modern models in deep learning. The primary focus is on the theory and algorithms of deep learning. The theory and algorithms of neural networks are particularly important for understanding important concepts, so that one can understand the important design concepts of neural architectures in different applications. Why do neural networks work? When do they work better than off-the-shelf machine-learning models? When is depth useful? Why is training neural networks so hard? What are the pitfalls? The book is also rich in discussing different applications in order to give the practitioner a flavor of how neural architectures are designed for different types of problems. Applications associated with many different areas like recommender systems, machine translation, image captioning, image classification, reinforcement-learning based gaming, and text analytics are covered. The

chapters of this book span three categories: The basics of neural networks: Many traditional machine learning models can be understood as special cases of neural networks. An emphasis is placed in the first two chapters on understanding the relationship between traditional machine learning and neural networks. Support vector machines, linear/logistic regression, singular value decomposition, matrix factorization, and recommender systems are shown to be special cases of neural networks. These methods are studied together with recent feature engineering methods like word2vec. Fundamentals of neural networks: A detailed discussion of training and regularization is provided in Chapters 3 and 4. Chapters 5 and 6 present radial-basis function (RBF) networks and restricted Boltzmann machines. Advanced topics in neural networks: Chapters 7 and 8 discuss recurrent neural networks and convolutional

neural networks. Several advanced topics like deep reinforcement learning, neural Turing machines, Kohonen self-organizing maps, and generative adversarial networks are introduced in Chapters 9 and 10. The book is written for graduate students, researchers, and practitioners. Numerous exercises are available along with a solution manual to aid in classroom teaching. Where possible, an application-centric view is highlighted in order to provide an understanding of the practical uses of each class of techniques.

Reinforcement Learning, second edition - Richard S. Sutton 2018-11-13

The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational approach to learning whereby an agent tries to maximize the total

amount of reward it receives while interacting with a complex, uncertain environment. In Reinforcement Learning, Richard Sutton and Andrew Barto provide a clear and simple account of the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms, with the more mathematical material set off in shaded boxes. Part I covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-

policy learning and policy-gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing, and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.

Dive Into Deep Learning -

Joanne Quinn 2019-07-15

The leading experts in system change and learning, with their school-based partners around the world, have created this essential companion to their runaway best-seller, Deep Learning: Engage the World Change the World. This hands-on guide provides a roadmap for building capacity in teachers, schools, districts, and systems to design deep learning, measure progress, and assess conditions needed to activate and sustain innovation. Dive Into Deep Learning: Tools for Engagement is rich with resources educators need to

construct and drive meaningful deep learning experiences in order to develop the kind of mindset and know-how that is crucial to becoming a problem-solving change agent in our global society. Designed in full color, this easy-to-use guide is loaded with tools, tips, protocols, and real-world examples. It includes:

- A framework for deep learning that provides a pathway to develop the six global competencies needed to flourish in a complex world — character, citizenship, collaboration, communication, creativity, and critical thinking.
- Learning progressions to help educators analyze student work and measure progress.
- Learning design rubrics, templates and examples for incorporating the four elements of learning design: learning partnerships, pedagogical practices, learning environments, and leveraging digital.
- Conditions rubrics, teacher self-assessment tools, and planning guides to help educators build, mobilize, and sustain deep learning in

schools and districts. Learn about, improve, and expand your world of learning. Put the joy back into learning for students and adults alike. Dive into deep learning to create learning experiences that give purpose, unleash student potential, and transform not only learning, but life itself.

Introduction to Machine Learning, fourth edition -

Ethem Alpaydin 2020-03-24

A substantially revised fourth edition of a comprehensive textbook, including new coverage of recent advances in deep learning and neural networks. The goal of machine learning is to program computers to use example data or past experience to solve a given problem. Machine learning underlies such exciting new technologies as self-driving cars, speech recognition, and translation applications. This substantially revised fourth edition of a comprehensive, widely used machine learning textbook offers new coverage of recent advances in the field in both theory and practice, including

developments in deep learning and neural networks. The book covers a broad array of topics not usually included in introductory machine learning texts, including supervised learning, Bayesian decision theory, parametric methods, semiparametric methods, nonparametric methods, multivariate analysis, hidden Markov models, reinforcement learning, kernel machines, graphical models, Bayesian estimation, and statistical testing. The fourth edition offers a new chapter on deep learning that discusses training, regularizing, and structuring deep neural networks such as convolutional and generative adversarial networks; new material in the chapter on reinforcement learning that covers the use of deep networks, the policy gradient methods, and deep reinforcement learning; new material in the chapter on multilayer perceptrons on autoencoders and the word2vec network; and discussion of a popular method of dimensionality reduction, t-

SNE. New appendixes offer background material on linear algebra and optimization. End-of-chapter exercises help readers to apply concepts learned. Introduction to Machine Learning can be used in courses for advanced undergraduate and graduate students and as a reference for professionals.

Learning with Kernels -

Bernhard Scholkopf

2018-06-05

A comprehensive introduction to Support Vector Machines and related kernel methods. In the 1990s, a new type of learning algorithm was developed, based on results from statistical learning theory: the Support Vector Machine (SVM). This gave rise to a new class of theoretically elegant learning machines that use a central concept of SVMs—kernels—for a number of learning tasks. Kernel machines provide a modular framework that can be adapted to different tasks and domains by the choice of the kernel function and the base algorithm. They are replacing

neural networks in a variety of fields, including engineering, information retrieval, and bioinformatics. Learning with Kernels provides an introduction to SVMs and related kernel methods.

Although the book begins with the basics, it also includes the latest research. It provides all of the concepts necessary to enable a reader equipped with some basic mathematical knowledge to enter the world of machine learning using theoretically well-founded yet easy-to-use kernel algorithms and to understand and apply the powerful algorithms that have been developed over the last few years.

Deep Learning - Josh

Patterson 2017-07-28

Although interest in machine learning has reached a high point, lofty expectations often scuttle projects before they get very far. How can machine learning—especially deep neural networks—make a real difference in your organization? This hands-on guide not only provides the most practical information

available on the subject, but also helps you get started building efficient deep learning networks. Authors Adam Gibson and Josh Patterson provide theory on deep learning before introducing their open-source

Deeplearning4j (DL4J) library for developing production-class workflows. Through real-world examples, you'll learn methods and strategies for training deep network architectures and running deep learning workflows on Spark and Hadoop with DL4J. Dive into machine learning concepts in general, as well as deep learning in particular. Understand how deep networks evolved from neural network fundamentals. Explore the major deep network architectures, including Convolutional and Recurrent. Learn how to map specific deep networks to the right problem. Walk through the fundamentals of tuning general neural networks and specific deep network architectures. Use vectorization techniques for different data types with

DataVec, DL4J's workflow tool
Learn how to use DL4J natively
on Spark and Hadoop

Knowledge Graphs - Mayank
Kejriwal 2021-03-30

A rigorous and comprehensive textbook covering the major approaches to knowledge graphs, an active and interdisciplinary area within artificial intelligence. The field of knowledge graphs, which allows us to model, process, and derive insights from complex real-world data, has emerged as an active and interdisciplinary area of artificial intelligence over the last decade, drawing on such fields as natural language processing, data mining, and the semantic web. Current projects involve predicting cyberattacks, recommending products, and even gleaning insights from thousands of papers on COVID-19. This textbook offers rigorous and comprehensive coverage of the field. It focuses systematically on the major approaches, both those that have stood the test of time and the latest deep learning methods.

Deep Learning on Graphs -
Yao Ma 2021-09-23

A comprehensive text on foundations and techniques of graph neural networks with applications in NLP, data mining, vision and healthcare.

Applied Deep Learning -
Umberto Michelucci
2018-09-07

Work with advanced topics in deep learning, such as optimization algorithms, hyperparameter tuning, dropout, and error analysis as well as strategies to address typical problems encountered when training deep neural networks. You'll begin by studying the activation functions mostly with a single neuron (ReLU, sigmoid, and Swish), seeing how to perform linear and logistic regression using TensorFlow, and choosing the right cost function. The next section talks about more complicated neural network architectures with several layers and neurons and explores the problem of random initialization of weights. An entire chapter is dedicated to a complete

overview of neural network error analysis, giving examples of solving problems originating from variance, bias, overfitting, and datasets coming from different distributions. Applied Deep Learning also discusses how to implement logistic regression completely from scratch without using any Python library except NumPy, to let you appreciate how libraries such as TensorFlow allow quick and efficient experiments. Case studies for each method are included to put into practice all theoretical information. You'll discover tips and tricks for writing optimized Python code (for

example vectorizing loops with NumPy). What You Will Learn Implement advanced techniques in the right way in Python and TensorFlow Debug and optimize advanced methods (such as dropout and regularization) Carry out error analysis (to realize if one has a bias problem, a variance problem, a data offset problem, and so on) Set up a machine learning project focused on deep learning on a complex dataset Who This Book Is For Readers with a medium understanding of machine learning, linear algebra, calculus, and basic Python programming.