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[Pro Machine Learning Algorithms](#) - V Kishore Ayyadevara 2018-06-30
Bridge the gap between a high-level understanding of how an algorithm works and knowing the nuts and bolts to tune your models better. This book will give you the confidence and skills when developing all the major machine learning models. In Pro Machine Learning Algorithms, you will first develop the algorithm in Excel so that you get a practical understanding of all the levers that can be tuned in a model, before implementing the models in Python/R. You will cover all the major algorithms: supervised and unsupervised learning, which include linear/logistic regression; k-means clustering; PCA; recommender system; decision tree; random forest; GBM; and neural networks. You will also be exposed to the latest in deep learning through CNNs, RNNs, and word2vec for text mining. You will be learning not only the algorithms, but also the concepts of feature engineering to maximize the performance of a model. You will see the theory along with case studies, such as sentiment classification, fraud detection, recommender systems, and image recognition, so that you get the best of both theory and practice for the vast majority of the machine learning algorithms used in industry. Along with learning the algorithms, you will also be exposed to running machine-learning models on all the major cloud service providers. You are expected to have minimal knowledge of

statistics/software programming and by the end of this book you should be able to work on a machine learning project with confidence. What You Will Learn Get an in-depth understanding of all the major machine learning and deep learning algorithms Fully appreciate the pitfalls to avoid while building models Implement machine learning algorithms in the cloud Follow a hands-on approach through case studies for each algorithm Gain the tricks of ensemble learning to build more accurate models Discover the basics of programming in R/Python and the Keras framework for deep learning Who This Book Is For Business analysts/ IT professionals who want to transition into data science roles. Data scientists who want to solidify their knowledge in machine learning.

The Python Workbook - Ben Stephenson 2019-07-05

This student-friendly textbook encourages the development of programming skills through active practice by focusing on exercises that support hands-on learning. The Python Workbook provides a compendium of 186 exercises, spanning a variety of academic disciplines and everyday situations. Solutions to selected exercises are also provided, supported by brief annotations that explain the technique used to solve the problem, or highlight a specific point of Python syntax. This enhanced new edition has been thoroughly updated and expanded with additional exercises, along with concise introductions that outline the

core concepts needed to solve them. The exercises and solutions require no prior background knowledge, beyond the material covered in a typical introductory Python programming course. Features: uses an accessible writing style and easy-to-follow structure; includes a mixture of classic exercises from the fields of computer science and mathematics, along with exercises that connect to other academic disciplines; presents the solutions to approximately half of the exercises; provides annotations alongside the solutions, which explain the approach taken to solve the problem and relevant aspects of Python syntax; offers a variety of exercises of different lengths and difficulties; contains exercises that encourage the development of programming skills using if statements, loops, basic functions, lists, dictionaries, files, and recursive functions. Undergraduate students enrolled in their first programming course and wishing to enhance their programming abilities will find the exercises and solutions provided in this book to be ideal for their needs.

Multiple Criteria Decision Aid - Jason Papathanasiou 2018-09-19
Multiple criteria decision aid (MCDA) methods are illustrated in this book through theoretical and computational techniques utilizing Python. Existing methods are presented in detail with a step by step learning approach. Theoretical background is given for TOPSIS, VIKOR, PROMETHEE, SIR, AHP, goal programming, and their variations. Comprehensive numerical examples are also discussed for each method in conjunction with easy to follow Python code. Extensions to multiple criteria decision making algorithms such as fuzzy number theory and group decision making are introduced and implemented through Python as well. Readers will learn how to implement and use each method based on the problem, the available data, the stakeholders involved, and the various requirements needed. Focusing on the practical aspects of the multiple criteria decision making methodologies, this book is designed for researchers, practitioners and advanced graduate students in the applied mathematics, information systems, operations research and business administration disciplines, as well as other engineers and scientists oriented in interdisciplinary research. Readers will greatly benefit from this book by learning and applying various MCDM/A

methods. (Adiel Teixeira de Almeida, CDSID-Center for Decision System and Information Development, Universidade Federal de Pernambuco, Recife, Brazil) Promoting the development and application of multicriteria decision aid is essential to ensure more ethical and sustainable decisions. This book is a great contribution to this objective. It is a perfect blend of theory and practice, providing potential users and researchers with the theoretical bases of some of the best-known methods as well as with the computing tools needed to practice, to compare and to put these methods to use. (Jean-Pierre Brans, Vrije Universiteit Brussel, Brussels, Belgium) This book is intended for researchers, practitioners and students alike in decision support who wish to familiarize themselves quickly and efficiently with multicriteria decision aiding algorithms. The proposed approach is original, as it presents a selection of methods from the theory to the practical implementation in Python, including a detailed example. This will certainly facilitate the learning of these techniques, and contribute to their effective dissemination in applications. (Patrick Meyer, IMT Atlantique, Lab-STICC, Univ. Bretagne Loire, Brest, France)
Introduction to Scientific Programming with Python - Joakim Sundnes 2020

This open access book offers an initial introduction to programming for scientific and computational applications using the Python programming language. The presentation style is compact and example-based, making it suitable for students and researchers with little or no prior experience in programming. The book uses relevant examples from mathematics and the natural sciences to present programming as a practical toolbox that can quickly enable readers to write their own programs for data processing and mathematical modeling. These tools include file reading, plotting, simple text analysis, and using NumPy for numerical computations, which are fundamental building blocks of all programs in data science and computational science. At the same time, readers are introduced to the fundamental concepts of programming, including variables, functions, loops, classes, and object-oriented programming. Accordingly, the book provides a sound basis for further computer

science and programming studies.

Data Science Fundamentals for Python and MongoDB - David Paper
2018-05-10

Build the foundational data science skills necessary to work with and better understand complex data science algorithms. This example-driven book provides complete Python coding examples to complement and clarify data science concepts, and enrich the learning experience. Coding examples include visualizations whenever appropriate. The book is a necessary precursor to applying and implementing machine learning algorithms. The book is self-contained. All of the math, statistics, stochastic, and programming skills required to master the content are covered. In-depth knowledge of object-oriented programming isn't required because complete examples are provided and explained. Data Science Fundamentals with Python and MongoDB is an excellent starting point for those interested in pursuing a career in data science. Like any science, the fundamentals of data science are a prerequisite to competency. Without proficiency in mathematics, statistics, data manipulation, and coding, the path to success is "rocky" at best. The coding examples in this book are concise, accurate, and complete, and perfectly complement the data science concepts introduced. What You'll Learn Prepare for a career in data science Work with complex data structures in Python Simulate with Monte Carlo and Stochastic algorithms Apply linear algebra using vectors and matrices Utilize complex algorithms such as gradient descent and principal component analysis Wrangle, cleanse, visualize, and problem solve with data Use MongoDB and JSON to work with data Who This Book Is For The novice yearning to break into the data science world, and the enthusiast looking to enrich, deepen, and develop data science skills through mastering the underlying fundamentals that are sometimes skipped over in the rush to be productive. Some knowledge of object-oriented programming will make learning easier.

Pyomo - Optimization Modeling in Python - William E. Hart
2012-02-15

This book provides a complete and comprehensive reference/guide to

Pyomo (Python Optimization Modeling Objects) for both beginning and advanced modelers, including students at the undergraduate and graduate levels, academic researchers, and practitioners. The text illustrates the breadth of the modeling and analysis capabilities that are supported by the software and support of complex real-world applications. Pyomo is an open source software package for formulating and solving large-scale optimization and operations research problems. The text begins with a tutorial on simple linear and integer programming models. A detailed reference of Pyomo's modeling components is illustrated with extensive examples, including a discussion of how to load data from data sources like spreadsheets and databases. Chapters describing advanced modeling capabilities for nonlinear and stochastic optimization are also included. The Pyomo software provides familiar modeling features within Python, a powerful dynamic programming language that has a very clear, readable syntax and intuitive object orientation. Pyomo includes Python classes for defining sparse sets, parameters, and variables, which can be used to formulate algebraic expressions that define objectives and constraints. Moreover, Pyomo can be used from a command-line interface and within Python's interactive command environment, which makes it easy to create Pyomo models, apply a variety of optimizers, and examine solutions. The software supports a different modeling approach than commercial AML (Algebraic Modeling Languages) tools, and is designed for flexibility, extensibility, portability, and maintainability but also maintains the central ideas in modern AMLs.

Spectral Methods - Jie Shen 2011-08-25

Along with finite differences and finite elements, spectral methods are one of the three main methodologies for solving partial differential equations on computers. This book provides a detailed presentation of basic spectral algorithms, as well as a systematical presentation of basic convergence theory and error analysis for spectral methods. Readers of this book will be exposed to a unified framework for designing and analyzing spectral algorithms for a variety of problems, including in particular high-order differential equations and problems in unbounded

domains. The book contains a large number of figures which are designed to illustrate various concepts stressed in the book. A set of basic matlab codes has been made available online to help the readers to develop their own spectral codes for their specific applications.

[Python Recipes Handbook](#) - Joey Bernard 2016-11-08

Learn the code to write algorithms, numerical computations, data analysis and much more using the Python language: look up and re-use the recipes for your own Python coding. This book is your handy code cookbook reference. Whether you're a maker, game developer, cloud computing programmer and more, this is a must-have reference for your library. Python Recipes Handbook gives you the most common and contemporary code snippets, using pandas (Python Data Analysis Library), NumPy, and other numerical Python packages. What You'll Learn Code with the pandas (Python Data Analysis Library) Work with the various Python algorithms useful for today's big data analytics and cloud applications Use NumPy and other numerical Python packages and code for doing various kinds of analysis Discover Python's new popular modules, packages, extensions and templates library Who This Book Is For This handy reference is for those with some experience with Python.

Programming with Python - T R Padmanabhan 2017-01-13

Based on the latest version of the language, this book offers a self-contained, concise and coherent introduction to programming with Python. The book's primary focus is on realistic case study applications of Python. Each practical example is accompanied by a brief explanation of the problem-terminology and concepts, followed by necessary program development in Python using its constructs, and simulated testing. Given the open and participatory nature of development, Python has a variety of incorporated data structures, which has made it difficult to present it in a coherent manner. Further, some advanced concepts (super, yield, generator, decorator, etc.) are not easy to explain. The book specially addresses these challenges; starting with a minimal subset of the core, it offers users a step-by-step guide to achieving proficiency.

Python Programming Fundamentals - Kent D. Lee 2015-01-07

This easy-to-follow and classroom-tested textbook guides the reader

through the fundamentals of programming with Python, an accessible language which can be learned incrementally. Features: includes numerous examples and practice exercises throughout the text, with additional exercises, solutions and review questions at the end of each chapter; highlights the patterns which frequently appear when writing programs, reinforcing the application of these patterns for problem-solving through practice exercises; introduces the use of a debugger tool to inspect a program, enabling students to discover for themselves how programs work and enhance their understanding; presents the Tkinter framework for building graphical user interface applications and event-driven programs; provides instructional videos and additional information for students, as well as support materials for instructors, at an associated website.

Python Programming Fundamentals - Kent D. Lee 2015-01-20

This easy-to-follow and classroom-tested textbook guides the reader through the fundamentals of programming with Python, an accessible language which can be learned incrementally. Features: includes numerous examples and practice exercises throughout the text, with additional exercises, solutions and review questions at the end of each chapter; highlights the patterns which frequently appear when writing programs, reinforcing the application of these patterns for problem-solving through practice exercises; introduces the use of a debugger tool to inspect a program, enabling students to discover for themselves how programs work and enhance their understanding; presents the Tkinter framework for building graphical user interface applications and event-driven programs; provides instructional videos and additional information for students, as well as support materials for instructors, at an associated website.

Applied Reinforcement Learning with Python - Taweh Beysolow II 2019-08-23

Delve into the world of reinforcement learning algorithms and apply them to different use-cases via Python. This book covers important topics such as policy gradients and Q learning, and utilizes frameworks such as Tensorflow, Keras, and OpenAI Gym. Applied Reinforcement Learning

with Python introduces you to the theory behind reinforcement learning (RL) algorithms and the code that will be used to implement them. You will take a guided tour through features of OpenAI Gym, from utilizing standard libraries to creating your own environments, then discover how to frame reinforcement learning problems so you can research, develop, and deploy RL-based solutions. What You'll Learn Implement reinforcement learning with Python Work with AI frameworks such as OpenAI Gym, Tensorflow, and KerasDeploy and train reinforcement learning-based solutions via cloud resourcesApply practical applications of reinforcement learning Who This Book Is For Data scientists, machine learning engineers and software engineers familiar with machine learning and deep learning concepts.

Multicriteria Portfolio Construction with Python - Elissaios Sarmas
2020-10-17

This book covers topics in portfolio management and multicriteria decision analysis (MCDA), presenting a transparent and unified methodology for the portfolio construction process. The most important feature of the book includes the proposed methodological framework that integrates two individual subsystems, the portfolio selection subsystem and the portfolio optimization subsystem. An additional highlight of the book includes the detailed, step-by-step implementation of the proposed multicriteria algorithms in Python. The implementation is presented in detail; each step is elaborately described, from the input of the data to the extraction of the results. Algorithms are organized into small cells of code, accompanied by targeted remarks and comments, in order to help the reader to fully understand their mechanics. Readers are provided with a link to access the source code through GitHub. This Work may also be considered as a reference which presents the state-of-art research on portfolio construction with multiple and complex investment objectives and constraints. The book consists of eight chapters. A brief introduction is provided in Chapter 1. The fundamental issues of modern portfolio theory are discussed in Chapter 2. In Chapter 3, the various multicriteria decision aid methods, either discrete or continuous, are concisely described. In Chapter 4, a comprehensive

review of the published literature in the field of multicriteria portfolio management is considered. In Chapter 5, an integrated and original multicriteria portfolio construction methodology is developed. Chapter 6 presents the web-based information system, in which the suggested methodological framework has been implemented. In Chapter 7, the experimental application of the proposed methodology is discussed and in Chapter 8, the authors provide overall conclusions. The readership of the book aims to be a diverse group, including fund managers, risk managers, investment advisors, bankers, private investors, analytics scientists, operations researchers scientists, and computer engineers, to name just several. Portions of the book may be used as instructional for either advanced undergraduate or post-graduate courses in investment analysis, portfolio engineering, decision science, computer science, or financial engineering.

Algorithms on Trees and Graphs - Gabriel Valiente 2021-10-11

Graph algorithms is a well-established subject in mathematics and computer science. Beyond classical application fields, such as approximation, combinatorial optimization, graphics, and operations research, graph algorithms have recently attracted increased attention from computational molecular biology and computational chemistry. Centered around the fundamental issue of graph isomorphism, this text goes beyond classical graph problems of shortest paths, spanning trees, flows in networks, and matchings in bipartite graphs. Advanced algorithmic results and techniques of practical relevance are presented in a coherent and consolidated way. This book introduces graph algorithms on an intuitive basis followed by a detailed exposition in a literate programming style, with correctness proofs as well as worst-case analyses. Furthermore, full C++ implementations of all algorithms presented are given using the LEDA library of efficient data structures and algorithms.

Supervised Learning with Python - Vaibhav Verdhan 2020-10-08

Gain a thorough understanding of supervised learning algorithms by developing use cases with Python. You will study supervised learning concepts, Python code, datasets, best practices, resolution of common

issues and pitfalls, and practical knowledge of implementing algorithms for structured as well as text and images datasets. You'll start with an introduction to machine learning, highlighting the differences between supervised, semi-supervised and unsupervised learning. In the following chapters you'll study regression and classification problems, mathematics behind them, algorithms like Linear Regression, Logistic Regression, Decision Tree, KNN, Naïve Bayes, and advanced algorithms like Random Forest, SVM, Gradient Boosting and Neural Networks. Python implementation is provided for all the algorithms. You'll conclude with an end-to-end model development process including deployment and maintenance of the model. After reading Supervised Learning with Python you'll have a broad understanding of supervised learning and its practical implementation, and be able to run the code and extend it in an innovative manner. What You'll Learn Review the fundamental building blocks and concepts of supervised learning using Python Develop supervised learning solutions for structured data as well as text and images Solve issues around overfitting, feature engineering, data cleansing, and cross-validation for building best fit models Understand the end-to-end model cycle from business problem definition to model deployment and model maintenance Avoid the common pitfalls and adhere to best practices while creating a supervised learning model using Python Who This Book Is For Data scientists or data analysts interested in best practices and standards for supervised learning, and using classification algorithms and regression techniques to develop predictive models.

Introduction to Computation and Programming Using Python, second edition - John V. Guttag 2016-08-12

The new edition of an introductory text that teaches students the art of computational problem solving, covering topics ranging from simple algorithms to information visualization. This book introduces students with little or no prior programming experience to the art of computational problem solving using Python and various Python libraries, including PyLab. It provides students with skills that will enable them to make productive use of computational techniques, including

some of the tools and techniques of data science for using computation to model and interpret data. The book is based on an MIT course (which became the most popular course offered through MIT's OpenCourseWare) and was developed for use not only in a conventional classroom but in in a massive open online course (MOOC). This new edition has been updated for Python 3, reorganized to make it easier to use for courses that cover only a subset of the material, and offers additional material including five new chapters. Students are introduced to Python and the basics of programming in the context of such computational concepts and techniques as exhaustive enumeration, bisection search, and efficient approximation algorithms. Although it covers such traditional topics as computational complexity and simple algorithms, the book focuses on a wide range of topics not found in most introductory texts, including information visualization, simulations to model randomness, computational techniques to understand data, and statistical techniques that inform (and misinform) as well as two related but relatively advanced topics: optimization problems and dynamic programming. This edition offers expanded material on statistics and machine learning and new chapters on Frequentist and Bayesian statistics.

Algebraic Graph Algorithms - K. Erciyes 2021-12-19

This textbook discusses the design and implementation of basic algebraic graph algorithms, and algebraic graph algorithms for complex networks, employing matroids whenever possible. The text describes the design of a simple parallel matrix algorithm kernel that can be used for parallel processing of algebraic graph algorithms. Example code is presented in pseudocode, together with case studies in Python and MPI. The text assumes readers have a background in graph theory and/or graph algorithms.

Beginning Python - Magnus Lie Hetland 2006-11-07

* Totaling 900 pages and covering all of the topics important to new and intermediate users, Beginning Python is intended to be the most comprehensive book on the Python ever written. * The 15 sample projects in Beginning Python are attractive to novice programmers

interested in learning by creating applications of timely interest, such as a P2P file-sharing application, Web-based bulletin-board, and an arcade game similar to the classic Space Invaders. * The author Magnus Lie Hetland, PhD, is author of Apress' well-received 2002 title, Practical Python, ISBN: 1-59059-006-6. He's also author of the popular online guide, Instant Python Hacking (<http://www.hetland.org>), from which both Practical Python and Beginning Python are based.

Quantum Machine Learning With Python - Santanu Pattanayak
2021-03-29

Quickly scale up to Quantum computing and Quantum machine learning foundations and related mathematics and expose them to different use cases that can be solved through Quantum based algorithms. This book explains Quantum Computing, which leverages the Quantum mechanical properties sub-atomic particles. It also examines Quantum machine learning, which can help solve some of the most challenging problems in forecasting, financial modeling, genomics, cybersecurity, supply chain logistics, cryptography among others. You'll start by reviewing the fundamental concepts of Quantum Computing, such as Dirac Notations, Qubits, and Bell state, followed by postulates and mathematical foundations of Quantum Computing. Once the foundation base is set, you'll delve deep into Quantum based algorithms including Quantum Fourier transform, phase estimation, and HHL (Harrow-Hassidim-Lloyd) among others. You'll then be introduced to Quantum machine learning and Quantum deep learning-based algorithms, along with advanced topics of Quantum adiabatic processes and Quantum based optimization. Throughout the book, there are Python implementations of different Quantum machine learning and Quantum computing algorithms using the Qiskit toolkit from IBM and Cirq from Google Research. What You'll Learn Understand Quantum computing and Quantum machine learning Explore varied domains and the scenarios where Quantum machine learning solutions can be applied Develop expertise in algorithm development in varied Quantum computing frameworks Review the major challenges of building large scale Quantum computers and applying its various techniques Who This Book Is For Machine Learning

enthusiasts and engineers who want to quickly scale up to Quantum Machine Learning

Computational Frameworks for Political and Social Research with Python - Josh Cutler 2021-04-23

This book is intended to serve as the basis for a first course in Python programming for graduate students in political science and related fields. The book introduces core concepts of software development and computer science such as basic data structures (e.g. arrays, lists, dictionaries, trees, graphs), algorithms (e.g. sorting), and analysis of computational efficiency. It then demonstrates how to apply these concepts to the field of political science by working with structured and unstructured data, querying databases, and interacting with application programming interfaces (APIs). Students will learn how to collect, manipulate, and exploit large volumes of available data and apply them to political and social research questions. They will also learn best practices from the field of software development such as version control and object-oriented programming. Instructors will be supplied with in-class example code, suggested homework assignments (with solutions), and material for practical lab sessions.

Text Analytics with Python - Dipanjan Sarkar 2019-05-21

Leverage Natural Language Processing (NLP) in Python and learn how to set up your own robust environment for performing text analytics. This second edition has gone through a major revamp and introduces several significant changes and new topics based on the recent trends in NLP. You'll see how to use the latest state-of-the-art frameworks in NLP, coupled with machine learning and deep learning models for supervised sentiment analysis powered by Python to solve actual case studies. Start by reviewing Python for NLP fundamentals on strings and text data and move on to engineering representation methods for text data, including both traditional statistical models and newer deep learning-based embedding models. Improved techniques and new methods around parsing and processing text are discussed as well. Text summarization and topic models have been overhauled so the book showcases how to build, tune, and interpret topic models in the context of an interest

dataset on NIPS conference papers. Additionally, the book covers text similarity techniques with a real-world example of movie recommenders, along with sentiment analysis using supervised and unsupervised techniques. There is also a chapter dedicated to semantic analysis where you'll see how to build your own named entity recognition (NER) system from scratch. While the overall structure of the book remains the same, the entire code base, modules, and chapters has been updated to the latest Python 3.x release.

- Understand NLP and text syntax, semantics and structure
- Discover text cleaning and feature engineering
- Review text classification and text clustering
- Assess text summarization and topic models
- Study deep learning for NLP

Who This Book Is For IT professionals, data analysts, developers, linguistic experts, data scientists and engineers and basically anyone with a keen interest in linguistics, analytics and generating insights from textual data.

[Introduction to Data Science](#) - Laura Igual 2017-02-22

This accessible and classroom-tested textbook/reference presents an introduction to the fundamentals of the emerging and interdisciplinary field of data science. The coverage spans key concepts adopted from statistics and machine learning, useful techniques for graph analysis and parallel programming, and the practical application of data science for such tasks as building recommender systems or performing sentiment analysis. Topics and features: provides numerous practical case studies using real-world data throughout the book; supports understanding through hands-on experience of solving data science problems using Python; describes techniques and tools for statistical analysis, machine learning, graph analysis, and parallel programming; reviews a range of applications of data science, including recommender systems and sentiment analysis of text data; provides supplementary code resources and data at an associated website.

[Practical Machine Learning with Python](#) - Dipanjan Sarkar 2017-12-20

Master the essential skills needed to recognize and solve complex problems with machine learning and deep learning. Using real-world examples that leverage the popular Python machine learning ecosystem, this book is your perfect companion for learning the art and science of

machine learning to become a successful practitioner. The concepts, techniques, tools, frameworks, and methodologies used in this book will teach you how to think, design, build, and execute machine learning systems and projects successfully. Practical Machine Learning with Python follows a structured and comprehensive three-tiered approach packed with hands-on examples and code. Part 1 focuses on understanding machine learning concepts and tools. This includes machine learning basics with a broad overview of algorithms, techniques, concepts and applications, followed by a tour of the entire Python machine learning ecosystem. Brief guides for useful machine learning tools, libraries and frameworks are also covered. Part 2 details standard machine learning pipelines, with an emphasis on data processing analysis, feature engineering, and modeling. You will learn how to process, wrangle, summarize and visualize data in its various forms. Feature engineering and selection methodologies will be covered in detail with real-world datasets followed by model building, tuning, interpretation and deployment. Part 3 explores multiple real-world case studies spanning diverse domains and industries like retail, transportation, movies, music, marketing, computer vision and finance. For each case study, you will learn the application of various machine learning techniques and methods. The hands-on examples will help you become familiar with state-of-the-art machine learning tools and techniques and understand what algorithms are best suited for any problem. Practical Machine Learning with Python will empower you to start solving your own problems with machine learning today! What You'll Learn Execute end-to-end machine learning projects and systems Implement hands-on examples with industry standard, open source, robust machine learning tools and frameworks Review case studies depicting applications of machine learning and deep learning on diverse domains and industries Apply a wide range of machine learning models including regression, classification, and clustering. Understand and apply the latest models and methodologies from deep learning including CNNs, RNNs, LSTMs and transfer learning. Who This Book Is For IT professionals, analysts, developers, data scientists, engineers, graduate

students

Practical Mathematical Optimization - Jan A Snyman 2018-05-02

This book presents basic optimization principles and gradient-based algorithms to a general audience, in a brief and easy-to-read form. It enables professionals to apply optimization theory to engineering, physics, chemistry, or business economics.

Hands-on Scikit-Learn for Machine Learning Applications - David Paper 2019-11-16

Aspiring data science professionals can learn the Scikit-Learn library along with the fundamentals of machine learning with this book. The book combines the Anaconda Python distribution with the popular Scikit-Learn library to demonstrate a wide range of supervised and unsupervised machine learning algorithms. Care is taken to walk you through the principles of machine learning through clear examples written in Python that you can try out and experiment with at home on your own machine. All applied math and programming skills required to master the content are covered in this book. In-depth knowledge of object-oriented programming is not required as working and complete examples are provided and explained. Coding examples are in-depth and complex when necessary. They are also concise, accurate, and complete, and complement the machine learning concepts introduced. Working the examples helps to build the skills necessary to understand and apply complex machine learning algorithms. Hands-on Scikit-Learn for Machine Learning Applications is an excellent starting point for those pursuing a career in machine learning. Students of this book will learn the fundamentals that are a prerequisite to competency. Readers will be exposed to the Anaconda distribution of Python that is designed specifically for data science professionals, and will build skills in the popular Scikit-Learn library that underlies many machine learning applications in the world of Python. What You'll Learn Work with simple and complex datasets common to Scikit-Learn Manipulate data into vectors and matrices for algorithmic processing Become familiar with the Anaconda distribution used in data science Apply machine learning with Classifiers, Regressors, and Dimensionality Reduction Tune algorithms

and find the best algorithms for each dataset Load data from and save to CSV, JSON, Numpy, and Pandas formats Who This Book Is For The aspiring data scientist yearning to break into machine learning through mastering the underlying fundamentals that are sometimes skipped over in the rush to be productive. Some knowledge of object-oriented programming and very basic applied linear algebra will make learning easier, although anyone can benefit from this book.

Hands-On Data Structures and Algorithms with Python - Dr. Basant Agarwal 2018-10-31

Learn to implement complex data structures and algorithms using Python Key Features Understand the analysis and design of fundamental Python data structures Explore advanced Python concepts such as Big O notation and dynamic programming Learn functional and reactive implementations of traditional data structures Book Description Data structures allow you to store and organize data efficiently. They are critical to any problem, provide a complete solution, and act like reusable code. Hands-On Data Structures and Algorithms with Python teaches you the essential Python data structures and the most common algorithms for building easy and maintainable applications. This book helps you to understand the power of linked lists, double linked lists, and circular linked lists. You will learn to create complex data structures, such as graphs, stacks, and queues. As you make your way through the chapters, you will explore the application of binary searches and binary search trees, along with learning common techniques and structures used in tasks such as preprocessing, modeling, and transforming data. In the concluding chapters, you will get to grips with organizing your code in a manageable, consistent, and extendable way. You will also study how to bubble sort, selection sort, insertion sort, and merge sort algorithms in detail. By the end of the book, you will have learned how to build components that are easy to understand, debug, and use in different applications. You will get insights into Python implementation of all the important and relevant algorithms. What you will learn Understand object representation, attribute binding, and data encapsulation Gain a solid understanding of Python data structures using algorithms Study

algorithms using examples with pictorial representation Learn complex algorithms through easy explanation, implementing Python Build sophisticated and efficient data applications in Python Understand common programming algorithms used in Python data science Write efficient and robust code in Python 3.7 Who this book is for This book is for developers who want to learn data structures and algorithms in Python to write complex and flexible programs. Basic Python programming knowledge is expected.

Mastering Machine Learning with Python in Six Steps - Manohar Swamynathan 2019-10-01

Explore fundamental to advanced Python 3 topics in six steps, all designed to make you a worthy practitioner. This updated version's approach is based on the "six degrees of separation" theory, which states that everyone and everything is a maximum of six steps away and presents each topic in two parts: theoretical concepts and practical implementation using suitable Python 3 packages. You'll start with the fundamentals of Python 3 programming language, machine learning history, evolution, and the system development frameworks. Key data mining/analysis concepts, such as exploratory analysis, feature dimension reduction, regressions, time series forecasting and their efficient implementation in Scikit-learn are covered as well. You'll also learn commonly used model diagnostic and tuning techniques. These include optimal probability cutoff point for class creation, variance, bias, bagging, boosting, ensemble voting, grid search, random search, Bayesian optimization, and the noise reduction technique for IoT data. Finally, you'll review advanced text mining techniques, recommender systems, neural networks, deep learning, reinforcement learning techniques and their implementation. All the code presented in the book will be available in the form of iPython notebooks to enable you to try out these examples and extend them to your advantage. What You'll Learn Understand machine learning development and frameworks Assess model diagnosis and tuning in machine learning Examine text mining, natural language processing (NLP), and recommender systems Review reinforcement learning and CNN Who This Book Is For Python

developers, data engineers, and machine learning engineers looking to expand their knowledge or career into machine learning area.

Programming for Computations - Python - Svein Linge 2018-05-31
This book presents computer programming as a key method for solving mathematical problems. There are two versions of the book, one for MATLAB and one for Python. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows the students to write simple programs for solving common mathematical problems with numerical methods in engineering and science courses. The emphasis is on generic algorithms, clean design of programs, use of functions, and automatic tests for verification.

Data Structures and Algorithms with Python - Kent D. Lee 2015-01-12

This textbook explains the concepts and techniques required to write programs that can handle large amounts of data efficiently. Project-oriented and classroom-tested, the book presents a number of important algorithms supported by examples that bring meaning to the problems faced by computer programmers. The idea of computational complexity is also introduced, demonstrating what can and cannot be computed efficiently so that the programmer can make informed judgements about the algorithms they use. Features: includes both introductory and advanced data structures and algorithms topics, with suggested chapter sequences for those respective courses provided in the preface; provides learning goals, review questions and programming exercises in each chapter, as well as numerous illustrative examples; offers downloadable programs and supplementary files at an associated website, with instructor materials available from the author; presents a primer on Python for those from a different language background.

Python Scripting for Computational Science - Hans Petter Langtangen 2013-03-14

Scripting with Python makes you productive and increases the reliability

of your scientific work. Here, the author teaches you how to develop tailored, flexible, and efficient working environments built from small programs (scripts) written in Python. The focus is on examples and applications of relevance to computational science: gluing existing applications and tools, e.g. for automating simulation, data analysis, and visualization; steering simulations and computational experiments; equipping programs with graphical user interfaces; making computational Web services; creating interactive interfaces with a Maple/Matlab-like syntax to numerical applications in C/C++ or Fortran; and building flexible object-oriented programming interfaces to existing C/C++ or Fortran libraries.

Python Algorithms - Magnus Lie Hetland 2014-09-04

Python Algorithms, Second Edition explains the Python approach to algorithm analysis and design. Written by Magnus Lie Hetland, author of Beginning Python, this book is sharply focused on classical algorithms, but it also gives a solid understanding of fundamental algorithmic problem-solving techniques. The book deals with some of the most important and challenging areas of programming and computer science in a highly readable manner. It covers both algorithmic theory and programming practice, demonstrating how theory is reflected in real Python programs. Well-known algorithms and data structures that are built into the Python language are explained, and the user is shown how to implement and evaluate others. What you'll learn How to transform new problems to well-known algorithmic problems with efficient solutions, or show that the problems belong to classes of problems thought not to be efficiently solvable How to analyze algorithms and Python programs using both mathematical tools and basic experiments and benchmarks How to understand several classical algorithms and data structures in depth, and be able to implement these efficiently in Python How to design and implement new algorithms for new problems, using time-tested design principles and techniques How to speed up implementations, using a plethora of tools for high-performance computing in Python Who this book is for The book is intended for Python programmers who need to learn about algorithmic problem-

solving, or who need a refresher. Data and computational scientists employed to do big data analytic analysis should find this book useful. Game programmers and financial analysts/engineers may find this book applicable too. And, students of computer science, or similar programming-related topics, such as bioinformatics, may also find the book to be quite useful. Table of Contents 1. Introduction 2. The Basics 3. Counting 101 4. Induction and Recursion ... and Reduction 5. Traversal: The Skeleton Key of Algorithmics 6. Divide, Combine, and Conquer 7. Greed Is Good? Prove It! 8. Tangled Dependencies and Memoization 9. From A to B with Edsger and Friends 10. Matchings, Cuts, and Flows 11. Hard Problems and (Limited) Sloppiness 12. Pedal to the Metal: Accelerating Python 13. List of Problems and Algorithms 14. Graph Terminology! 15. Hints for Exercises

[An Introduction to Python and Computer Programming](#) - Yue Zhang 2015-07-08

This book introduces Python programming language and fundamental concepts in algorithms and computing. Its target audience includes students and engineers with little or no background in programming, who need to master a practical programming language and learn the basic thinking in computer science/programming. The main contents come from lecture notes for engineering students from all disciplines, and has received high ratings. Its materials and ordering have been adjusted repeatedly according to classroom reception. Compared to alternative textbooks in the market, this book introduces the underlying Python implementation of number, string, list, tuple, dict, function, class, instance and module objects in a consistent and easy-to-understand way, making assignment, function definition, function call, mutability and binding environments understandable inside-out. By giving the abstraction of implementation mechanisms, this book builds a solid understanding of the Python programming language.

[Python Algorithms](#) - Magnus Lie Hetland 2014-09-17

Python Algorithms, Second Edition explains the Python approach to algorithm analysis and design. Written by Magnus Lie Hetland, author of Beginning Python, this book is sharply focused on classical algorithms,

but it also gives a solid understanding of fundamental algorithmic problem-solving techniques. The book deals with some of the most important and challenging areas of programming and computer science in a highly readable manner. It covers both algorithmic theory and programming practice, demonstrating how theory is reflected in real Python programs. Well-known algorithms and data structures that are built into the Python language are explained, and the user is shown how to implement and evaluate others.

[Solving PDEs in Python](#) - Hans Petter Langtangen 2017-03-21

This book offers a concise and gentle introduction to finite element programming in Python based on the popular FEniCS software library. Using a series of examples, including the Poisson equation, the equations of linear elasticity, the incompressible Navier–Stokes equations, and systems of nonlinear advection–diffusion–reaction equations, it guides readers through the essential steps to quickly solving a PDE in FEniCS, such as how to define a finite variational problem, how to set boundary conditions, how to solve linear and nonlinear systems, and how to visualize solutions and structure finite element Python programs. This book is open access under a CC BY license.

Pyomo — Optimization Modeling in Python - William E. Hart 2017-05-26

This book provides a complete and comprehensive guide to Pyomo (Python Optimization Modeling Objects) for beginning and advanced modelers, including students at the undergraduate and graduate levels, academic researchers, and practitioners. Using many examples to illustrate the different techniques useful for formulating models, this text beautifully elucidates the breadth of modeling capabilities that are supported by Pyomo and its handling of complex real-world applications. This second edition provides an expanded presentation of Pyomo's modeling capabilities, providing a broader description of the software that will enable the user to develop and optimize models. Introductory chapters have been revised to extend tutorials; chapters that discuss advanced features now include the new functionalities added to Pyomo since the first edition including generalized disjunctive programming, mathematical programming with equilibrium constraints, and bilevel

programming. Pyomo is an open source software package for formulating and solving large-scale optimization problems. The software extends the modeling approach supported by modern AML (Algebraic Modeling Language) tools. Pyomo is a flexible, extensible, and portable AML that is embedded in Python, a full-featured scripting language. Python is a powerful and dynamic programming language that has a very clear, readable syntax and intuitive object orientation. Pyomo includes Python classes for defining sparse sets, parameters, and variables, which can be used to formulate algebraic expressions that define objectives and constraints. Moreover, Pyomo can be used from a command-line interface and within Python's interactive command environment, which makes it easy to create Pyomo models, apply a variety of optimizers, and examine solutions.

Programming for Computations - Python - Svein Linge 2019-10-30

This book is published open access under a CC BY 4.0 license. This book presents computer programming as a key method for solving mathematical problems. This second edition of the well-received book has been extensively revised: All code is now written in Python version 3.6 (no longer version 2.7). In addition, the two first chapters of the previous edition have been extended and split up into five new chapters, thus expanding the introduction to programming from 50 to 150 pages. Throughout the book, the explanations provided are now more detailed, previous examples have been modified, and new sections, examples and exercises have been added. Also, a number of small errors have been corrected. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style employed is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows students to write simple programs for solving common mathematical problems with numerical methods in the context of engineering and science courses. The emphasis is on generic algorithms, clean program design, the use of functions, and automatic tests for verification.

Python for Probability, Statistics, and Machine Learning - José

Unpingco 2019-06-29

This book, fully updated for Python version 3.6+, covers the key ideas that link probability, statistics, and machine learning illustrated using Python modules in these areas. All the figures and numerical results are reproducible using the Python codes provided. The author develops key intuitions in machine learning by working meaningful examples using multiple analytical methods and Python codes, thereby connecting theoretical concepts to concrete implementations. Detailed proofs for certain important results are also provided. Modern Python modules like Pandas, Sympy, Scikit-learn, Tensorflow, and Keras are applied to simulate and visualize important machine learning concepts like the bias/variance trade-off, cross-validation, and regularization. Many abstract mathematical ideas, such as convergence in probability theory, are developed and illustrated with numerical examples. This updated edition now includes the Fisher Exact Test and the Mann-Whitney-Wilcoxon Test. A new section on survival analysis has been included as well as substantial development of Generalized Linear Models. The new deep learning section for image processing includes an in-depth discussion of gradient descent methods that underpin all deep learning algorithms. As with the prior edition, there are new and updated *Programming Tips* that illustrate effective Python modules and methods for scientific programming and machine learning. There are 445 run-able code blocks with corresponding outputs that have been tested for accuracy. Over 158 graphical visualizations (almost all generated using Python) illustrate the concepts that are developed both in code and in mathematics. We also discuss and use key Python modules such as Numpy, Scikit-learn, Sympy, Scipy, Lifelines, CvxPy, Theano, Matplotlib, Pandas, Tensorflow, Statsmodels, and Keras. This book is suitable for anyone with an undergraduate-level exposure to probability, statistics, or machine learning and with rudimentary knowledge of Python programming.

[A Primer on Scientific Programming with Python](#) - Hans Petter

Langtangen 2016-07-28

The book serves as a first introduction to computer programming of

scientific applications, using the high-level Python language. The exposition is example and problem-oriented, where the applications are taken from mathematics, numerical calculus, statistics, physics, biology and finance. The book teaches "Matlab-style" and procedural programming as well as object-oriented programming. High school mathematics is a required background and it is advantageous to study classical and numerical one-variable calculus in parallel with reading this book. Besides learning how to program computers, the reader will also learn how to solve mathematical problems, arising in various branches of science and engineering, with the aid of numerical methods and programming. By blending programming, mathematics and scientific applications, the book lays a solid foundation for practicing computational science. From the reviews: Langtangen ... does an excellent job of introducing programming as a set of skills in problem solving. He guides the reader into thinking properly about producing program logic and data structures for modeling real-world problems using objects and functions and embracing the object-oriented paradigm. ... Summing Up: Highly recommended. F. H. Wild III, Choice, Vol. 47 (8), April 2010 Those of us who have learned scientific programming in Python 'on the streets' could be a little jealous of students who have the opportunity to take a course out of Langtangen's Primer." John D. Cook, The Mathematical Association of America, September 2011 This book goes through Python in particular, and programming in general, via tasks that scientists will likely perform. It contains valuable information for students new to scientific computing and would be the perfect bridge between an introduction to programming and an advanced course on numerical methods or computational science. Alex Small, IEEE, CiSE Vol. 14 (2), March /April 2012 "This fourth edition is a wonderful, inclusive textbook that covers pretty much everything one needs to know to go from zero to fairly sophisticated scientific programming in Python..." Joan Horvath, Computing Reviews, March 2015

Numerical Python - Robert Johansson 2018-12-24

Leverage the numerical and mathematical modules in Python and its standard library as well as popular open source numerical Python

packages like NumPy, SciPy, FiPy, matplotlib and more. This fully revised edition, updated with the latest details of each package and changes to Jupyter projects, demonstrates how to numerically compute solutions and mathematically model applications in big data, cloud computing, financial engineering, business management and more. Numerical Python, Second Edition, presents many brand-new case study examples of applications in data science and statistics using Python, along with extensions to many previous examples. Each of these demonstrates the power of Python for rapid development and exploratory computing due to its simple and high-level syntax and multiple options for data analysis. After reading this book, readers will be familiar with many computing techniques including array-based and symbolic computing, visualization and numerical file I/O, equation solving, optimization, interpolation and integration, and domain-specific computational problems, such as differential equation solving, data analysis, statistical modeling and machine learning. What You'll Learn Work with vectors and matrices using NumPy Plot and visualize data

with Matplotlib Perform data analysis tasks with Pandas and SciPy Review statistical modeling and machine learning with statsmodels and scikit-learn Optimize Python code using Numba and Cython Who This Book Is For Developers who want to understand how to use Python and its related ecosystem for numerical computing.

Programming for Computations - Python - Svein Linge 2016-07-25 This book presents computer programming as a key method for solving mathematical problems. There are two versions of the book, one for MATLAB and one for Python. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows the students to write simple programs for solving common mathematical problems with numerical methods in engineering and science courses. The emphasis is on generic algorithms, clean design of programs, use of functions, and automatic tests for verification.