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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.

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

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.

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.

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. What

You'll Learn • 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.

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.

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.

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.

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 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.

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.

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.

The Discrete Math Workbook - Sergei Kurgalin 2020-08-12

This practically-focused study guide introduces the fundamentals of discrete mathematics through an extensive set of classroom-tested problems. Each chapter presents a concise introduction to the relevant theory, followed by a detailed account of common challenges and methods for overcoming these. The

reader is then encouraged to practice solving such problems for themselves, by tackling a varied selection of questions and assignments of different levels of complexity. This updated second edition now covers the design and analysis of algorithms using Python, and features more than 50 new problems, complete with solutions. Topics and features: provides a substantial collection of problems and examples of varying levels of difficulty, suitable for both laboratory practical training and self-study; offers detailed solutions to each problem, applying commonly-used methods and computational schemes; introduces the fundamentals of mathematical logic, the theory of algorithms, Boolean algebra, graph theory, sets, relations, functions, and combinatorics; presents more advanced material on the design and analysis of algorithms, including Turing machines, asymptotic analysis, and parallel algorithms; includes reference lists of trigonometric and finite summation formulae in an appendix, together with basic rules for differential and integral calculus. This hands-on workbook is an invaluable resource for undergraduate students of computer science, informatics, and electronic engineering. Suitable for use in a one- or two-semester course on discrete mathematics, the text emphasizes the skills required to develop and implement an algorithm in a specific programming language.

Introduction to Data Systems - Thomas Bressoud 2020-12-04

Encompassing a broad range of forms and sources of data, this textbook introduces data systems through a progressive presentation. Introduction to Data Systems covers data acquisition starting with local files, then progresses to data acquired from relational databases,

from REST APIs and through web scraping. It teaches data forms/formats from tidy data to relationally defined sets of tables to hierarchical structure like XML and JSON using data models to convey the structure, operations, and constraints of each data form. The starting point of the book is a foundation in Python programming found in introductory computer science classes or short courses on the language, and so does not require prerequisites of data structures, algorithms, or other courses. This makes the material accessible to students early in their educational career and equips them with understanding and skills that can be applied in computer science, data science/data analytics, and information technology programs as well as for internships and research experiences. This book is accessible to a wide variety of students. By drawing together content normally spread across upper level computer science courses, it offers a single source providing the essentials for data science practitioners. In our increasingly data-centric world, students from all domains will benefit from the "data-aptitude" built by the material in this book.

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)

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

Introduction to Computation and Programming Using Python, third edition - John V. Guttag 2021-01-26 The new edition of an introduction to the art of computational problem solving using Python. 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 numpy, matplotlib, random, pandas, and sklearn. 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 as well as substantial material on machine learning. All of the code in the book and an errata sheet are available on the book's web page on the MIT Press website.

Algorithms for Data Science - Brian Steele 2016-12-25

This textbook on practical data analytics unites fundamental principles, algorithms, and data. Algorithms are the keystone of data analytics and the focal point of this textbook. Clear and intuitive explanations of the mathematical and statistical foundations make the algorithms transparent. But practical data analytics requires more than just the foundations. Problems and data are enormously variable and only the most elementary of algorithms can be used without modification. Programming fluency and experience with real and challenging data is indispensable and so the reader is immersed in Python and R and real data analysis. By the end of the book, the reader will have gained the ability to adapt algorithms to new problems and carry out innovative analyses. This book has three parts:(a) Data Reduction: Begins with the concepts of data reduction, data maps, and information extraction. The second chapter introduces associative statistics, the mathematical foundation of scalable algorithms and distributed computing. Practical aspects of distributed computing is the subject of the Hadoop and MapReduce chapter.(b) Extracting Information from Data: Linear regression and data visualization are the principal topics of Part II. The authors dedicate a chapter to the critical domain of Healthcare Analytics for an extended example of practical data analytics. The algorithms and analytics will be of much interest to practitioners interested in utilizing the large and

unwieldy data sets of the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System. (c) Predictive Analytics Two foundational and widely used algorithms, k-nearest neighbors and naive Bayes, are developed in detail. A chapter is dedicated to forecasting. The last chapter focuses on streaming data and uses publicly accessible data streams originating from the Twitter API and the NASDAQ stock market in the tutorials. This book is intended for a one- or two-semester course in data analytics for upper-division undergraduate and graduate students in mathematics, statistics, and computer science. The prerequisites are kept low, and students with one or two courses in probability or statistics, an exposure to vectors and matrices, and a programming course will have no difficulty. The core material of every chapter is accessible to all with these prerequisites. The chapters often expand at the close with innovations of interest to practitioners of data science. Each chapter includes exercises of varying levels of difficulty. The text is eminently suitable for self-study and an exceptional resource for practitioners.

Programming Computer Vision with Python - Jan Erik Solem 2012-06-19

If you want a basic understanding of computer vision's underlying theory and algorithms, this hands-on introduction is the ideal place to start. You'll learn techniques for object recognition, 3D reconstruction, stereo imaging, augmented reality, and other computer vision applications as you follow clear examples written in Python. Programming Computer Vision with Python explains computer vision in broad terms that won't bog you down in theory. You get complete code samples with explanations on how to

reproduce and build upon each example, along with exercises to help you apply what you've learned. This book is ideal for students, researchers, and enthusiasts with basic programming and standard mathematical skills. Learn techniques used in robot navigation, medical image analysis, and other computer vision applications Work with image mappings and transforms, such as texture warping and panorama creation Compute 3D reconstructions from several images of the same scene Organize images based on similarity or content, using clustering methods Build efficient image retrieval techniques to search for images based on visual content Use algorithms to classify image content and recognize objects Access the popular OpenCV library through a Python interface Beginning Python - Magnus Lie Hetland 2006-11-07

* Totalling 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.

Supervised Learning with Python - Vaibhav Verdhhan 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.

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.

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 Contents1. 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

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.

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.

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.

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.

Python for Scientists - John M. Stewart 2017-07-20

Scientific Python is taught from scratch in this book via copious, downloadable, useful and adaptable code snippets. Everything the working scientist needs to know is covered, quickly providing researchers and research students with the skills to start using Python effectively.

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.

Algebraic Graph Algorithms - K.

Erciyas 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.

Practical Machine Learning and Image

Processing - Himanshu Singh

2019-02-26

Gain insights into image-processing methodologies and algorithms, using machine learning and neural networks in Python. This book begins with the environment setup, understanding basic image-processing terminology, and exploring Python concepts that will be useful for implementing the

algorithms discussed in the book. You will then cover all the core image processing algorithms in detail before moving onto the biggest computer vision library: OpenCV. You'll see the OpenCV algorithms and how to use them for image processing. The next section looks at advanced machine learning and deep learning methods for image processing and classification. You'll work with concepts such as pulse coupled neural networks, AdaBoost, XG boost, and convolutional neural networks for image-specific applications. Later you'll explore how models are made in real time and then deployed using various DevOps tools. All the concepts in Practical Machine Learning and Image Processing are explained using real-life scenarios. After reading this book you will be able to apply image processing techniques and make machine learning models for customized application. What You Will Learn Discover image-processing algorithms and their applications using Python Explore image processing using the OpenCV library Use TensorFlow, scikit-learn, NumPy, and other libraries Work with machine learning and deep learning algorithms for image processing Apply image-processing techniques to five real-time projects Who This Book Is For Data scientists and software developers interested in image processing and computer vision.

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 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.

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.

Applied Scientific Computing - Peter

R. Turner 2018-07-18

This easy-to-understand textbook presents a modern approach to learning numerical methods (or scientific computing), with a unique focus on the modeling and applications of the mathematical content. Emphasis is placed on the need for, and methods of, scientific computing for a range of different types of problems, supplying the evidence and justification to motivate the reader. Practical guidance on coding the methods is also provided, through simple-to-follow examples using Python. Topics and features: provides an accessible and applications-oriented approach, supported by working Python code for many of the methods; encourages both problem- and project-based learning through extensive examples, exercises, and projects drawn from practical applications; introduces the main concepts in modeling, python programming, number representation,

and errors; explains the essential details of numerical calculus, linear, and nonlinear equations, including the multivariable Newton method; discusses interpolation and the numerical solution of differential equations, covering polynomial interpolation, splines, and the Euler, Runge–Kutta, and shooting methods; presents largely self-contained chapters, arranged in a logical order suitable for an introductory course on scientific computing. Undergraduate students embarking on a first course on numerical methods or scientific computing will find this textbook to be an invaluable guide to the field, and to the application of these methods across such varied disciplines as computer science, engineering, mathematics, economics, the physical sciences, and social science.

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.

Reinforcement Learning - Abhishek Nandy 2017-12-08

Master reinforcement learning, a popular area of machine learning, starting with the basics: discover how agents and the environment evolve and then gain a clear picture of how they are inter-related. You'll then work with theories related to reinforcement learning and see the concepts that build up the reinforcement learning process.

Reinforcement Learning discusses algorithm implementations important for reinforcement learning, including Markov's Decision process and Semi Markov Decision process. The next section shows you how to get started with Open AI before looking at Open AI Gym. You'll then learn about Swarm Intelligence with Python in terms of reinforcement learning. The last part of the book starts with the TensorFlow environment and gives an outline of how reinforcement learning can be applied to TensorFlow. There's also coverage of Keras, a framework that can be used with reinforcement learning. Finally, you'll delve into Google's Deep Mind and see scenarios where reinforcement learning can be used. What You'll Learn Absorb the core concepts of the reinforcement learning process Use advanced topics of deep learning and AI Work with Open AI Gym, Open AI, and Python Harness reinforcement learning with TensorFlow and Keras using Python Who This Book Is For Data scientists, machine learning and deep learning professionals, developers who want to adapt and learn reinforcement learning.

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.

Guide to Competitive Programming - Antti Laaksonen 2018-01-02

This invaluable textbook presents a comprehensive introduction to modern competitive programming. The text highlights how competitive programming has proven to be an excellent way to learn algorithms, by encouraging the design of algorithms that actually work, stimulating the improvement of programming and debugging skills, and reinforcing the type of thinking required to solve problems in a competitive setting. The book contains many "folklore" algorithm design tricks that are known by experienced competitive programmers, yet which have previously only been formally discussed in online forums and blog posts. Topics and features: reviews the features of the C++ programming language, and describes how to create efficient algorithms that can quickly process large data sets; discusses sorting algorithms and binary search, and examines a selection of data structures of the C++ standard library; introduces the algorithm design technique of dynamic programming, and investigates elementary graph algorithms; covers such advanced algorithm design topics as bit-parallelism and amortized analysis, and presents a focus on efficiently processing array range queries; surveys specialized algorithms for trees, and discusses the mathematical topics that are relevant in competitive programming; examines advanced graph techniques, geometric algorithms, and string

techniques; describes a selection of more advanced topics, including square root algorithms and dynamic programming optimization. This easy-to-follow guide is an ideal reference for all students wishing to learn algorithms, and practice for programming contests. Knowledge of the basics of programming is assumed, but previous background in algorithm design or programming contests is not necessary. Due to the broad range of topics covered at various levels of difficulty, this book is suitable for both beginners and more experienced readers.

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.