

A Primer On Scientific Programming With Python

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Numerical Methods in Engineering with Python 3 - Jaan Kiusalaas

2013-01-21

Provides an introduction to numerical methods for students in engineering.

It uses Python 3, an easy-to-use, high-level programming language.

Julia Programming for Operations Research - Changyun Kwon

2019-03-03

Last Updated: December 2020 Based on Julia v1.3+ and JuMP v0.21+

The main motivation of writing this book was to help the author himself. He is a professor in the field of operations research, and his daily activities involve building models of mathematical optimization, developing algorithms for solving the problems, implementing those algorithms using computer programming languages, experimenting with data, etc. Three

languages are involved: human language, mathematical language, and computer language. His team of students need to go over three different languages, which requires "translation" among the three languages. As this book was written to teach his research group how to translate, this book will also be useful for anyone who needs to learn how to translate in a similar situation. The Julia Language is as fast as C, as convenient as MATLAB, and as general as Python with a flexible algebraic modeling language for mathematical optimization problems. With the great support from Julia developers, especially the developers of the JuMP–Julia for Mathematical Programming–package, Julia makes a perfect tool for students and professionals in operations research and related areas such as industrial engineering, management science, transportation engineering,

economics, and regional science. For more information, visit:

<http://www.chkwon.net/julia>

Introduction to Numerical Methods for Variational Problems - Hans Petter Langtangen 2019-09-26

This textbook teaches finite element methods from a computational point of view. It focuses on how to develop flexible computer programs with Python, a programming language in which a combination of symbolic and numerical tools is used to achieve an explicit and practical derivation of finite element algorithms. The finite element library FEniCS is used throughout the book, but the content is provided in sufficient detail to ensure that students with less mathematical background or mixed programming-language experience will equally benefit. All program examples are available on the Internet.

A Primer for Computational Biology - Shawn T. O'Neil 2017-12-21

A Primer for Computational Biology aims to provide life scientists and students the skills necessary for research in a data-rich world. The text covers accessing and using remote servers via the command-line, writing programs and pipelines for data analysis, and provides useful vocabulary for interdisciplinary work. The book is broken into three parts: Introduction to Unix/Linux: The command-line is the "natural environment" of scientific computing, and this part covers a wide range of topics, including logging

in, working with files and directories, installing programs and writing scripts, and the powerful "pipe" operator for file and data manipulation.

Programming in Python: Python is both a premier language for learning and a common choice in scientific software development. This part covers the basic concepts in programming (data types, if-statements and loops, functions) via examples of DNA-sequence analysis. This part also covers more complex subjects in software development such as objects and classes, modules, and APIs. Programming in R: The R language specializes in statistical data analysis, and is also quite useful for visualizing large datasets. This third part covers the basics of R as a programming language (data types, if-statements, functions, loops and when to use them) as well as techniques for large-scale, multi-test analyses. Other topics include S3 classes and data visualization with ggplot2.

Real World Instrumentation with Python - John M. Hughes 2010-11-15

Learn how to develop your own applications to monitor or control instrumentation hardware. Whether you need to acquire data from a device or automate its functions, this practical book shows you how to use Python's rapid development capabilities to build interfaces that include everything from software to wiring. You get step-by-step instructions, clear examples, and hands-on tips for interfacing a PC to a variety of devices.

Use the book's hardware survey to identify the interface type for your particular device, and then follow detailed examples to develop an interface with Python and C. Organized by interface type, data processing activities, and user interface implementations, this book is for anyone who works with instrumentation, robotics, data acquisition, or process control. Understand how to define the scope of an application and determine the algorithms necessary, and why it's important. Learn how to use industry-standard interfaces such as RS-232, RS-485, and GPIB. Create low-level extension modules in C to interface Python with a variety of hardware and test instruments. Explore the console, curses, TkInter, and wxPython for graphical and text-based user interfaces. Use open source software tools and libraries to reduce costs and avoid implementing functionality from scratch.

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.

Learn to Code by Solving Problems - Daniel Zingaro 2021-06-29

Learn to Code by Solving Problems is a practical introduction to programming using Python. It uses coding-competition challenges to teach you the mechanics of coding and how to think like a savvy programmer. Computers are capable of solving almost any problem when given the right instructions. That's where programming comes in. This beginner's book will have you writing Python programs right away. You'll solve interesting problems drawn from real coding competitions and build your programming skills as you go. Every chapter presents problems from coding challenge websites, where online judges test your solutions and provide targeted feedback. As you practice using core Python features, functions, and techniques, you'll develop a clear understanding of data structures, algorithms, and other programming basics. Bonus exercises invite you to explore new concepts on your own, and multiple-choice questions encourage you to think about how each piece of code works. You'll learn how to:

- Run Python code, work with strings, and use variables
- Write programs that make decisions
- Make code more

efficient with while and for loops • Use Python sets, lists, and dictionaries to organize, sort, and search data • Design programs using functions and top-down design • Create complete-search algorithms and use Big O notation to design more efficient code By the end of the book, you'll not only be proficient in Python, but you'll also understand how to think through problems and tackle them with code. Programming languages come and go, but this book gives you the lasting foundation you need to start thinking like a programmer.

Elegant SciPy - Juan Nunez-Iglesias 2017-08-11

Welcome to Scientific Python and its community. If you're a scientist who programs with Python, this practical guide not only teaches you the fundamental parts of SciPy and libraries related to it, but also gives you a taste for beautiful, easy-to-read code that you can use in practice. You'll learn how to write elegant code that's clear, concise, and efficient at executing the task at hand. Throughout the book, you'll work with examples from the wider scientific Python ecosystem, using code that illustrates principles outlined in the book. Using actual scientific data, you'll work on real-world problems with SciPy, NumPy, Pandas, scikit-image, and other Python libraries. Explore the NumPy array, the data structure that underlies numerical scientific computation Use quantile normalization to ensure that measurements fit a specific distribution Represent separate

regions in an image with a Region Adjacency Graph Convert temporal or spatial data into frequency domain data with the Fast Fourier Transform Solve sparse matrix problems, including image segmentations, with SciPy's sparse module Perform linear algebra by using SciPy packages Explore image alignment (registration) with SciPy's optimize module Process large datasets with Python data streaming primitives and the Toolz library

Finite Difference Computing with PDEs - Hans Petter Langtangen
2017-06-21

This book is open access under a CC BY 4.0 license. This easy-to-read book introduces the basics of solving partial differential equations by means of finite difference methods. Unlike many of the traditional academic works on the topic, this book was written for practitioners. Accordingly, it especially addresses: the construction of finite difference schemes, formulation and implementation of algorithms, verification of implementations, analyses of physical behavior as implied by the numerical solutions, and how to apply the methods and software to solve problems in the fields of physics and biology.

Advanced Guide to Python 3 Programming - John Hunt 2019-09-18

Advanced Guide to Python 3 Programming delves deeply into a host of subjects that you need to understand if you are to develop sophisticated

real-world programs. Each topic is preceded by an introduction followed by more advanced topics, along with numerous examples, that take you to an advanced level. There are nine different sections within the book covering Computer Graphics (including GUIs), Games, Testing, File Input and Output, Databases Access, Logging, Concurrency and Parallelism, Reactive programming, and Networking. Each section is self-contained and can either be read on its own or as part of the book as a whole. This book is aimed at the those who have learnt the basics of the Python 3 language but want to delve deeper into Python's eco system of additional libraries and modules, to explore concurrency and parallelism, to create impressive looking graphical interfaces, to work with databases and files and to provide professional logging facilities.

Introducing Data Science - Davy Cielen 2016-05-02

Summary Introducing Data Science teaches you how to accomplish the fundamental tasks that occupy data scientists. Using the Python language and common Python libraries, you'll experience firsthand the challenges of dealing with data at scale and gain a solid foundation in data science.

Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Many companies need developers with data science skills to work on projects ranging from social media marketing to machine learning. Discovering

what you need to learn to begin a career as a data scientist can seem bewildering. This book is designed to help you get started. About the Book Introducing Data Science Introducing Data Science explains vital data science concepts and teaches you how to accomplish the fundamental tasks that occupy data scientists. You'll explore data visualization, graph databases, the use of NoSQL, and the data science process. You'll use the Python language and common Python libraries as you experience firsthand the challenges of dealing with data at scale. Discover how Python allows you to gain insights from data sets so big that they need to be stored on multiple machines, or from data moving so quickly that no single machine can handle it. This book gives you hands-on experience with the most popular Python data science libraries, Scikit-learn and StatsModels. After reading this book, you'll have the solid foundation you need to start a career in data science. What's Inside Handling large data Introduction to machine learning Using Python to work with data Writing data science algorithms About the Reader This book assumes you're comfortable reading code in Python or a similar language, such as C, Ruby, or JavaScript. No prior experience with data science is required. About the Authors Davy Cielen, Arno D. B. Meysman, and Mohamed Ali are the founders and managing partners of Optimately and Maiton, where they focus on developing data science projects and solutions in various

sectors. Table of Contents Data science in a big data world The data science process Machine learning Handling large data on a single computer First steps in big data Join the NoSQL movement The rise of graph databases Text mining and text analytics Data visualization to the end user

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.

Neural Data Science - Erik Lee Nylén 2017-02-24

A Primer with MATLAB® and Python™ present important information on the emergence of the use of Python, a more general purpose option to MATLAB, the preferred computation language for scientific computing and

analysis in neuroscience. This book addresses the snake in the room by providing a beginner's introduction to the principles of computation and data analysis in neuroscience, using both Python and MATLAB, giving readers the ability to transcend platform tribalism and enable coding versatility. Includes discussions of both MATLAB and Python in parallel Introduces the canonical data analysis cascade, standardizing the data analysis flow Presents tactics that strategically, tactically, and algorithmically help improve the organization of code

[A Primer on Scientific Programming with Python](#) - Hans Petter Langtangen 2009-08-04

The aim of this book is to teach computer programming using examples from mathematics and the natural sciences. We have chosen to use the Python programming language because it combines remarkable power with very clean, simple, and compact syntax. Python is easy to learn and very well suited for an introduction to computer programming. Python is also quite similar to Matlab and a good language for doing mathematical computing. It is easy to combine Python with compiled languages, like Fortran, C, and C++, which are widely used languages

for scientific computations. A seamless integration of Python with Java is offered by a special version of Python called Jython. The examples in this book integrate programming with applications to mathematics, physics, biology,

and finance. The reader is expected to have knowledge of basic one-variable calculus as taught in mathematics-intensive programs in high schools. It is certainly an advantage to take a university calculus course in parallel, preferably containing both classical and numerical aspects of calculus. Although not strictly required, a background in high school physics makes many of the examples more meaningful.

Doing Computational Social Science - John McLevey 2021-12-15

Computational approaches offer exciting opportunities for us to do social science differently. This beginner's guide discusses a range of computational methods and how to use them to study the problems and questions you want to research. It assumes no knowledge of programming, offering step-by-step guidance for coding in Python and drawing on examples of real data analysis to demonstrate how you can apply each approach in any discipline. The book also: Considers important principles of social scientific computing, including transparency, accountability and reproducibility. Understands the realities of completing research projects and offers advice for dealing with issues such as messy or incomplete data and systematic biases. Empowers you to learn at your own pace, with online resources including screencast tutorials and datasets that enable you to practice your skills and get up to speed. For anyone who wants to use computational methods to conduct a social

science research project, this book equips you with the skills, good habits and best working practices to do rigorous, high quality work.

[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.

[Python for Data Analysis](#) - Wes McKinney 2017-09-25

Get complete instructions for manipulating, processing, cleaning, and crunching datasets in Python. Updated for Python 3.6, the second edition of this hands-on guide is packed with practical case studies that show you how to solve a broad set of data analysis problems effectively. You'll learn the latest versions of pandas, NumPy, IPython, and Jupyter in the process. Written by Wes McKinney, the creator of the Python pandas project, this book is a practical, modern introduction to data science tools in Python. It's ideal for analysts new to Python and for Python programmers new to data science and scientific computing. Data files and related material are available on GitHub. Use the IPython shell and Jupyter notebook for exploratory computing Learn basic and advanced features in NumPy (Numerical Python) Get started with data analysis tools in the pandas library Use flexible tools to load, clean, transform, merge, and reshape

data Create informative visualizations with matplotlib Apply the pandas groupby facility to slice, dice, and summarize datasets Analyze and manipulate regular and irregular time series data Learn how to solve real-world data analysis problems with thorough, detailed examples

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.

SQL Primer - Rahul Batra 2018-06-15

Build a core level of competency in SQL so you can recognize the parts of queries and write simple SQL statements. SQL knowledge is essential for anyone involved in programming, data science, and data management.

This book covers features of SQL that are standardized and common across most database vendors. You will gain a base of knowledge that will prepare you to go deeper into the specifics of any database product you might encounter. Examples in the book are worked in PostgreSQL and SQLite, but the bulk of the examples are platform agnostic and will work on any database platform supporting SQL. Early in the book you learn about table design, the importance of keys as row identifiers, and essential query operations. You then move into more advanced topics such as grouping and summarizing, creating calculated fields, joining data from multiple tables when it makes business sense to do so, and more.

Throughout the book, you are exposed to a set-based approach to the language and are provided a good grounding in subtle but important topics such as the effects of null value on query results. With the explosion of data science, SQL has regained its prominence as a top skill to have for technologists and decision makers worldwide. SQL Primer will guide you from the very basics of SQL through to the mainstream features you need to have a solid, working knowledge of this important, data-oriented language. What You'll Learn Create and populate your own database tables Read SQL queries and understand what they are doing Execute queries that get correct results Bring together related rows from multiple tables Group and sort data in support of reporting applications Get a grip

on nulls, normalization, and other key concepts Employ subqueries, unions, and other advanced features Who This Book Is For Anyone new to SQL who is looking for step-by-step guidance toward understanding and writing SQL queries. The book is aimed at those who encounter SQL statements often in their work, and provides a sound baseline useful across all SQL database systems. Programmers, database managers, data scientists, and business analysts all can benefit from the baseline of SQL knowledge provided in this book.

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

A Student's Guide to Python for Physical Modeling: Second Edition - Jesse M. Kinder 2021-08-03

A fully updated tutorial on the basics of the Python programming language for science students Python is a computer programming language that has gained popularity throughout the sciences. This fully updated second edition of *A Student's Guide to Python for Physical Modeling* aims to help you, the student, teach yourself enough of the Python programming language to get started with physical modeling. You will learn how to install an open-source Python programming environment and use it to accomplish many common scientific computing tasks: importing, exporting, and visualizing data; numerical analysis; and simulation. No prior programming experience is assumed. This guide introduces a wide range of useful tools, including: Basic Python programming and scripting Numerical arrays Two- and three-dimensional graphics Animation Monte Carlo simulations Numerical methods, including solving ordinary differential

equations Image processing Numerous code samples and exercises—with solutions—illustrate new ideas as they are introduced. This guide also includes supplemental online resources: code samples, data sets, tutorials, and more. This edition includes new material on symbolic calculations with SymPy, an introduction to Python libraries for data science and machine learning (pandas and sklearn), and a primer on Python classes and object-oriented programming. A new appendix also introduces command line tools and version control with Git.

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.

Learning Scientific Programming with Python - Christian Hill 2020-10-22

This fast-paced introduction to Python moves from the basics to advanced

concepts, enabling readers to gain proficiency quickly.

The Hitchhiker's Guide to Python - Kenneth Reitz 2016-08-30

The Hitchhiker's Guide to Python takes the journeyman Pythonista to true expertise. More than any other language, Python was created with the philosophy of simplicity and parsimony. Now 25 years old, Python has become the primary or secondary language (after SQL) for many business users. With popularity comes diversity—and possibly dilution. This guide, collaboratively written by over a hundred members of the Python community, describes best practices currently used by package and application developers. Unlike other books for this audience, The Hitchhiker's Guide is light on reusable code and heavier on design philosophy, directing the reader to excellent sources that already exist.

Discovering Computer Science - Jessen Havill 2020-10-12

"Havill's problem-driven approach introduces algorithmic concepts in context and motivates students with a wide range of interests and backgrounds." -- Janet Davis, Associate Professor and Microsoft Chair of Computer Science, Whitman College "This book looks really great and takes exactly the approach I think should be used for a CS 1 course. I think it really fills a need in the textbook landscape." -- Marie desJardins, Dean of the College of Organizational, Computational, and Information Sciences, Simmons University "Discovering Computer Science is a

refreshing departure from introductory programming texts, offering students a much more sincere introduction to the breadth and complexity of this ever-growing field." -- James Deverick, Senior Lecturer, The College of William and Mary "This unique introduction to the science of computing guides students through broad and universal approaches to problem solving in a variety of contexts and their ultimate implementation as computer programs." -- Daniel Kaplan, DeWitt Wallace Professor, Macalester College

Discovering Computer Science: Interdisciplinary Problems, Principles, and Python Programming is a problem-oriented introduction to computational problem solving and programming in Python, appropriate for a first course for computer science majors, a more targeted disciplinary computing course or, at a slower pace, any introductory computer science course for a general audience. Realizing that an organization around language features only resonates with a narrow audience, this textbook instead connects programming to students' prior interests using a range of authentic problems from the natural and social sciences and the digital humanities. The presentation begins with an introduction to the problem-solving process, contextualizing programming as an essential component. Then, as the book progresses, each chapter guides students through solutions to increasingly complex problems, using a spiral approach to introduce Python language features. The text also

places programming in the context of fundamental computer science principles, such as abstraction, efficiency, testing, and algorithmic techniques, offering glimpses of topics that are traditionally put off until later courses. This book contains 30 well-developed independent projects that encourage students to explore questions across disciplinary boundaries, over 750 homework exercises, and 300 integrated reflection questions engage students in problem solving and active reading. The accompanying website – <https://www.discoveringcs.net> – includes more advanced content, solutions to selected exercises, sample code and data files, and pointers for further exploration.

Effective Computation in Physics - Anthony Scopatz 2015-06-25

More physicists today are taking on the role of software developer as part of their research, but software development isn't always easy or obvious, even for physicists. This practical book teaches essential software development skills to help you automate and accomplish nearly any aspect of research in a physics-based field. Written by two PhDs in nuclear engineering, this book includes practical examples drawn from a working knowledge of physics concepts. You'll learn how to use the Python programming language to perform everything from collecting and analyzing data to building software and publishing your results. In four parts, this book includes: Getting Started: Jump into Python, the command line, data

containers, functions, flow control and logic, and classes and objects
Getting It Done: Learn about regular expressions, analysis and
visualization, NumPy, storing data in files and HDF5, important data
structures in physics, computing in parallel, and deploying software
Getting It Right: Build pipelines and software, learn to use local and remote
version control, and debug and test your code
Getting It Out There:
Document your code, process and publish your findings, and collaborate
efficiently; dive into software licenses, ownership, and copyright
procedures

A Primer on Scientific Programming with Python - Hans Petter Langtangen

2012-07-04

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.

[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.

Python for Biologists - Martin Jones 2013

Python for biologists is a complete programming course for beginners that

will give you the skills you need to tackle common biological and bioinformatics problems.

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.

Python Programming and Visualization for Scientists - Alex DeCaria 2020-12-30

A color-illustrated introduction and reference volume for the popular Python 3 language with an emphasis on scientific plotting and data analysis and relevant software modules, including numpy, matplotlib, cartopy, datetime, and pandas.

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

Mathematics for Machine Learning - Marc Peter Deisenroth 2020-04-23

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

Introduction to Scientific Programming and Simulation Using R - Owen Jones 2014-06-12

Learn How to Program Stochastic Models Highly recommended, the best-selling first edition of Introduction to Scientific Programming and Simulation Using R was lauded as an excellent, easy-to-read introduction with extensive examples and exercises. This second edition continues to introduce scientific programming and stochastic modelling in a clear, **Introduction to Python for Engineers and Scientists - Sandeep Nagar** 2017-12-06

Familiarize yourself with the basics of Python for engineering and scientific computations using this concise, practical tutorial that is focused on writing code to learn concepts. Introduction to Python is useful for industry engineers, researchers, and students who are looking for open-source solutions for numerical computation. In this book you will learn by doing, avoiding technical jargon, which makes the concepts easy to learn. First you'll see how to run basic calculations, absorbing technical complexities incrementally as you progress toward advanced topics. Throughout, the language is kept simple to ensure that readers at all levels can grasp the concepts. What You'll Learn Understand the fundamentals of the Python programming language Apply Python to numerical computational programming projects in engineering and science Discover the Pythonic way of life Apply data types, operators, and arrays Carry out plotting for visualization Work with functions and loops Who This Book Is For

Engineers, scientists, researchers, and students who are new to Python. Some prior programming experience would be helpful but not required. **Programming for Computations - MATLAB/Octave - Svein Linge** 2016-08-01

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.

Finite Difference Computing with Exponential Decay Models - Hans Petter Langtangen 2016-06-10

This text provides a very simple, initial introduction to the complete scientific computing pipeline: models, discretization, algorithms, programming, verification, and visualization. The pedagogical strategy is to use one case study – an ordinary differential equation describing

exponential decay processes – to illustrate fundamental concepts in mathematics and computer science. The book is easy to read and only requires a command of one-variable calculus and some very basic knowledge about computer programming. Contrary to similar texts on numerical methods and programming, this text has a much stronger focus on implementation and teaches testing and software engineering in particular.

Fundamentals of Data Visualization - Claus O. Wilke 2019-03-18

Effective visualization is the best way to communicate information from the increasingly large and complex datasets in the natural and social sciences. But with the increasing power of visualization software today, scientists, engineers, and business analysts often have to navigate a bewildering array of visualization choices and options. This practical book takes you through many commonly encountered visualization problems, and it provides guidelines on how to turn large datasets into clear and compelling figures. What visualization type is best for the story you want to tell? How do you make informative figures that are visually pleasing? Author Claus O. Wilke teaches you the elements most critical to successful data visualization. Explore the basic concepts of color as a tool to highlight, distinguish, or represent a value Understand the importance of redundant coding to ensure you provide key information in multiple ways Use the

book's visualizations directory, a graphical guide to commonly used types of data visualizations Get extensive examples of good and bad figures Learn how to use figures in a document or report and how employ them effectively to tell a compelling story

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.

Introduction to Python for Science and Engineering - David J. Pine

2019-03-15

Series in Computational Physics Steven A. Gottlieb and Rubin H. Landau,

Series Editors Introduction to Python for Science and Engineering This

guide offers a quick and incisive introduction to Python programming for anyone. The author has carefully developed a concise approach to using

Python in any discipline of science and engineering, with plenty of

examples, practical hints, and insider tips. Readers will see why Python is

such a widely appealing program, and learn the basics of syntax, data structures, input and output, plotting, conditionals and loops, user-defined functions, curve fitting, numerical routines, animation, and visualization.

The author teaches by example and assumes no programming

background for the reader. David J. Pine is the Silver Professor and

Professor of Physics at New York University, and Chair of the Department

of Chemical and Biomolecular Engineering at the NYU Tandon School of

Engineering. He is an elected fellow of the American Physical Society and

American Association for the Advancement of Science (AAAS), and is a

Guggenheim Fellow.