

Learning Scipy For Numerical And Scientific Computing Second Edition

[Learning Scipy for Numerical and Scientific Computing Second Edition](#) [Numerical Python Python Programming and Numerical Methods](#) [Elegant SciPy Learning SciPy for Numerical and Scientific Computing - Second Edition](#) [Mastering SciPy](#) [SciPy and NumPy](#) [Numerical Python](#) [Python for Data Analysis](#) [Numerical Methods in Engineering with Python 3](#) [Programming for Computations - Python](#) [Numerical Python in Astronomy and Astrophysics](#) [Numerical Methods in Physics with Python](#) [Introduction to Scientific Programming with Python](#) [A Primer on Scientific Programming with Python](#) [IPython Interactive Computing and Visualization Cookbook](#) [Python Data Science Handbook](#) [Python Scripting for Computational Science](#) [Scientific Computing with Python - Second Edition](#) [Guide to NumPy](#) [Python for Bioinformatics](#) [Elegant Scipy](#) [Learning Scientific Programming with Python](#) [Programming for Computations - Python](#) [A Student's Guide to Python for Physical Modeling: Second Edition](#) [Mastering SciPy](#) [Python for Data Mining](#) [Quick Syntax Reference](#) [Applied Scientific Computing](#) [Explorations In Numerical Analysis: Python Edition](#) [Python for Scientists](#) [Programming for Computations - Python](#) [NumPy Essentials](#) [Learning NumPy Array](#) [Introduction to Python for Engineers and Scientists](#) [Mastering Numerical Computing with NumPy](#) [Computational Physics](#) [Programming Computer Vision with Python](#) [Numerical Python](#) [Elementary Mechanics Using Matlab](#) [A Student's Guide to Python for Physical Modeling](#)

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Numerical Methods in Physics with Python Oct 23 2021 Bringing together idiomatic Python programming, foundational numerical methods, and physics applications, this is an ideal standalone textbook for courses on computational physics. All the frequently used numerical methods in physics are explained, including foundational techniques and hidden gems on topics such as linear algebra, differential equations, root-finding, interpolation, and integration. Accompanying the mathematical derivations are full implementations of dozens of numerical methods in Python, as well as more than 250 end-of-chapter problems. Numerical methods and physics examples are clearly separated, allowing this introductory book to be later used as a reference; the penultimate section in each chapter is an in depth project, tackling physics problems which cannot be solved without the use of a computer. Written primarily for students studying computational physics, this textbook brings the non-specialist quickly up to speed with Python before looking in detail at the numerical methods often used in the subject.

Elegant SciPy Aug 01 2022 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

Python for Scientists May 06 2020 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.

[Numerical Methods in Engineering with Python 3](#) Jan 26 2022 Provides an introduction to numerical methods for students in engineering. It uses Python 3, an easy-to-use, high-level programming language.

Computational Physics Oct 30 2019 This book explains the fundamentals of computational physics and describes the techniques that every physicist should know, such as finite difference methods, numerical quadrature, and the fast Fourier transform. The book offers a complete introduction to the topic at the undergraduate level, and is also suitable for the advanced student or researcher. The book begins with an introduction to Python, then moves on to a step-by-step description of the techniques of computational physics, with examples ranging from simple mechanics problems to complex calculations in quantum mechanics, electromagnetism, statistical mechanics, and more.

Python Scripting for Computational Science May 18 2021 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.

Numerical Python Oct 03 2022 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.

Learning Scientific Programming with Python Dec 13 2020 This fast-paced introduction to Python moves from the basics to advanced concepts, enabling readers to gain proficiency quickly.

Numerical Python Mar 28 2022 Numerical Python by Robert Johansson shows you how to leverage the numerical and mathematical modules in Python and its Standard Library as well as popular open source numerical Python packages like NumPy, FiPy, Pillow, matplotlib and more to numerically compute solutions and mathematically model applications in a number of areas like big data, cloud computing, financial engineering, business management and more. After reading and using this book, you'll get some takeaway case study examples of applications that can be found in areas like business management, big data/cloud computing, financial engineering (i.e., options trading investment alternatives), and even games. Up until very recently, Python was mostly regarded as just a web scripting language. Well, computational scientists and engineers have recently discovered the flexibility and power of Python to do more. Big data analytics and cloud computing programmers are seeing Python's immense use. Financial engineers are also now employing Python in their work. Python seems to be evolving as a language that can even rival C++, Fortran, and Pascal/Delphi for numerical and mathematical computations.

Explorations In Numerical Analysis: Python Edition Jun 06 2020 This textbook is intended to introduce advanced undergraduate and early-career graduate students to the field of numerical analysis. This field pertains to the design, analysis, and implementation of algorithms for the approximate solution of mathematical problems that arise in applications spanning science and engineering, and are not practical to solve using analytical techniques such as those taught in courses in calculus, linear algebra or differential equations. Topics covered include computer arithmetic, error analysis, solution of systems of linear equations, least squares problems, eigenvalue problems, nonlinear equations, optimization, polynomial interpolation and approximation, numerical differentiation and integration, ordinary differential equations, and partial differential equations. For each problem considered, the presentation includes the derivation of solution techniques, analysis of their efficiency, accuracy and robustness, and details of their implementation, illustrated through the Python programming language. This text is suitable for a year-long sequence in numerical analysis, and can also

be used for a one-semester course in numerical linear algebra.

Programming for Computations - Python Apr 04 2020 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.

Python for Data Analysis Feb 24 2022 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

Programming Computer Vision with Python Sep 29 2019 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 Learning Scipy for Numerical and Scientific Computing Second Edition Nov 04 2022

Programming for Computations - Python Dec 25 2021 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.

Elementary Mechanics Using Matlab Jul 28 2019 This book – specifically developed as a novel textbook on elementary classical mechanics – shows how analytical and numerical methods can be seamlessly integrated to solve physics problems. This approach allows students to solve more advanced and applied problems at an earlier stage and equips them to deal with real-world examples well beyond the typical special cases treated in standard textbooks. Another advantage of this approach is that students are brought closer to the way physics is actually discovered and applied, as they are introduced right from the start to a more exploratory way of understanding phenomena and of developing their physical concepts. While not a requirement, it is advantageous for the reader to have some prior knowledge of scientific programming with a scripting-type language. This edition of the book uses Matlab, and a chapter devoted to the basics of scientific programming with Matlab is included. A parallel edition using Python instead of Matlab is also available. Last but not least, each chapter is accompanied by an extensive set of course-tested exercises and solutions.

Applied Scientific Computing Jul 08 2020 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.

Scientific Computing with Python - Second Edition Apr 16 2021 Leverage this example-packed, comprehensive guide for all your Python computational needs Key Features: Learn the first steps within Python to highly specialized concepts Explore examples and code snippets taken from typical programming situations within scientific computing. Delve into essential computer science concepts like iterating, object-oriented programming, testing, and MPI presented in strong connection to applications within scientific computing. Book Description: Python has tremendous potential within the scientific computing domain. This updated edition of Scientific Computing with Python features new chapters on graphical user interfaces, efficient data processing, and parallel computing to help you perform mathematical and scientific computing efficiently using Python. This book will help you to explore new Python syntax features and create different models using scientific computing principles. The book presents Python alongside mathematical applications and demonstrates how to apply Python concepts in computing with the help of examples involving Python 3.8. You'll use pandas for basic data analysis to understand the modern needs of scientific computing, and cover data module improvements and built-in features. You'll also explore numerical computation modules such as NumPy and SciPy, which enable fast access to highly efficient numerical algorithms. By learning to use the plotting module Matplotlib, you will be able to represent your computational results in talks and publications. A special chapter is devoted to SymPy, a tool for bridging symbolic and numerical computations. By the end of this Python book, you'll have gained a solid understanding of task automation and how to implement and test mathematical algorithms within the realm of scientific computing. What You Will Learn: Understand the building blocks of computational mathematics, linear algebra, and related Python objects Use Matplotlib to create high-quality figures and graphics to draw and visualize results Apply object-oriented programming (OOP) to scientific computing in Python Discover how to use pandas to enter the world of data processing Handle exceptions for writing reliable and usable code Cover manual and automatic aspects of testing for scientific programming Get to grips with parallel computing to increase computation speed Who this book is for: This book is for students with a mathematical background, university teachers designing modern courses in programming, data scientists, researchers, developers, and anyone who wants to perform scientific computation in Python.

Learning SciPy for Numerical and Scientific Computing - Second Edition Jun 30 2022 This book targets programmers and scientists who have basic Python knowledge and who are keen to perform scientific and numerical computations with SciPy.

NumPy Essentials Mar 04 2020 Boost your scientific and analytic capabilities in no time at all by discovering how to build real-world applications with NumPy About This Book Optimize your Python scripts with powerful NumPy modules Explore the vast opportunities to build outstanding scientific/ analytical modules by yourself Packed with rich examples to help you master NumPy arrays and universal functions Who This Book Is For If you are an experienced Python developer who intends to drive your numerical and scientific applications with NumPy, this book is for you. Prior experience or knowledge of working with the Python language is required. What You Will Learn Manipulate the key attributes and universal functions of NumPy Utilize matrix and mathematical computation using linear algebra modules Implement regression and curve fitting for models Perform time frequency / spectral density analysis using the Fourier Transform modules Collate with the distutils and setuptools modules used by other Python libraries Establish Cython with NumPy arrays Write extension modules for NumPy code using the C API Build sophisticated data structures using NumPy array with libraries such as Panda and Scikits In Detail In today's world of science and technology, it's all about speed and flexibility. When it comes to scientific computing, NumPy tops the list. NumPy gives you both the speed and high productivity you need. This book will walk you through NumPy using clear, step-by-step examples and just the right amount of theory. We will guide you through wider applications of NumPy in scientific computing and will then focus on the fundamentals of NumPy, including array objects, functions, and matrices, each of them explained with practical examples. You will then learn about different NumPy modules while performing mathematical operations such as calculating the Fourier Transform; solving linear systems of equations, interpolation, extrapolation, regression, and curve fitting; and evaluating integrals and derivatives. We will also introduce you to using Cython with NumPy arrays and writing extension modules for NumPy code using the C API. This book will give you exposure to the vast NumPy library and help you build efficient, high-speed programs using a wide range of mathematical features. Style and approach This quick guide will help you get to grips with the nitty-gritties of NumPy using with practical programming examples. Each topic is explained in both theoretical and practical ways with hands-on examples providing you efficient way of learning and adequate knowledge to support your professional work.

SciPy and NumPy Apr 28 2022 "Optimizing and boosting your Python programming"--Cover.

A Primer on Scientific Programming with Python Aug 21 2021 The book serves as a first introduction to computer programming of scientific applications, using the high-level Python language. The exposition is example and problem-oriented, where the applications are taken from mathematics, numerical calculus, statistics, physics, biology

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

Numerical Python Aug 28 2019 Numerical Python by Robert Johansson shows you how to leverage the numerical and mathematical modules in Python and its Standard Library as well as popular open source numerical Python packages like NumPy, FiPy, matplotlib and more to numerically compute solutions and mathematically model applications in a number of areas like big data, cloud computing, financial engineering, business management and more. After reading and using this book, you'll get some takeaway case study examples of applications that can be found in areas like business management, big data/cloud computing, financial engineering (i.e., options trading investment alternatives), and even games. Up until very recently, Python was mostly regarded as just a web scripting language. Well, computational scientists and engineers have recently discovered the flexibility and power of Python to do more. Big data analytics and cloud computing programmers are seeing Python's immense use. Financial engineers are also now employing Python in their work. Python seems to be evolving as a language that can even rival C++, Fortran, and Pascal/Delphi for numerical and mathematical computations.

Elegant SciPy Jan 14 2021 Welcome to Scientific Python and its community! With this practical book, you'll learn the fundamental parts of SciPy and related libraries, and get a taste of beautiful, easy-to-read code that you can use in practice. More and more scientists are programming, and the SciPy library is here to help. Finding useful functions and using them correctly, efficiently, and in easily readable code are two very different things. You'll learn by example with some of the best code available, selected to cover a wide range of SciPy and related libraries—including scikit-learn, scikit-image, toolz, and pandas. The examples highlight clever, elegant uses of advanced features of NumPy, SciPy, and related libraries. Beginners will learn not the functionality of the library, but its application to real world problems. This book starts from first principles and provides all of the necessary background to understand each example, including idioms, libraries, and scientific concepts.

Python Data Science Handbook Jun 18 2021 For many researchers, Python is a first-class tool mainly because of its libraries for storing, manipulating, and gaining insight from data. Several resources exist for individual pieces of this data science stack, but only with the Python Data Science Handbook do you get them all—IPython, NumPy, Pandas, Matplotlib, Scikit-Learn, and other related tools. Working scientists and data crunchers familiar with reading and writing Python code will find this comprehensive desk reference ideal for tackling day-to-day issues: manipulating, transforming, and cleaning data; visualizing different types of data; and using data to build statistical or machine learning models. Quite simply, this is the must-have reference for scientific computing in Python. With this handbook, you'll learn how to use: IPython and Jupyter: provide computational environments for data scientists using Python NumPy: includes the ndarray for efficient storage and manipulation of dense data arrays in Python Pandas: features the DataFrame for efficient storage and manipulation of labeled/columnar data in Python Matplotlib: includes capabilities for a flexible range of data visualizations in Python Scikit-Learn: for efficient and clean Python implementations of the most important and established machine learning algorithms

Python for Data Mining Quick Syntax Reference Aug 09 2020 ?Learn how to use Python and its structures, how to install Python, and which tools are best suited for data analyst work. This book provides you with a handy reference and tutorial on topics ranging from basic Python concepts through to data mining, manipulating and importing datasets, and data analysis. Python for Data Mining Quick Syntax Reference covers each concept concisely, with many illustrative examples. You'll be introduced to several data mining packages, with examples of how to use each of them. The first part covers core Python including objects, lists, functions, modules, and error handling. The second part covers Python's most important data mining packages: NumPy and SciPy for mathematical functions and random data generation, pandas for dataframe management and data import, Matplotlib for drawing charts, and scikitlearn for machine learning. What You'll Learn Install Python and choose a development environment Understand the basic concepts of object-oriented programming Import, open, and edit files Review the differences between Python 2.x and 3.x Who This Book Is For Programmers new to Python's data mining packages or with experience in other languages, who want a quick guide to Pythonic tools and techniques.

Numerical Python in Astronomy and Astrophysics Nov 23 2021 This book provides a solid foundation in the Python programming language, numerical methods, and data analysis, all embedded within the context of astronomy and astrophysics. It not only enables students to learn programming with the aid of examples from these fields but also provides ample motivation for engagement in independent research. The book opens by outlining the importance of computational methods and programming algorithms in contemporary astronomical and astrophysical research, showing why programming in Python is a good choice for beginners. The performance of basic calculations with Python is then explained with reference to, for example, Kepler's laws of planetary motion and gravitational and tidal forces. Here, essential background knowledge is provided as necessary. Subsequent chapters are designed to teach the reader to define and use important functions in Python and to utilize numerical methods to solve differential equations and landmark dynamical problems in astrophysics. Finally, the analysis of astronomical data is discussed, with various hands-on examples as well as guidance on astronomical image analysis and applications of artificial neural networks.

A Student's Guide to Python for Physical Modeling Jun 26 2019 "Python is a computer programming language that is rapidly gaining popularity throughout the sciences. 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."--

Mastering SciPy Sep 09 2020 Implement state-of-the-art techniques to visualize solutions to challenging problems in scientific computing, with the use of the SciPy stack About This Book- Master the theory and algorithms behind numerical recipes and how they can be applied to real-world problems- Learn to combine the most appropriate built-in functions from the SciPy stack by understanding the connection between the sources of your problem, volume of data, or computer architecture- A comprehensive coverage of all the mathematical techniques needed to solve the presented topics, with a discussion of the relevant algorithms built in the SciPy stack Who This Book Is For If you are a mathematician, engineer, or computer scientist with a proficiency in Python and familiarity with IPython, this is the book for you. Some basic knowledge of numerical methods in scientific computing would be helpful. What You Will Learn- Master relevant algorithms used in symbolic or numerical mathematics to address approximation, interpolation, differentiation, integration, root-finding, and optimization of scalar or multi-variate functions- Develop different algorithms and strategies to efficiently store and manipulate large matrices of data, in particular to solve systems of linear equations, or compute their eigenvalues/eigenvectors- Understand how to model physical problems with systems of differential equations and distinguish the factors that dictate the strategies to solve them- Perform statistical analysis, hypothesis test design and resolution, or data mining at a higher level, and apply them to real-life problems in the field of data analysis- Gain insights on the power of distances, Delaunay triangulations and Voronoi diagrams for Computational Geometry, and apply them to various engineering problems- Familiarize yourself with different techniques in signal/image processing, including filtering audio, images, or video to extract information, features, or remove components In Detail The SciPy stack is a collection of open source libraries of the powerful scripting language Python, together with its interactive shells. This environment offers a cutting-edge platform for numerical computation, programming, visualization and publishing, and is used by some of the world's leading mathematicians, scientists, and engineers. It works on any operating system that supports Python and is very easy to install, and completely free of charge! It can effectively transform into a data-processing and system-prototyping environment, directly rivalling MATLAB and Octave. This book goes beyond a mere description of the different built-in functions coded in the libraries from the SciPy stack. It presents you with a solid mathematical and computational background to help you identify the right tools for each problem in scientific computing and visualization. You will gain an insight into the best practices with numerical methods depending on the amount or type of data, properties of the mathematical tools employed, or computer architecture, among other factors. The book kicks off with a concise exploration of the basics of numerical linear algebra and graph theory for the treatment of problems that handle large data sets or matrices. In the subsequent chapters, you will delve into the depths of algorithms in symbolic algebra and numerical analysis to address modeling/simulation of various real-world problems with functions (through interpolation, approximation, or creation of systems of differential equations), and extract their representing features (zeros, extrema, integration or differentiation). Lastly, you will move on to advanced concepts of data analysis, image/signal processing, and computational geometry. Style and approach Packed with real-world examples, this book explores the mathematical techniques needed to solve the presented topics, and focuses on the algorithms built in the SciPy stack.

Mastering SciPy May 30 2022 Implement state-of-the-art techniques to visualize solutions to challenging problems in scientific computing, with the use of the SciPy stack About This Book Master the theory and algorithms behind numerical recipes and how they can be applied to real-world problems Learn to combine the most appropriate built-in functions from the SciPy stack by understanding the connection between the sources of your problem, volume of data, or computer architecture A comprehensive coverage of all the mathematical techniques needed to solve the presented topics, with a discussion of the relevant algorithms built in the SciPy stack Who This Book Is

For If you are a mathematician, engineer, or computer scientist with a proficiency in Python and familiarity with IPython, this is the book for you. Some basic knowledge of numerical methods in scientific computing would be helpful. What You Will Learn Master relevant algorithms used in symbolic or numerical mathematics to address approximation, interpolation, differentiation, integration, root-finding, and optimization of scalar or multi-variate functions Develop different algorithms and strategies to efficiently store and manipulate large matrices of data, in particular to solve systems of linear equations, or compute their eigenvalues/eigenvectors Understand how to model physical problems with systems of differential equations and distinguish the factors that dictate the strategies to solve them Perform statistical analysis, hypothesis test design and resolution, or data mining at a higher level, and apply them to real-life problems in the field of data analysis Gain insights on the power of distances, Delaunay triangulations and Voronoi diagrams for Computational Geometry, and apply them to various engineering problems Familiarize yourself with different techniques in signal/image processing, including filtering audio, images, or video to extract information, features, or remove components In Detail The SciPy stack is a collection of open source libraries of the powerful scripting language Python, together with its interactive shells. This environment offers a cutting-edge platform for numerical computation, programming, visualization and publishing, and is used by some of the world's leading mathematicians, scientists, and engineers. It works on any operating system that supports Python and is very easy to install, and completely free of charge! It can effectively transform into a data-processing and system-prototyping environment, directly rivalling MATLAB and Octave. This book goes beyond a mere description of the different built-in functions coded in the libraries from the SciPy stack. It presents you with a solid mathematical and computational background to help you identify the right tools for each problem in scientific computing and visualization. You will gain an insight into the best practices with numerical methods depending on the amount or type of data, properties of the mathematical tools employed, or computer architecture, among other factors. The book kicks off with a concise exploration of the basics of numerical linear algebra and graph theory for the treatment of problems that handle large data sets or matrices. In the subsequent chapters, you will delve into the depths of algorithms in symbolic algebra and numerical analysis to address modeling/simulation of various real-world problems with functions (through interpolation, approximation, or creation of systems of differential equations), and extract their representing features (zeros, extrema, integration or differentiation). Lastly, you will move on to advanced concepts of data analysis, image/signal processing, and computational geometry. Style and approach Packed with real-world examples, this book explores the mathematical techniques needed to solve the presented topics, and focuses on the algorithms built in the SciPy stack.

A Student's Guide to Python for Physical Modeling: Second Edition Oct 11 2020 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.

Python Programming and Numerical Methods Sep 02 2022 Python Programming and Numerical Methods: A Guide for Engineers and Scientists introduces programming tools and numerical methods to engineering and science students, with the goal of helping the students to develop good computational problem-solving techniques through the use of numerical methods and the Python programming language. Part One introduces fundamental programming concepts, using simple examples to put new concepts quickly into practice. Part Two covers the fundamentals of algorithms and numerical analysis at a level that allows students to quickly apply results in practical settings. Includes tips, warnings and "try this" features within each chapter to help the reader develop good programming practice Summaries at the end of each chapter allow for quick access to important information Includes code in Jupyter notebook format that can be directly run online

Guide to NumPy Mar 16 2021 This is the second edition of Travis Oliphant's A Guide to NumPy originally published electronically in 2006. It is designed to be a reference that can be used by practitioners who are familiar with Python but want to learn more about NumPy and related tools. In this updated edition, new perspectives are shared as well as descriptions of new distributed processing tools in the ecosystem, and how Numba can be used to compile code using NumPy arrays. Travis Oliphant is the co-founder and CEO of Continuum Analytics. Continuum Analytics develops Anaconda, the leading modern open source analytics platform powered by Python. Travis, who is a passionate advocate of open source technology, has a Ph.D. from Mayo Clinic and B.S. and M.S. degrees in Mathematics and Electrical Engineering from Brigham Young University. Since 1997, he has worked extensively with Python for computational and data science. He was the primary creator of the NumPy package and founding contributor to the SciPy package. He was also a co-founder and past board member of NumFOCUS, a non-profit for reproducible and accessible science that supports the PyData stack. He also served on the board of the Python Software Foundation.

Mastering Numerical Computing with NumPy Dec 01 2019 Enhance the power of NumPy and start boosting your scientific computing capabilities Key Features Grasp all aspects of numerical computing and understand NumPy Explore examples to learn exploratory data analysis (EDA), regression, and clustering Access NumPy libraries and use performance benchmarking to select the right tool Book Description NumPy is one of the most important scientific computing libraries available for Python. Mastering Numerical Computing with NumPy teaches you how to achieve expert level competency to perform complex operations, with in-depth coverage of advanced concepts. Beginning with NumPy's arrays and functions, you will familiarize yourself with linear algebra concepts to perform vector and matrix math operations. You will thoroughly understand and practice data processing, exploratory data analysis (EDA), and predictive modeling. You will then move on to working on practical examples which will teach you how to use NumPy statistics in order to explore US housing data and develop a predictive model using simple and multiple linear regression techniques. Once you have got to grips with the basics, you will explore unsupervised learning and clustering algorithms, followed by understanding how to write better NumPy code while keeping advanced considerations in mind. The book also demonstrates the use of different high-performance numerical computing libraries and their relationship with NumPy. You will study how to benchmark the performance of different configurations and choose the best for your system. By the end of this book, you will have become an expert in handling and performing complex data manipulations. What you will learn Perform vector and matrix operations using NumPy Perform exploratory data analysis (EDA) on US housing data Develop a predictive model using simple and multiple linear regression Understand unsupervised learning and clustering algorithms with practical use cases Write better NumPy code and implement the algorithms from scratch Perform benchmark tests to choose the best configuration for your system Who this book is for Mastering Numerical Computing with NumPy is for you if you are a Python programmer, data analyst, data engineer, or a data science enthusiast, who wants to master the intricacies of NumPy and build solutions for your numeric and scientific computational problems. You are expected to have familiarity with mathematics to get the most out of this book.

Python for Bioinformatics Feb 12 2021 Python for Bioinformatics provides a clear introduction to the Python programming language and instructs beginners on the development of simple programming exercises. Important Notice: The digital edition of this book is missing some of the images or content found in the physical edition.

Programming for Computations - Python Nov 11 2020 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 Engineers and Scientists Jan 02 2020 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.

IPython Interactive Computing and Visualization Cookbook Jul 20 2021 Intended to anyone interested in numerical computing and data science: students, researchers, teachers, engineers, analysts, hobbyists... Basic knowledge of Python/NumPy is recommended. Some skills in mathematics will help you understand the theory behind the computational methods.

Learning NumPy Array Feb 01 2020 A step-by-step guide, packed with examples of practical numerical analysis that will give you a comprehensive, but concise

overview of NumPy. This book is for programmers, scientists, or engineers, who have basic Python knowledge and would like to be able to do numerical computations with Python.

Introduction to Scientific Programming with Python Sep 21 2021 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.