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NumPy Essentials

Boost your scientific and analytic capabilities in no time at all by discovering how to build real-world applications with NumPy

Leo (Liang-Huan) Chin
Tanmay Dutta

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Numpy Essentials

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Numpy Essentials Liang-Hua Chin, Tanmay Datta, 2016-04-28 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 gritty 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 *Learn Python by Building Data Science Applications* Philipp Kats, David Katz, 2019-08-30 Understand the constructs of the Python programming language and use them to build data science projects Key Features Learn the basics of developing applications with Python and deploy your first data application Take your first steps in Python programming by understanding and using data structures variables and loops Delve into Jupyter NumPy Pandas SciPy and sklearn to explore the data science ecosystem in Python Book Description Python is the most widely used programming language for building data science applications Complete with step by step instructions this book contains easy to follow tutorials to help you learn Python and develop real world data science projects The secret sauce of the book is its curated list of topics and solutions put together using a range

of real world projects covering initial data collection data analysis and production This Python book starts by taking you through the basics of programming right from variables and data types to classes and functions You ll learn how to write idiomatic code and test and debug it and discover how you can create packages or use the range of built in ones You ll also be introduced to the extensive ecosystem of Python data science packages including NumPy Pandas scikit learn Altair and Datashader Furthermore you ll be able to perform data analysis train models and interpret and communicate the results Finally you ll get to grips with structuring and scheduling scripts using Luigi and sharing your machine learning models with the world as a microservice By the end of the book you ll have learned not only how to implement Python in data science projects but also how to maintain and design them to meet high programming standards What you will learnCode in Python using Jupyter and VS CodeExplore the basics of coding loops variables functions and classesDeploy continuous integration with Git Bash and DVCGet to grips with Pandas NumPy and scikit learnPerform data visualization with Matplotlib Altair and DatashaderCreate a package out of your code using poetry and test it with PyTestMake your machine learning model accessible to anyone with the web APIWho this book is for If you want to learn Python or data science in a fun and engaging way this book is for you You ll also find this book useful if you re a high school student researcher analyst or anyone with little or no coding experience with an interest in the subject and courage to learn fail and learn from failing A basic understanding of how computers work will be useful

Python Data Analysis Avinash Navlani,Armando Fandango,Ivan Idris,2021-02-05 Understand data analysis pipelines using machine learning algorithms and techniques with this practical guide Key FeaturesPrepare and clean your data to use it for exploratory analysis data manipulation and data wranglingDiscover supervised unsupervised probabilistic and Bayesian machine learning methodsGet to grips with graph processing and sentiment analysisBook Description Data analysis enables you to generate value from small and big data by discovering new patterns and trends and Python is one of the most popular tools for analyzing a wide variety of data With this book you ll get up and running using Python for data analysis by exploring the different phases and methodologies used in data analysis and learning how to use modern libraries from the Python ecosystem to create efficient data pipelines Starting with the essential statistical and data analysis fundamentals using Python you ll perform complex data analysis and modeling data manipulation data cleaning and data visualization using easy to follow examples You ll then understand how to conduct time series analysis and signal processing using ARMA models As you advance you ll get to grips with smart processing and data analytics using machine learning algorithms such as regression classification Principal Component Analysis PCA and clustering In the concluding chapters you ll work on real world examples to analyze textual and image data using natural language processing NLP and image analytics techniques respectively Finally the book will demonstrate parallel computing using Dask By the end of this data analysis book you ll be equipped with the skills you need to prepare data for analysis and create meaningful data visualizations for forecasting values from data What you will learnExplore data

science and its various process models Perform data manipulation using NumPy and pandas for aggregating cleaning and handling missing values Create interactive visualizations using Matplotlib Seaborn and Bokeh Retrieve process and store data in a wide range of formats Understand data preprocessing and feature engineering using pandas and scikit learn Perform time series analysis and signal processing using sunspot cycle data Analyze textual data and image data to perform advanced analysis Get up to speed with parallel computing using Dask Who this book is for This book is for data analysts business analysts statisticians and data scientists looking to learn how to use Python for data analysis Students and academic faculties will also find this book useful for learning and teaching Python data analysis using a hands on approach A basic understanding of math and working knowledge of the Python programming language will help you get started with this book

Machine Learning Hero Quantum Technologies LLC, 2025-01-16 Learn machine learning through hands on Python projects covering core concepts essential libraries and real world applications for aspiring data scientists Key Features Comprehensive coverage of machine learning fundamentals and advanced topics Real world projects to apply skills in practical scenarios Integration of Python libraries for data science and AI development Book Description This book takes you on a journey through the world of machine learning beginning with foundational concepts such as supervised and unsupervised learning and progressing to advanced topics like feature engineering hyperparameter tuning and dimensionality reduction Each chapter blends theory with practical exercises to ensure a deep understanding of the material The book emphasizes Python introducing essential libraries like NumPy Pandas Matplotlib and Scikit learn along with deep learning frameworks like TensorFlow and PyTorch You ll learn to preprocess data visualize insights and build models capable of tackling complex datasets Hands on coding examples and exercises reinforce concepts and help bridge the gap between knowledge and application In the final chapters you ll work on real world projects like predictive analytics clustering and regression These projects are designed to provide a practical context for the techniques learned and equip you with actionable skills for data science and AI roles By the end you ll be prepared to apply machine learning principles to solve real world challenges with confidence What you will learn Build machine learning models using Python libraries Apply feature engineering and preprocessing techniques Visualize datasets with Matplotlib and Seaborn Optimize machine learning models with hyperparameter tuning Implement clustering and dimensionality reduction methods Work on real world projects for practical experience Who this book is for Aspiring data scientists software developers and tech enthusiasts seeking to master machine learning concepts and Python libraries Basic Python knowledge is recommended but not required as foundational topics are covered [Introduction to Scientific Programming with Python](#) Pankaj Jayaraman, 2025-02-20 Introduction to Scientific Programming with Python offers an immersive exploration into the dynamic field of scientific programming using Python We cater to a diverse audience serving as an entry point for novices and a valuable resource for seasoned practitioners in scientific computing Python s popularity in scientific circles stems from its readability versatility and

extensive libraries for numerical computing data analysis and visualization We cover fundamental programming concepts and gradually introduce advanced techniques specific to scientific applications From mastering Python basics to exploring advanced topics like machine learning and symbolic mathematics each chapter provides a structured and hands on learning experience Real world case studies practical examples and exercises ensure readers grasp theoretical concepts and gain practical skills Throughout the book Python becomes a tool of empowerment enabling readers to unravel complex scientific data model intricate phenomena and contribute meaningfully to their fields Introduction to Scientific Programming with Python is an invaluable companion for harnessing Python s potential in scientific inquiry and discovery By the end readers will have a robust foundation in Python and the confidence to apply scientific programming methodologies to real world problems This book unlocks the door to a world where Python drives exploration discovery and innovation in science

Profound Python Data Science Önder Teker,2023-11-26 The book covers data science topics in Python language Libraries such as Numpy Matplotlib Pandas Scipy are explained in detail In addition to data science the book contains the usage of many libraries for developers of Python The basic knowledge needed to use Artificial Intelligence Machine Learning Natural Language Processing Computer Vision features are covered The book contains tools for data analysis and business intelligence *Data Analysis Foundations with Python* Quantum Technologies LLC,2024-06-12 Dive into data analysis with Python starting from the basics to advanced techniques This course covers Python programming data manipulation with Pandas data visualization exploratory data analysis and machine learning Key Features From Python basics to advanced data analysis techniques Apply your skills to practical scenarios through real world case studies Detailed projects and quizzes to help gain the necessary skills Book DescriptionEmbark on a comprehensive journey through data analysis with Python Begin with an introduction to data analysis and Python setting a strong foundation before delving into Python programming basics Learn to set up your data analysis environment ensuring you have the necessary tools and libraries at your fingertips As you progress gain proficiency in NumPy for numerical operations and Pandas for data manipulation mastering the skills to handle and transform data efficiently Proceed to data visualization with Matplotlib and Seaborn where you ll create insightful visualizations to uncover patterns and trends Understand the core principles of exploratory data analysis EDA and data preprocessing preparing your data for robust analysis Explore probability theory and hypothesis testing to make data driven conclusions and get introduced to the fundamentals of machine learning Delve into supervised and unsupervised learning techniques laying the groundwork for predictive modeling To solidify your knowledge engage with two practical case studies sales data analysis and social media sentiment analysis These real world applications will demonstrate best practices and provide valuable tips for your data analysis projects What you will learn Develop a strong foundation in Python for data analysis Manipulate and analyze data using NumPy and Pandas Create insightful data visualizations with Matplotlib and Seaborn Understand and apply probability theory and hypothesis testing Implement supervised and unsupervised machine

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Python for ArcGIS Pro Silas Toms,Bill Parker,Dr. Christopher Tucker,Rene Rubalcava,2022-04-29 Extend your ArcGIS expertise by unlocking the world of Python programming A fully hands on guide that takes you through exercise after exercise using real data and real problems NOTE This book is compatible with ArcGIS Pro 2 9 Key FeaturesLearn the core components of the two Python modules for ArcGIS ArcPy and ArcGIS API for PythonUse ArcPy pandas NumPy and ArcGIS in ArcGIS Pro Notebooks to manage and analyze geospatial data at scaleIntegrate with ArcGIS Online using Python to publish and manage dataBook Description Integrating Python into your day to day ArcGIS work is highly recommended when dealing with large amounts of geospatial data Python for ArcGIS Pro aims to help you get your work done faster with greater repeatability and higher confidence in your results Starting from programming basics and building in complexity two experienced ArcGIS professionals turned Python programmers teach you how to incorporate scripting at each step automating the production of maps for print managing data between ArcGIS Pro and ArcGIS Online

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The Statistics and Calculus with Python Workshop Peter Farrell, Alvaro Fuentes, Ajinkya Sudhir Kolhe, Quan Nguyen, Alexander Joseph Sarver, Marios Tsatsos, 2020-08-18 With examples and activities that help you achieve real results applying calculus and statistical methods relevant to advanced data science has never been so easy Key Features Discover how most programmers use the main Python libraries when performing statistics with Python Use descriptive statistics and visualizations to answer business and scientific questions Solve complicated calculus problems such as arc length and solids of revolution using derivatives and integrals Book Description Are you looking to start developing artificial intelligence applications Do you need a refresher on key mathematical concepts Full of engaging practical exercises The Statistics and Calculus with Python Workshop will show you how to apply your understanding of advanced mathematics in the context of Python The book begins by giving you a high level overview of the libraries you'll use while performing statistics with Python As you progress you'll perform various mathematical tasks using the Python programming language such as solving algebraic functions with Python starting with basic functions and then working through transformations and solving equations Later chapters in the book will cover statistics and calculus concepts and how to use them to solve problems and gain useful insights Finally you'll study differential equations with an emphasis on numerical methods and learn about algorithms that directly calculate values of functions By the end of this book you'll have learned how to apply essential statistics and calculus concepts to develop robust Python applications that solve business challenges What you will learn Get to grips with the fundamental mathematical functions in Python Perform calculations on tabular datasets using pandas Understand the

differences between polynomials rational functions exponential functions and trigonometric functions Use algebra techniques for solving systems of equations Solve real world problems with probability Solve optimization problems with derivatives and integrals Who this book is for If you are a Python programmer who wants to develop intelligent solutions that solve challenging business problems then this book is for you To better grasp the concepts explained in this book you must have a thorough understanding of advanced mathematical concepts such as Markov chains Euler's formula and Runge Kutta methods as the book only explains how these techniques and concepts can be implemented in Python

Learning NumPy Array Ivan Idris, 2014-06-13 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

NumPy: Beginner's Guide Ivan Idris, 2015-06-24 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 will give you both speed and high productivity This book will walk you through NumPy with clear step by step examples and just the right amount of theory The book focuses 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 finding the inverse of a matrix and determining eigenvalues among many others This book is a one stop solution to knowing the ins and outs of the vast NumPy library empowering you to use its wide range of mathematical features to build efficient high speed programs

IPython Notebook Essentials L. Felipe Martins, 2014-11-21 If you are a professional student or educator who wants to learn to use IPython Notebook as a tool for technical and scientific computing visualization and data analysis this is the book for you This book will prove valuable for anyone that needs to do computations in an agile environment

Computational Modeling and Visualization of Physical Systems with Python Jay Wang, 2016-01-11 Computational Modeling by Jay Wang introduces computational modeling and visualization of physical systems that are commonly found in physics and related areas The authors begin with a framework that integrates model building algorithm development and data visualization for problem solving via scientific computing Through carefully selected problems methods and projects the reader is guided to learning and discovery by actively doing rather than just knowing physics

Machine Learning and Deep Learning Using Python and TensorFlow Venkata Reddy Konasani, Shailendra Kadre, 2021-04-29 Understand the principles and practices of machine learning and deep learning This hands on guide lays out machine learning and deep learning techniques and technologies in a style that is approachable using just the basic math required Written by a pair of experts in the field Machine Learning and Deep Learning Using Python and TensorFlow contains case studies in several industries including banking insurance e commerce retail and healthcare The book shows how to utilize machine learning and deep learning functions in today's smart devices and apps You will get download links for datasets code and sample

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The Numpy Pocketbook Silas Meadowlark,2023-08-21 The Numpy Pocketbook Essentials on the Go is your quick reference guide to mastering the nuances of the Python library Numpy Whether you re a seasoned programmer or just dipping your toes into the world of data analysis and computational programming this pocketbook is tailored just for you Dive into this concise guide and explore Getting Started with Numpy An introduction for those new to this powerful library Mastering Arrays Dive deep into the heart of Numpy s functionality Shape Transform Learn to manipulate and reshape your data with finesse Insights from Data Extract valuable insights from your datasets Matrix Wonders Navigate the magic of linear algebra and matrix computations Tips Tricks Pitfalls Avoid common mistakes and harness expert techniques Numpy in the Wild Real world applications and case studies using Numpy Packed with golden nuggets of information this pocketbook ensures you re always equipped with the essentials wherever you go So gear up and get ready to harness the full potential of Numpy with this handy companion *Maintenance Engineering Handbook, Ninth Edition* Keith Mobley,2025-08-22 The most complete and current guide to every aspect of maintenance engineering updated to reflect the latest advances in the industry The most comprehensive resource of its kind Maintenance Engineering Handbook has long been a staple for engineers managers and technicians seeking current advice on everything from tools and techniques to planning and

scheduling Since the last edition was published there have been exponential technology advancements that directly affect maintenance and maintenance engineering function Recent changes in technology especially those of predictive analytics wireless cloud base data acquisition and smart sensors have radically changed the landscape of both engineering and maintenance management This updated edition integrates these advances into a comprehensive approach to maintenance management with proven best practices for maintenance repair and overhaul MRO inventory management root cause analysis and performance management Featuring contributions from noted experts in the field Maintenance Engineering Handbook Ninth Edition will help engineers reduce excessive downtime and high maintenance costs by detecting and mitigating repetitive failures

Deep Learning with JAX Grigory Sapunov, 2024-12-03 Accelerate deep learning and other number intensive tasks with JAX Google's awesome high performance numerical computing library The JAX numerical computing library tackles the core performance challenges at the heart of deep learning and other scientific computing tasks By combining Google's Accelerated Linear Algebra platform XLA with a hyper optimized version of NumPy and a variety of other high performance features JAX delivers a huge performance boost in low level computations and transformations In Deep Learning with JAX you will learn how to Use JAX for numerical calculations Build differentiable models with JAX primitives Run distributed and parallelized computations with JAX Use high level neural network libraries such as Flax Leverage libraries and modules from the JAX ecosystem Deep Learning with JAX is a hands on guide to using JAX for deep learning and other mathematically intensive applications Google Developer Expert Grigory Sapunov steadily builds your understanding of JAX's concepts The engaging examples introduce the fundamental concepts on which JAX relies and then show you how to apply them to real world tasks You'll learn how to use JAX's ecosystem of high level libraries and modules and also how to combine TensorFlow and PyTorch with JAX for data loading and deployment About the technology Google's JAX offers a fresh vision for deep learning This powerful library gives you fine control over low level processes like gradient calculations delivering fast and efficient model training and inference especially on large datasets JAX has transformed how research scientists approach deep learning Now boasting a robust ecosystem of tools and libraries JAX makes evolutionary computations federated learning and other performance sensitive tasks approachable for all types of applications About the book Deep Learning with JAX teaches you to build effective neural networks with JAX In this example rich book you'll discover how JAX's unique features help you tackle important deep learning performance challenges like distributing computations across a cluster of TPUs You'll put the library into action as you create an image classification tool an image filter application and other realistic projects The nicely annotated code listings demonstrate how JAX's functional programming mindset improves composability and parallelization What's inside Use JAX for numerical calculations Build differentiable models with JAX primitives Run distributed and parallelized computations with JAX Use high level neural network libraries such as Flax About the reader For intermediate Python programmers who are familiar with deep learning

About the author Grigory Sapunov holds a Ph D in artificial intelligence and is a Google Developer Expert in Machine Learning The technical editor on this book was Nicholas McGreivy Table of Contents Part 1 1 When and why to use JAX 2 Your first program in JAX Part 2 3 Working with arrays 4 Calculating gradients 5 Compiling your code 6 Vectorizing your code 7 Parallelizing your computations 8 Using tensor sharding 9 Random numbers in JAX 10 Working with pytrees Part 3 11 Higher level neural network libraries 12 Other members of the JAX ecosystem A Installing JAX B Using Google Colab C Using Google Cloud TPUs D Experimental parallelization

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