Discrete Mathematics Python Programming

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Generate effective results in a variety of visually appealing charts using the plotting packages in Python About This Book Explore various tools and their strengths while building meaningful representations that can make it easier to understand data Packed with computational methods and algorithms in diverse fields of science Written in an easy-to-follow categorical style, this book discusses some niche techniques that will make your code easier to work with and reuse Who This Book Is For If you are a Python developer who performs data visualization and wants to develop existing knowledge about Python to build analytical results and produce some amazing visual display, then this book is for you. A basic knowledge level and understanding of Python libraries is assumed. What You Will Learn Gather, cleanse, access, and map data to a visual framework Recognize which visualization method is applicable and learn best practices for data visualization Get acquainted with reader-driven narratives and author-driven narratives and the principles of perception Understand why Python is an effective tool to be used for numerical computation much like MATLAB, and explore some interesting data structures that come with it Explore with various visualization choices how Python can be very useful in computation in the field of finance and statistics Get to know why Python is the second choice after Java, and is used frequently in the field of machine learning Compare Python with other visualization approaches using Julia and a JavaScript-based framework such as D3.js Discover how

Python can be used in conjunction with NoSQL such as Hive to produce results efficiently in a distributed environment In Detail Python has a handful of open source libraries for numerical computations involving optimization, linear algebra, integration, interpolation, and other special functions using array objects, machine learning, data mining, and plotting. Pandas have a productive environment for data analysis. These libraries have a specific purpose and play an important role in the research into diverse domains including economics, finance, biological sciences, social science, health care, and many more. The variety of tools and approaches available within Python community is stunning, and can bolster and enhance visual story experiences. This book offers practical guidance to help you on the journey to effective data visualization. Commencing with a chapter on the data framework, which explains the transformation of data into information and eventually knowledge, this book subsequently covers the complete visualization process using the most popular Python libraries with working examples. You will learn the usage of Numpy, Scipy, IPython, MatPlotLib, Pandas, Patsy, and Scikit-Learn with a focus on generating results that can be visualized in many different ways. Further chapters are aimed at not only showing advanced techniques such as interactive plotting; numerical, graphical linear, and non-linear regression; clustering and classification, but also in helping you understand the aesthetics and best practices of data visualization. The book concludes with interesting examples such as social networks, directed graph examples in real-life, data structures appropriate for these problems, and network analysis. By the end of this book, you will be able to effectively solve a broad set of data analysis problems. Style and approach The approach of this book is not step by step, but rather categorical. The categories are based on fields such as bioinformatics, statistical and

machine learning, financial computation, and linear algebra. This approach is beneficial for the community in many different fields of work and also helps you learn how one approach can make sense across many fields

The Discrete Math WorkbookA Companion Manual Using PythonSpringer Nature

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This textbook provides a broad introduction to continuous and discrete dynamical systems. With its hands-on approach, the text leads the reader from basic theory to recently published research material in nonlinear ordinary differential equations, nonlinear optics, multifractals, neural networks, and binary oscillator computing. Dynamical Systems with Applications Using Python takes advantage of Python's extensive visualization, simulation, and algorithmic tools to study those topics in nonlinear dynamical systems through numerical algorithms and generated diagrams. After a tutorial introduction to Python, the first part of the book deals with continuous systems using differential equations, including both ordinary and delay differential equations. The second part of the book deals with discrete dynamical systems and progresses to the study of both continuous and discrete systems in contexts like chaos control and synchronization, neural networks, and binary oscillator computing. These later sections are useful reference material for undergraduate student projects. The book is rounded off with example coursework to challenge students' programming abilities and Python-based exam questions. This book will appeal to advanced undergraduate and graduate students, applied mathematicians, engineers, and researchers in a range of disciplines, such as biology, chemistry, computing, economics, and physics. Since it provides a survey of dynamical systems, a familiarity with linear algebra, real and complex analysis, calculus, and ordinary differential equations

is necessary, and knowledge of a programming language like
C or Java is beneficial but not essential.
This textbook discusses the design and implementation of
basic algebraic graph algorithms, and algebraic graph
algorithms for complex networks, employing matroids
whenever possible. The text describes the design of a simple
parallel matrix algorithm kernel that can be used for parallel
processing of algebraic graph algorithms. Example code is
presented in pseudocode, together with case studies coded
in MATLAB, pMATLAB, and MPI. The text assumes readers
have a background in graph theory and/or graph algorithms.
This practically-focused study guide introduces the
fundamentals of discrete mathematics through an extensive
set of classroom-tested problems. Each chapter presents a
concise introduction to the relevant theory, followed by a
detailed account of common challenges and methods for
overcoming these. The reader is then encouraged to practice
solving such problems for themselves, by tackling a varied
selection of questions and assignments of different levels of
complexity. This updated second edition now covers the
design and analysis of algorithms using Python, and features
more than 50 new problems, complete with solutions. Topics
and features: provides a substantial collection of problems
and examples of varying levels of difficulty, suitable for both
laboratory practical training and self-study; offers detailed
solutions to each problem, applying commonly-used methods
and computational schemes; introduces the fundamentals of
mathematical logic, the theory of algorithms, Boolean algebra,
graph theory, sets, relations, functions, and combinatorics;
presents more advanced material on the design and analysis
of algorithms, including Turing machines, asymptotic analysis,
and parallel algorithms; includes reference lists of
trigonometric and finite summation formulae in an appendix,
together with basic rules for differential and integral calculus.

This hands-on workbook is an invaluable resource for undergraduate students of computer science, informatics, and electronic engineering. Suitable for use in a one- or two-semester course on discrete mathematics, the text emphasizes the skills required to develop and implement an algorithm in a specific programming language.

This clearly written textbook presents an accessible introduction to discrete mathematics for computer science students, offering the reader an enjoyable and stimulating path to improve their programming competence. The text empowers students to think critically, to be effective problem solvers, to integrate theory and practice, and to recognize the importance of abstraction. Its motivational and interactive style provokes a conversation with the reader through a questioning commentary, and supplies detailed walkthroughs of several algorithms. This updated and enhanced new edition also includes new material on directed graphs, and on drawing and coloring graphs, in addition to more than 100 new exercises (with solutions to selected exercises). Topics and features: assumes no prior mathematical knowledge, and discusses concepts in programming as and when they are needed; designed for both classroom use and self-study, presenting modular and self-contained chapters that follow ACM curriculum recommendations; describes mathematical processes in an algorithmic manner, often supported by a walkthrough demonstrating how the algorithm performs the desired task; includes an extensive set of exercises throughout the text, together with numerous examples, and shaded boxes highlighting key concepts; selects examples that demonstrate a practical use for the concept in question. Students embarking on the start of their studies of computer science will find this book to be an easy-to-understand and fun-to-read primer, ideal for use in a mathematics course taken concurrently with their first programming course.

Written for the one-term course, the Third Edition of Essentials of Discrete Mathematics is designed to serve computer science majors as well as students from a wide range of disciplines. The material is organized around five types of thinking: logical, relational, recursive, quantitative, and analytical. This presentation results in a coherent outline that steadily builds upon mathematical sophistication. Graphs are introduced early and referred to throughout the text, providing a richer context for examples and applications. tudents will encounter algorithms near the end of the text, after they have acquired the skills and experience needed to analyze them. The final chapter contains in-depth case studies from a variety of fields, including biology, sociology, linguistics, economics, and music. All the algorithms, proofs, and implementations in Python you need to know for tech job interviews and coding competitions. This volume contains the proceedings of the AMS Special Session on Algebraic and Geometric Methods in Applied Discrete Mathematics, held on January 11, 2015, in San Antonio, Texas. The papers present connections between techniques from "pure" mathematics and various applications amenable to the analysis of discrete models, encompassing applications of combinatorics, topology, algebra, geometry, optimization, and representation theory. Papers not only present novel results, but also survey the current state of knowledge of important topics in applied discrete mathematics. Particular highlights include: a new computational framework, based on geometric combinatorics, for structure prediction from RNA sequences; a new method for approximating the optimal solution of a sum of squares problem; a survey of recent Helly-type geometric theorems; applications of representation theory to voting theory and game theory; a study of fixed points of tensors; and exponential random graph models from the perspective of

algebraic statistics with applications to networks. This volume was written for those trained in areas such as algebra, topology, geometry, and combinatorics who are interested in tackling problems in fields such as biology, the social sciences, data analysis, and optimization. It may be useful not only for experts, but also for students who wish to gain an applied or interdisciplinary perspective.

A practical guide simplifying discrete math for curious minds and demonstrating its application in solving problems related to software development, computer algorithms, and data science Key Features: Apply the math of countable objects to practical problems in computer science Explore modern Python libraries such as scikit-learn, NumPy, and SciPy for performing mathematics Learn complex statistical and mathematical concepts with the help of hands-on examples and expert guidance Book Description: Discrete mathematics deals with studying countable, distinct elements, and its principles are widely used in building algorithms for computer science and data science. The knowledge of discrete math concepts will help you understand the algorithms, binary, and general mathematics that sit at the core of data-driven tasks. Practical Discrete Mathematics is a comprehensive introduction for those who are new to the mathematics of countable objects. This book will help you get up to speed with using discrete math principles to take your computer science skills to a more advanced level. As you learn the language of discrete mathematics, you'll also cover methods crucial to studying and describing computer science and machine learning objects and algorithms. The chapters that follow will guide you through how memory and CPUs work. In addition to this, you'll understand how to analyze data for useful patterns, before finally exploring how to apply math concepts in network routing, web searching, and data science. By the end of this book, you'll have a deeper

understanding of discrete math and its applications in computer science, and be ready to work on real-world algorithm development and machine learning. What You Will Learn: Understand the terminology and methods in discrete math and their usage in algorithms and data problems Use Boolean algebra in formal logic and elementary control structures Implement combinatorics to measure computational complexity and manage memory allocation Use random variables, calculate descriptive statistics, and find average-case computational complexity Solve graph problems involved in routing, pathfinding, and graph searches, such as depth-first search Perform ML tasks such as data visualization, regression, and dimensionality reduction Who this book is for: ?This book is for computer scientists looking to expand their knowledge of discrete math, the core topic of their field. University students looking to get hands-on with computer science, mathematics, statistics, engineering, or related disciplines will also find this book useful. Basic Python programming skills and knowledge of elementary real-number algebra are required to get started with this book.

Programming language has rendered itself as the language of choice for coding beginners and advanced software programmers alike. This book is written to help you master the basic concepts of Python and SQL coding and how you can utilize your coding skills to analyze a large volume of data and uncover valuable information that can otherwise be easily lost in the volume. Python was designed primarily to emphasize readability of the programming code, and its syntax enables programmers to convey ideas using fewer lines of code. The Structured Query Language (SQL) is the language of choice to define, manipulate, control, and query the data within an RDBMS. This book will provide you overarching guidance on how you can use Python to develop

machine learning models using Scikit-Learn, most widely used Python-based machine learning library. Python programming, data analysis, and machine learning are widely credited in the birth of the powerhouse, which is the "Silicon Valley." To become a machine learning expert, a sound and in-depth understanding of every nuance of this area is critical. On the other hand, you can efficiently and effectively learn and write SQL statements or queries to retrieve from and update data on relational databases such as MySQL. You will be able to install the free and open MySQL user interface with the instructions provided in this book. Some of the highlights of the book include: ? Key features and advantages of learning to code Python as well as the history of how Python programming was created. ? Step by step instructions on how to install Python on your operating systems (Windows, Mac, and Linux). ? Concept of Python data types is presented in exquisite detail with various examples of each data type. ? Learn how to create Python variables and assign desired data type to them. ? Includes comprehensive lists of a variety of built-in functions and methods supported by Python. ? Basic concepts of writing efficient and effective Python codes, focusing on various programming elements such as Booleans, Tuples, Sets, Dictionaries, and much more. ? A variety of SQL data types that are a pre-requisite for learning SQL have been explained in an easy to understand language. ? Learn how to create an effective database on the MySQL server as well as to create data tables and insert data into those tables. ? The key concept of SQL Joins is provided in exquisite detail including different SQL JOIN and the SQL Union functions. ? Learn CREATE VIEW, MERGE, TEMPTABLE, UNDEFINED, Updatable SQL Views, ALTER VIEW and CREATE OR REPLACE VIEW statements. ? The properties of SQL transactions as well as various SQL transaction statements with controlling clauses such as,

START TRANSACTION, COMMIT, ROLLBACK among others. Finally, as an added bonus you will learn some Python and SQL tips and tricks to take your machine learning programming game to the next level. Remember, knowledge is power, and with the great power you will gather from this book, you will be armed to make sound personal and professional technological choices. Don't miss the opportunity to quickly learn a programming language like SQL. Don't you think it can be that easy? If you really want to have proof of all this, don't waste any more time! Don't wait any longer! Grab your copy now!

The book discusses the fundamentals of high-performance computing. The authors combine visualization, comprehensibility, and strictness in their material presentation, and thus influence the reader towards practical application and learning how to solve real computing problems. They address both key approaches to programming modern computing systems: multithreading-based parallelizing in shared memory systems, and applying message-passing technologies in distributed systems. The book is suitable for undergraduate and graduate students, and for researchers and practitioners engaged with high-performance computing systems. Each chapter begins with a theoretical part, where the relevant terminology is introduced along with the basic theoretical results and methods of parallel programming, and concludes with a list of test questions and problems of varying difficulty. The authors include many solutions and hints, and often sample code. Automated question generation is critical for realizing personalized learning. Also, learning research shows that answering questions is a more effective method than rereading the textbook multiple times. However, creating different types of questions is intellectually

challenging and time-intensive. Therefore, it emphasizes a necessity for an automated way to generate questions and evaluate them. In this research after analyzing the existing approaches to automated question generation, we conclude that most of the current systems use natural language process techniques to extract questions from the text, therefore, other topics such as mathematics are lacking an automated question generation system that could help learners to assess their knowledge.In this research we present a novel framework that automatically generates unlimited numbers of questions for different topics in discrete mathematics. We created multiple algorithms for various questions in four main topics using Python. Our final product is presented as an application programming interface (API) using Flask library, which makes it easy to gain access and use this system in any future developments. Finally, we discuss the potential extensions that can be added to our framework as future contributions. The repository for this framework is freely available at https://github.com/SalarHoushvand/discrete-math-restfulAPI.

Discover how to build your own smart Internet of Things projects and bring a new degree of interconnectivity to your world About This Book Learn how to extract and analyse data from physical devices and build smart IoT projects Master the skills

of building enticing projects such as a neural network autonomous car, computer vision through a camera, and cloud-based IoT applications This project-based guide leverages revolutionary computing chips such as Raspberry Pi, Arduino, and so on Who This Book Is For If you are hobbyist who is keen on making smart IoT projects, then this book is for you. You should have a basic knowledge of Python. What You Will Learn Implement data science in your IoT projects and build a smart temperature controller Create a simple machine learning application and implement decision system concepts Develop a vision machine using OpenCV Build a robot car with manual and automatic control Implement speech modules with your own voice commands for IoT projects Connect IoT to a cloud-based server In Detail Internet of Things (IoT) is a groundbreaking technology that involves connecting numerous physical devices to the Internet and controlling them. Creating basic IoT projects is common, but imagine building smart IoT projects that can extract data from physical devices, thereby making decisions by themselves. Our book overcomes the challenge of analyzing data from physical devices and accomplishes all that your imagination can dream up by teaching you how to build smart IoT projects. Basic statistics and various applied algorithms in data science and machine learning are introduced to accelerate your knowledge of how to integrate a

decision system into a physical device. This book contains IoT projects such as building a smart temperature controller, creating your own vision machine project, building an autonomous mobile robot car, controlling IoT projects through voice commands, building IoT applications utilizing cloud technology and data science, and many more. We will also leverage a small yet powerful IoT chip, Raspberry Pi with Arduino, in order to integrate a smart decision-making system in the IoT projects. Style and approach The book follows a project-based approach to building smart IoT projects using powerful boards such as the Raspberry Pi, Arduino, and the IoT chip.

This student-friendly textbook encourages the development of programming skills through active practice by focusing on exercises that support hands-on learning. The Python Workbook provides a compendium of 186 exercises, spanning a variety of academic disciplines and everyday situations. Solutions to selected exercises are also provided, supported by brief annotations that explain the technique used to solve the problem, or highlight a specific point of Python syntax. This enhanced new edition has been thoroughly updated and expanded with additional exercises, along with concise introductions that outline the core concepts needed to solve them. The exercises and solutions require no prior background knowledge, beyond the material

covered in a typical introductory Python programming course. Features: Uses an accessible writing style and easy-to-follow structure Includes a mixture of classic exercises from the fields of computer science and mathematics, along with exercises that connect to other academic disciplines Presents the solutions to approximately half of the exercises Provides annotations alongside the solutions, which explain the approach taken to solve the problem and relevant aspects of Python syntax Offers a variety of exercises of different lengths and difficulties Contains exercises that encourage the development of programming skills using if statements, loops, basic functions, lists, dictionaries, files, and recursive functions Undergraduate students enrolled in their first programming course and wishing to enhance their programming abilities will find the exercises and solutions provided in this book to be ideal for their needs. Dr. Ben Stephenson is a Teaching Professor in the Department of Computer Science at the University of Calgary, AB, Canada. His other publications include the Springer textbook Fundamentals of Discrete Math for Computer Science: A Problem-Solving Primer. The view of discrete mathematics has evolved from a course in pure mathematics to a preparatory course for programming-related topics. There is an emphasis on explaining concepts using intuitive terms, to look at mathematical statements visually, to

reach audiences with varied learning abilities, and to encourage programming at a younger age. This book offers analysis of problems, many solutions, and techniques that are difficult to find in a single traditional textbook. The chapter on GEMS will captivate you - gold nuggets!Richard and Dean have a specific vision for this book, providing the use of graphics and programming in mathematical problem-solving. This is not a replacement for a traditional textbook but serves as a useful supplement to any mathematics course. Who could use this book?-Undergraduates-Pre-service teachers and in-service teachers-Computer science faculty-Discrete mathematics instructors-Instructors of mathematics applications courses-Amateur mathematiciansPrimary features include: -Easy and fun to read - take it to the beach!-Demonstrating proofs in an intuitive way -Involving graphics, visuals, and varied solutions-Problems explained and solved using Python programming-Viewing problems and solutions from dual perspectives-Independent of topics chosen

Readers will learn discrete mathematical abstracts as well as its implementation in algorithm and data structures shown in various programming languages, such as C, C++, PHP, Java, C#, Python and Dart. This book combines two major components of Mathematics and Computer Science under one roof. Without the core conceptions and tools derived from

discrete mathematics, one cannot understand the abstract or the general idea involving algorithm and data structures in Computer Science. The objects of data structures are basically objects of discrete mathematics. This book tries to bridge the gap between two major components of Mathematics and Computer Science.In any computer science course, studying discrete mathematics is essential, although they are taught separately, except in a few cases. Yet, a comprehensive book, combining these two major components, is hard to find out; not only that, it is almost impossible to understand one without the help of other.Hope, this book will fill the gap. Readers will learn discrete mathematical abstracts as well as its implementation in algorithm and data structures shown in various programming language, such as C++, Java, C#, Python and Dart.1. Introduction to the Discourse Is Discrete Mathematics enough to study Computer Science? A short Introduction to Discrete Mathematics What is Discrete Mathematics What is the relationship between Discrete Mathematics and Computer Science Introducing necessary conceptions 2. Introduction to Programming Language and Boolean Algebra Logic, Mathematics, and Programming Language Introduction to Boolean Algebra 3. De Morgan's Laws on Boolean Algebra, Logical Expression, and Algorithm Logical Expression Short Circuit Evaluation Syntax, Semantics and

Conditional Execution Why we need Control Constructs Discrete Mathematical Notations and Algorithm 4. Data Structures in different Programming languages Mean, Median and Mode Array, the First Step to Data Structure Let us understand some Array features Set Theory, Probability and Array Skewed Mean, Maximized Median Complex Array Algorithm 5. Data Structures: Abstractions and Implementation How objects work with each other More Algorithm and Time Complexity Introducing Data Structures How Calculus and Linear Algebra are Related to this Discourse 6. Data Structures in Detail Frequently Asked Questions about Data Structures Abstract Data Type (ADT) Linear Data Structures Modeling of a Structure ArrayList to overcome limitations of Array ArrayList or LinkedList, which is faster? Collection Framework in programming languages Stack and Queue in Java Deque, a high-performance Abstract Data Type 7. Algorithm, Data Structure, Collection Framework and Standard Template Library (STL) Introducing Algorithm Library Different types of Algorithms Binary Tree and Data Structure Collection Framework in Java Discrete Mathematical Abstractions and Implementation through Java Collection Comparator, Comparable and Iterator Standard Template Library in C++ 8. Time Complexity Order of n, or O(n) Big O Notation 9. Set, Symmetric Difference and Propositional Logic Why

Set is important in Data Structures How Symmetric Difference and Propositional Logic combine 10. Combinatorics and Counting, Permutation and Combinations Permutation and Combination What Next
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In Math for Programmers you'll explore important mathematical concepts through hands-on coding. Filled with graphics and more than 300 exercises and mini-projects, this book unlocks the door to interesting–and lucrative!–careers in some of today's hottest fields. As you tackle the basics of linear algebra, calculus, and machine learning, you'll master the key Python libraries used to turn them into real-world software applications. Summary To score a job in data science, machine learning, computer graphics, and cryptography, you need to bring strong math skills to the party. Math for Programmers teaches the math you need for these hot careers, concentrating on what you need to know as a developer. Filled with lots of helpful graphics and more than 200 exercises and mini-projects, this book unlocks the door to interesting–and lucrative!–careers in some of today's hottest programming fields. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Skip the mathematical jargon: This one-of-a-kind book uses Python to teach the math you

need to build games, simulations, 3D graphics, and
machine learning algorithms. Discover how algebra
and calculus come alive when you see them in code!
About the book In Math for Programmers you'll
explore important mathematical concepts through
hands-on coding. Filled with graphics and more than
300 exercises and mini-projects, this book unlocks
the door to interesting–and lucrative!–careers in
some of today's hottest fields. As you tackle the
basics of linear algebra, calculus, and machine
learning, you'll master the key Python libraries used
to turn them into real-world software applications.
What's inside Vector geometry for computer graphics
Matrices and linear transformations Core concepts
from calculus Simulation and optimization Image and
audio processing Machine learning algorithms for
regression and classification About the reader For
programmers with basic skills in algebra. About the
author Paul Orland is a programmer, software
entrepreneur, and math enthusiast. He is co-founder
of Tachyus, a start-up building predictive analytics
software for the energy industry. You can find him
online at www.paulor.land. Table of Contents 1
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to the 3D world 4 Transforming vectors and graphics
5 Computing transformations with matrices 6
Generalizing to higher dimensions 7 Solving systems
of linear equations PART 2 - CALCULUS AND

PHYSICAL SIMULATION 8 Understanding rates of change 9 Simulating moving objects 10 Working with symbolic expressions 11 Simulating force fields 12 Optimizing a physical system 13 Analyzing sound waves with a Fourier series PART 3 - MACHINE LEARNING APPLICATIONS 14 Fitting functions to data 15 Classifying data with logistic regression 16 Training neural networks

Python Algorithms, Second Edition explains the Python approach to algorithm analysis and design. Written by Magnus Lie Hetland, author of Beginning Python, this book is sharply focused on classical algorithms, but it also gives a solid understanding of fundamental algorithmic problem-solving techniques. The book deals with some of the most important and challenging areas of programming and computer science in a highly readable manner. It covers both algorithmic theory and programming practice, demonstrating how theory is reflected in real Python programs. Well-known algorithms and data structures that are built into the Python language are explained, and the user is shown how to implement and evaluate others.

Known for its accessible, precise approach, Epp's DISCRETE MATHEMATICS WITH APPLICATIONS, 5th Edition, introduces discrete mathematics with clarity and precision. Coverage emphasizes the major themes of discrete mathematics as well as the reasoning that underlies mathematical thought.

Students learn to think abstractly as they study the ideas of logic and proof. While learning about logic circuits and computer addition, algorithm analysis, recursive thinking, computability, automata, cryptography and combinatorics, students discover that ideas of discrete mathematics underlie and are essential to today's science and technology. The author's emphasis on reasoning provides a foundation for computer science and upper-level mathematics courses. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

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A complete guide for Python programmers to master scientific computing using Python APIs and tools About This Book The basics of scientific computing to advanced concepts involving parallel and large scale computation are all covered. Most of the Python APIs and tools used in scientific computing are discussed in detail The concepts are discussed with suitable example programs Who This Book Is For If you are a Python programmer and want to get your hands on scientific computing, this book is for you. The book expects you to have had exposure to

various concepts of Python programming. What You Will Learn Fundamentals and components of scientific computing Scientific computing data management Performing numerical computing using NumPy and SciPy Concepts and programming for symbolic computing using SymPy Using the plotting library matplotlib for data visualization Data analysis and visualization using Pandas, matplotlib, and IPython Performing parallel and high performance computing Real-life case studies and best practices of scientific computing In Detail In today's world, along with theoretical and experimental work, scientific computing has become an important part of scientific disciplines. Numerical calculations, simulations and computer modeling in this day and age form the vast majority of both experimental and theoretical papers. In the scientific method, replication and reproducibility are two important contributing factors. A complete and concrete scientific result should be reproducible and replicable. Python is suitable for scientific computing. A large community of users, plenty of help and documentation, a large collection of scientific libraries and environments, great performance, and good support makes Python a great choice for scientific computing. At present Python is among the top choices for developing scientific workflow and the book targets existing Python developers to master this domain using Python. The main things to

learn in the book are the concept of scientific workflow, managing scientific workflow data and performing computation on this data using Python. The book discusses NumPy, SciPy, SymPy, matplotlib, Pandas and IPython with several example programs. Style and approach This book follows a hands-on approach to explain the complex concepts related to scientific computing. It details various APIs using appropriate examples.

This book introduces Python as a powerful tool for the investigation of problems in computational biology, for novices and experienced programmers alike.

A PRACTICAL GUIDE TO OPTIMIZATION PROBLEMS WITH DISCRETE OR INTEGER VARIABLES, REVISED AND UPDATED The revised second edition of Integer Programming explains in clear and simple terms how to construct custom-made algorithms or use existing commercial software to obtain optimal or near-optimal solutions for a variety of real-world problems. The second edition also includes information on the remarkable progress in the development of mixed integer programming solvers in the 22 years since the first edition of the book appeared. The updated text includes information on the most recent developments in the field such as the much improved preprocessing/presolving and the many new ideas for primal heuristics included in the

solvers. The result has been a speed-up of several orders of magnitude. The other major change reflected in the text is the widespread use of decomposition algorithms, in particular column generation (branch-(cut)-and-price) and Benders' decomposition. The revised second edition: Contains new developments on column generation Offers a new chapter on Benders' algorithm Includes expanded information on preprocessing, heuristics, and branch-and-cut Presents several basic and extended formulations, for example for fixed cost network flows Also touches on and briefly introduces topics such as non-bipartite matching, the complexity of extended formulations or a good linear program for the implementation of lift-and-project Written for students of integer/mathematical programming in operations research, mathematics, engineering, or computer science, Integer Programming offers an updated edition of the basic text that reflects the most recent developments in the field.
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"This 10-volume compilation of authoritative, research-based articles contributed by thousands of researchers and experts from all over the world emphasized modern issues and the presentation of potential opportunities, prospective solutions, and future directions in the field of information science and technology"--Provided by publisher.
This book constitutes the proceedings of the 24th International Conference on Principles and Practice of Constraint Programming, CP 2018, held in Lille, France, in

August 2018.The 41 full and 9 short papers presented in this volume were carefully reviewed and selected from 114 submissions. They deal with all aspects of computing with constraints including theory, algorithms, environments, languages, models, systems, and applications such as decision making, resource allocation, scheduling, configuration, and planning. The papers were organized according to the following topics/tracks: main technical track; applications track; CP and data science; CP and music; CP and operations research; CP, optimization and power system management; multiagent and parallel CP; and testing and verification.

This practically-oriented textbook presents an accessible introduction to discrete mathematics through a substantial collection of classroom-tested exercises. Each chapter opens with concise coverage of the theory underlying the topic, reviewing the basic concepts and establishing the terminology, as well as providing the key formulae and instructions on their use. This is then followed by a detailed account of the most common problems in the area, before the reader is invited to practice solving such problems for themselves through a varied series of questions and assignments. Topics and features: provides an extensive set of exercises and examples of varying levels of complexity, suitable for both laboratory practical training and self-study; offers detailed solutions to many problems, applying commonly-used methods and computational schemes; introduces the fundamentals of mathematical logic, the theory of algorithms, Boolean algebra, graph theory, sets, relations, functions, and combinatorics; presents more advanced material on the design and analysis of algorithms, including asymptotic analysis, and parallel algorithms; includes reference lists of trigonometric and finite summation formulae in an appendix, together with basic rules for differential and

integral calculus. This hands-on study guide is designed to address the core needs of undergraduate students training in computer science, informatics, and electronic engineering, emphasizing the skills required to develop and implement an algorithm in a specific programming language.
This book constitutes the proceedings of the 22nd Conference on Integer Programming and Combinatorial Optimization, IPCO 2021, which took place during May 19-21, 2021. The conference was organized by Georgia Institute of Technology and planned to take place it Atlanta, GA, USA, but changed to an online format due to the COVID-19 pandemic. The 33 papers included in this book were carefully reviewed and selected from 90 submissions. IPCO is under the auspices of the Mathematical Optimization Society, and it is an important forum for presenting the latest results of theory and practice of the various aspects of discrete optimization.
Though Python takes its name from the comical British television series Monty Python's Flying Circus, the coding language is seriously powerful. Guido van Rossum, the programmer who wrote Python, was motivated to create a coding language that is intuitive and easy to understand. This book traces how van Rossum achieved his goal and how both novice programmers and experts use Python to create apps like Instagram and Pinterest and to achieve other objectives.
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