

# Data Structures By Puntambekar

The book is written for an undergraduate course on the Feedback Control Systems. It provides comprehensive explanation of theory and practice of control system engineering. It elaborates various aspects of time domain and frequency domain analysis and design of control systems. Each chapter starts with the background of the topic. Then it gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The explanations are given using very simple and lucid language. All the chapters are arranged in a specific sequence which helps to build the understanding of the subject in a logical fashion. The book starts with explaining the various types of control systems. Then it explains how to obtain the mathematical models of various types of systems such as electrical, mechanical, thermal and liquid level systems. Then the book includes good coverage of the block diagram and signal flow graph methods of representing the various systems and the reduction methods to obtain simple system from the analysis point of view. The book further illustrates the steady state and transient analysis of control systems. The book covers the fundamental knowledge of controllers used in practice to optimize the performance of the systems. The book emphasizes the detailed analysis of second order systems as these systems are common in practice and higher order systems can be approximated as second

order systems. The book teaches the concept of stability and time domain stability analysis using Routh-Hurwitz method and root locus method. It further explains the fundamentals of frequency domain analysis of the systems including co-relation between time domain and frequency domain. The book gives very simple techniques for stability analysis of the systems in the frequency domain, using Bode plot, Polar plot and Nyquist plot methods. It also explores the concepts of compensation and design of the control systems in time domain and frequency domain. The classical approach loses the importance of initial conditions in the systems. Thus, the book provides the detailed explanation of modern approach of analysis which is the state variable analysis of the systems including methods of finding the state transition matrix, solution of state equation and the concepts of controllability and observability. The variety of solved examples is the feature of this book which helps to inculcate the knowledge of the design and analysis of the control systems in the students. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

This textbook provides comprehensive introduction to scripting languages that are used for creating web based applications. The book is divided into five different sections. In the first section the book introduces web site basics, HTTP, HTML5 and CSS3. The second and third section is based on client side and server side scripting. In these sections, the client side scripting such as JavaScript, DHTML and JSON is introduced. The sever

side programming includes Servlet programming and JSP. In this section Java Database Connectivity is introduced and Simple Web Applications based on database connectivity have been developed. The fourth section deals with PHP and XML. The last section includes introduction to AJAX and Web Services. A database driven web service is developed and explained in step by step manner. At the end of the book some sample programs based on various scripting languages are given. The books helps the reader to learn the internet programming in the most lucid way. Various programming examples discussed in this book will motivate the students to learn the subject.

Crucial reading for those concerned with education and school reform.

This book uses meta-analysis to synthesize research on scaffolding and scaffolding-related interventions in STEM (science, technology, engineering, and mathematics) education. Specifically, the volume examines the extent to which study quality, assessment type, and scaffolding characteristics (strategy, intended outcome, fading schedule, scaffolding intervention, and paired intervention) influence cognitive student outcomes. It includes detailed descriptions of the theoretical foundations of scaffolding, scaffolding strategies that have been proposed to meet different intended learning outcomes in STEM, and associated efficacy information. Furthermore, the book describes assessment strategies and study designs which can be used to evaluate the influence of scaffolding, and suggests new fields in which scaffolding strategies that have proven efficacious may

be used.

These two volumes constitute the Proceedings of the 7th International Workshop on Soft Computing Applications (SOFA 2016), held on 24–26 August 2016 in Arad, Romania. This edition was organized by Aurel Vlaicu University of Arad, Romania, University of Belgrade, Serbia, in conjunction with the Institute of Computer Science, Iasi Branch of the Romanian Academy, IEEE Romanian Section, Romanian Society of Control Engineering and Technical Informatics (SRAIT) - Arad Section, General Association of Engineers in Romania - Arad Section, and BTM Resources Arad. The soft computing concept was introduced by Lotfi Zadeh in 1991 and serves to highlight the emergence of computing methodologies in which the accent is on exploiting the tolerance for imprecision and uncertainty to achieve tractability, robustness and lower costs. Soft computing facilitates the combined use of fuzzy logic, neurocomputing, evolutionary computing and probabilistic computing, leading to the concept of hybrid intelligent systems. The rapid emergence of new tools and applications calls for a synergy of scientific and technological disciplines in order to reveal the great potential of soft computing in all domains. The conference papers included in these proceedings, published post-conference, were grouped into the following areas of research: • Methods and Applications in Electrical Engineering • Knowledge-Based Technologies for Web Applications, Cloud Computing, Security Algorithms and Computer Networks • Biomedical Applications • Image, Text and Signal

Processing • Machine Learning and Applications • &nb  
sp; Business Process Management • Fuzzy  
Applications, Theory and Fuzzy Control • Computational  
Intelligence in Education • Soft Computing & Fuzzy  
Logic i n Biometrics (SCFLB) • Soft Computing  
Algorithms Applied in Economy, Industry and  
Communication Technology • Modelling and  
Applications in Textiles The book helps to disseminate  
advances in selected active research directions in the  
field of soft computing, along with current issues and  
applications of related topics. As such, it provides  
valuable information for professors, researchers and  
graduate students in the area of soft computing  
techniques and applications.

This textbook has been written in such a way that the  
concepts are explained with the help of examples. The  
book covers the topics right from basics of PHP  
programming such as variables, data types, operators,  
control structures, arrays to graphics. The book also  
covers implementation of object oriented concepts such  
as classes, objects, inheritance, overloading and so on.  
In the next subsequent unit, the textbook covers creating  
and validating forms. Finally, the book explains how to  
connect to database using PHP and MySQL laying more  
stress on examples. Thus this book helps the students to  
learn the PHP programming in the most lucid way.  
This book covers the object oriented programming  
aspects using Java programming. It focuses on  
developing the applications both at basic and moderate  
level. In this book there are number of illustrative  
programming examples that help the students to

understand the concepts. Starting from introduction to Java programming, handling of control statements, arrays, objects and classes, this book moves gradually towards Exception handling, Interfaces, Collection classes and concurrent programming with the help of Java threads. In addition, the book also covers JAVA FX basics, Event driven programming, Animations, creating GUI applications and multimedia using JAVA FX.

Explanation of all the object oriented programming concepts is given in simple and expressive language. Also, the Java programs are followed by step by step explanation. This book explains the object oriented programming concepts in such a way that even if the reader having no Java programming background can develop the applications with ease.

This book offers a concise and easy-to-understand overview of facts and concepts in pelvic anatomy. Laparoscopy provides good vision in a limited field, which means that surgeons have to rely on their anatomical knowledge of what structures lie in the vicinity and which structures need to be preserved. Focusing on surgical anatomy, the book helps laparoscopic surgeons better understand the female pelvic structures so improve their surgical skills.

JavaScript is an important scripting language for almost every modern web application. It is simple for beginners but complex when you build a full-scale application. The book is extremely user-friendly. It assumes no programming experience and helps the students to learn the JavaScript in step by step manner with the help of illustrative examples.

The first two units cover the fundamental concepts of JavaScript such as variables, operators, control structures, arrays, functions and strings. In the third unit, the concept of

form and event handling is discussed. This feature of JavaScript help us to design the interactive web page with graphical user interface. In the next subsequent chapter, the book demonstrates how to create and manage cookies, how to create browser history, implementation of form validation with the help of regular expressions, creating rollover effects and creating and handling frames. At the end, the book illustrates creation of banner, management of status bar and creation of slideshows using JavaScript. This book serves the purpose of teaching JavaScript in the simplest and easiest manner.

Basic Terminology, Elementary Data Organization, Structure Operations, Algorithm Complexity and Time-Space trade-off  
Arrays : Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address Calculation, Application of Arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors.  
Stacks : Array Representation and Implementation of Stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of Stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of Postfix expression using Stack.  
Recursion : Recursive Definition and Processes, Recursion in C, Example of Recursion, Tower of Hanoi Problem, Simulating Recursion, Backtracking, Recursive Algorithms, Principles of Recursion, Tail Recursion, Removal of Recursion.  
Queues : Array and Linked Representation and Implementation of Queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular Queues, D-Queues and Priority Queues.  
Linked List : Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to/from Linked Lists, Insertion and Deletion Algorithms, Doubly

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Linked List, Linked List in Array, Polynomial Representation and Addition, Generalized Linked List, Garbage Collection and Compaction. Trees : Basic Terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary Trees, Traversing Binary Trees, Threaded Binary Trees, Traversing Threaded Binary Trees, Huffman Algorithm. Searching and Hashing : Sequential Search, Binary Search, Comparison and Analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Sorting : Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical Consideration for Internal Sorting. Binary Search Trees : Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees. Graphs : Terminology & Representations, Graphs & Multi-Graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees. File Structures : Physical Storage Media File Organization, Organization of Records into Blocks, Sequential Files, Indexing and Hashing, Primary Indices, Secondary Indices, B+ Tree Index Files, B Tree Index Files, Indexing and Hashing Comparisons.

Theory of Automata is designed to serve as a textbook for undergraduate students of B..E, B.Tech. CSE and MCA/IT. It attempts to help students grasp the essential concepts involved in automata theory.

This book reviews the fundamentals, background and theoretical concepts of optimization principles in comprehensive manner along with their potentials applications and implementation strategies. The book will be very useful for wide spectrum of target readers such as



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research scholars, academia, and industry professionals. The book has been developed to provide comprehensive and consistent coverage of both the concepts of data structures as well as implementation of these concepts using C programming. The book utilizes a systematic approach wherein each data structure is explained using examples followed by its implementation using a programming language. It begins with the introduction to data types. In this, an overview of various types of data structures is given and asymptotic notations, best case, worst case and average case time complexity is discussed. The book then focuses on the linear data structures such as arrays, stacks, queues and linked lists. In these units each concept is followed by its implementation and logic explanation part. The book then covers the non-linear data structures such as trees and graphs. These data structures are very well explained with the help of illustrative diagrams, examples and implementations. The text book then covers two important topics - hashing and file structures. While explaining the hashing - various hashing methods, and collision handling techniques are explained with necessary illustrations and examples. File structures are demonstrated by implementing sequential, index sequential and random file organization. Finally searching and sorting algorithms, their implementation and time complexities are discussed. The sorting and searching methods are illustrated systematically with the help of examples. The explanation in this book is in a very simple language along with clear and concise form which will help the students to have clear-cut understanding of the subject. This book has been designed for B.E., M.C.A., B.C.A. or M.Sc Students of most Indian universities as well as those preparing for C-related aptitude tests and interviews. Analysis of signals is given in first chapter. Types of

signals, properties of systems are also presented. Second chapter presents Fourier series analysis. Its properties are also discussed. Fourier transform is given in third chapter, along with its properties. The transmission of signals through linear systems is given in fourth chapter. Realizability and distortion less transmission is also discussed. Fifth chapter discusses, convolution, its properties and impulse response properties of LTI systems. Causality and stability are discussed. Autocorrelation and cross correlation is also given. Energy spectral density and power spectral density along with their properties are also given. Sampling principles and types are given in sixth chapter. Chapter seventh and eighth presents Laplace transforms and z-transforms in detail. Their properties, inversion and applications to LTI systems are analyzed in detail. Relationships among transforms are also given. All the concepts are supported with lot of solved examples. This book covers the object oriented programming aspects using C++ programming. It focuses on developing the applications both at basic and moderate level. In this book there are number of illustrative programming examples that help the students to understand the concepts. Starting from introduction to object oriented programming, handling of control statements using C++, arrays, objects and classes, this book moves gradually towards the concept of overloading, inheritance, Exception handling, and I/O operations. In the later part of this book, concept of multicore programming is discussed. This chapter also focuses on the operating system's role in multicore

programming. Then in the next subsequent unit, the concept of processes, interface classes and predicates is discussed. Lastly, the creation and handling of threads, thread scheduling and priorities are illustrated with the help of simple and easy to understand programs. Then there is a discussion on how the communication and synchronization of concurrent tasks take place. This book doesn't just provide a collection of ready-made programs but teaching you the basics of object oriented programming through C++ and multicore programming quickly and painlessly.

'The book under review is an interesting elaboration that fills the gaps in libraries for concisely written and student-friendly books about essentials in computer science ... I recommend this book for anyone who would like to study algorithms, learn a lot about computer science or simply would like to deepen their knowledge ... The book is written in very simple English and can be understood even by those with limited knowledge of the English language. It should be emphasized that, despite the fact that the book consists of many examples, mathematical formulas and theorems, it is very hard to find any mistakes, errors or typos.'

zbMATHIn computer science, an algorithm is an unambiguous specification of how to solve a class of problems. Algorithms can perform calculation, data processing and automated reasoning tasks. As an effective method, an algorithm can be expressed within a finite amount of space and time and in a well-defined formal language for calculating a function. Starting from an initial state and initial input (perhaps empty), the instructions describe a computation

that, when executed, proceeds through a finite number of well-defined successive states, eventually producing 'output' and terminating at a final ending state. The transition from one state to the next is not necessarily deterministic; some algorithms, known as randomized algorithms, incorporate random input. This book introduces a set of concepts in solving problems computationally such as Growth of Functions; Backtracking; Divide and Conquer; Greedy Algorithms; Dynamic Programming; Elementary Graph Algorithms; Minimal Spanning Tree; Single-Source Shortest Paths; All Pairs Shortest Paths; Flow Networks; Polynomial Multiplication, to ways of solving NP-Complete Problems, supported with comprehensive, and detailed problems and solutions, making it an ideal resource to those studying computer science, computer engineering and information technology.

This book initiates the descriptions of the practical performance of different hysterectomies with conventional and robotically assisted laparoscopy, laparotomy and vaginal surgery. Laparoscopic hysterectomy has been out as an additional technique for hysterectomies for the last couple of decades. As the necessary light, augmentation and advanced skill has only been introduced into this already 200 year old surgical procedure within the last few decades by laparoscopy, the editors aim to look at the laparoscopic procedures followed by the traditional techniques of hysterectomy with laparotomy and vaginal surgery. Provides a comprehensive coverage of the subject, Includes numerous illustrative example, Demonstrate the

development of algorithms in a lucid manner,  
Demonstrate the implementation of algorithms in a good programming style, provides challenging programming exercise to test you knowledge gained about the subject,  
Glossary of terms for ready reference

The book has been developed to provide comprehensive and consistent coverage of both the concepts of data structures as well as implementation of these concepts using Python and C++ language. The book utilizes a systematic approach wherein each data structure is explained using examples followed by its implementation using suitable programming language. It begins with the introduction to data structures and algorithms. In this, an overview of various types of data structures is given and asymptotic notations, best case, worst case and average case time complexity is discussed. This part is concluded by discussing the two important algorithmic strategies such as - divide and conquer and greedy method. The book then focuses on the linear data structures such as arrays in which types of arrays, concept of ordered list, implementation of polynomial using arrays and sparse matrix representation and operations are discussed. The implementation of these concepts is using Python and C++ programming language. Then searching and sorting algorithms, their implementation and time complexities are discussed. The sorting and searching methods are illustrated systematically with the help of examples. The book then covers the linear data structures such as linked list, stacks and queues. These data structures are very well explained with the help of illustrative diagrams, examples and implementations. The explanation in this

book is in a very simple language along with clear and concise form which will help the students to have clear-cut understanding of the subject.

This book is designed for the 3rd semester gtu engineering students pursuing the probability and statistics (code 3130006). The crisp but complete explanation of topics will help the students easily understand the basic concepts. The tutorial approach (I.E. Teach by example) followed in the text will enable students develop a logical perspective to solving problems.

This textbook is designed to learn python programming from scratch. At the beginning of the book general problem solving concepts such as types of problems, difficulties in problem solving, and problem solving aspects are discussed. From this book, you will start learning the Python programming by knowing about the variables, constants, keywords, data types, indentation and various programming constructs. The most commonly used types such as Lists, Tuples, dictionaries are also discussed with necessary examples and illustrations. The book includes the concepts of functions, lambda functions, modules and strings. In the later part of this book the concept of object oriented programming using Python is discussed in detail. Finally how to handle files and directories using Python is discussed. At the end of book some sample programs in Python are given that are based

on the programming constructs. Python will be most demanded language after Java in future. So learning Python is need for today's software professionals. This book serves the purpose of teaching Python programming in the simplest and easiest manner. This well-organized textbook provides the design techniques of algorithms in a simple and straight forward manner. The book begins with a description of the fundamental concepts such as algorithm, functions and relations, vectors and matrices. Then it focuses on efficiency analysis of algorithms. In this unit, the technique of computing time complexity of the algorithm is discussed along with illustrative examples. Gradually, the text discusses various algorithmic strategies such as divide and conquer, dynamic programming, Greedy algorithm, backtracking and branch and bound. Finally the string matching algorithms and introduction to NP completeness is discussed. Each algorithmic strategy is explained in stepwise manner, followed by examples and pseudo code. Thus this book helps the reader to learn the analysis and design of algorithms in the most lucid way.

Collaborative learning has become an increasingly important part of education, but the research supporting it is distributed across a wide variety of fields including social, cognitive, developmental, and educational psychology, instructional design, the learning sciences, educational technology, socio-

cultural studies, and computer-supported collaborative learning. The goal of this book is to integrate theory and research across these diverse fields of study and, thereby, to forward our understanding of collaborative learning and its instructional applications. The book is structured into the following 4 sections: 1) Theoretical Foundations 2) Research Methodologies 3) Instructional Approaches and Issues and 4) Technology. Key features include the following: Comprehensive and Global – This is the first book to provide a comprehensive review of the widely scattered research on collaborative learning including the contributions of many international authors. Cross disciplinary – The field of collaborative learning is highly interdisciplinary drawing scholars from psychology, computer science, mathematics education, science education, and educational technology. Within psychology, the book brings together perspectives from cognitive, social, and developmental psychology as well as from the cross-disciplinary field of the learning sciences. Chapter Structure – To ensure consistency across the book, authors have organized their chapters around integrative themes and issues. Each chapter author summarizes the accumulated literature related to their chapter topic and identifies the strengths and weaknesses of the supporting evidence. Strong Methodology – Each chapter within the extensive



methodology section describes a specific methodology, its underlying assumptions, and provide examples of its application. This book is appropriate for researchers and graduate level instructors in educational psychology, learning sciences, cognitive psychology, social psychology, computer science, educational technology, teacher education and the academic libraries serving them. It is also appropriate as a graduate level textbook in collaborative learning, computer-supported collaborative learning, cognition and instruction, educational technology, and learning sciences. Advanced Data Structures is a core subject in Computer Science. It includes a solid introduction to algorithms, data structures and uses C++ syntax and structure in the design of data structures. This textbook helps the students to make the transition from fundamentals of data structures to an advanced level of data structures and their applications. At the beginning, the non-linear data structures such as trees and graphs are discussed in the first two units. In the third unit, the concept of hashing is discussed. In this, the hashing methods, collision handling techniques, concept of dictionary and skip lists are discussed. Next two units are based on search trees and multiway trees. These are basically the advanced level tree structures such as AVL trees, Optimal Binary Search Trees (OBST), B trees, B+ trees, Trie trees, Red-black trees, KD trees and AA

trees. Sufficient number of examples and programming illustrations are supported for better understanding of the complex concepts in the simplest manner. Finally, the file organization is discussed, in which various file organization techniques and implementation is illustrated. The objective of this book is to enable students to have the much-needed foundation for advanced technical skill, leading to better problem-solving approach.

"This book is a collection of the latest developments, models, and applications within the transdisciplinary fields related to metaheuristic computing, providing readers with insight into a wide range of topics such as genetic algorithms, differential evolution, and ant colony optimization"--Provided by publisher.

The book has been developed to provide comprehensive and consistent coverage of concepts of automata theory, formal languages and computation. This book begins by giving prerequisites for the subject, like strings, languages, types of automata, deterministic and non-deterministic automata. It proceeds forward to discuss advanced concepts like regular expressions, context free grammar and pushdown automata. The text then goes on to give a detailed description of context free and non context free languages and Turing Machine with its complexity. This compact and well-organized book provides a clear understanding of the subject with its emphasis on

concepts along with a large number of examples. Advanced Data Structures presents a comprehensive look at the ideas, analysis, and implementation details of data structures as a specialized topic in applied algorithms. Data structures are how data is stored within a computer, and how one can go about searching for data within. This text examines efficient ways to search and update sets of numbers, intervals, or strings by various data structures, such as search trees, structures for sets of intervals or piece-wise constant functions, orthogonal range search structures, heaps, union-find structures, dynamization and persistence of structures, structures for strings, and hash tables. This is the first volume to show data structures as a crucial algorithmic topic, rather than relegating them as trivial material used to illustrate object-oriented programming methodology, filling a void in the ever-increasing computer science market. Numerous code examples in C and more than 500 references make Advanced Data Structures an indispensable text. Numerous code examples in C and more than 500 references make Advanced Data Structures an indispensable text.

"This reference is a broad, multi-volume collection of the best recent works published under the umbrella of computer engineering, including perspectives on the fundamental aspects, tools and technologies, methods and design, applications, managerial impact,

social/behavioral perspectives, critical issues, and emerging trends in the field"--Provided by publisher. This book is designed for the way we learn and intended for one-semester course in Design and Analysis of Algorithms . This is a very useful guide for graduate and undergraduate students and teachers of computer science. This book provides a coherent and pedagogically sound framework for learning and teaching. Its breadth of coverage insures that algorithms are carefully and comprehensively discussed with figures and tracing of algorithms. Carefully developing topics with sufficient detail, this text enables students to learn about concepts on their own, offering instructors flexibility and allowing them to use the text as lecture reinforcement. Key Features:" Focuses on simple explanations of techniques that can be applied to real-world problems." Presents algorithms with self-explanatory pseudocode." Covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers." Includes chapter summary, self-test quiz and exercises at the end of each chapter. Key to quizzes and solutions to exercises are given in appendices.

This textbook, for second- or third-year students of computer science, presents insights, notations, and analogies to help them describe and think about algorithms like an expert, without grinding through lots of formal proof. Solutions to many problems are provided to let students check their progress, while class-tested PowerPoint slides are on the web for anyone running the course. By looking at both the big picture and easy step-

by-step methods for developing algorithms, the author guides students around the common pitfalls. He stresses paradigms such as loop invariants and recursion to unify a huge range of algorithms into a few meta-algorithms. The book fosters a deeper understanding of how and why each algorithm works. These insights are presented in a careful and clear way, helping students to think abstractly and preparing them for creating their own innovative ways to solve problems.

Advanced Java is a textbook specially designed for undergraduate and post graduate students of Computer Science. It focuses on developing the applications both at basic and moderate level. This text book is divided into seven units. The first unit introduces Java network programming. In this unit along with the basic concepts of networking, the programming using Sockets, InetAddress, URL and URLConnection class is discussed in a lucid manner. The second unit is based on JDBC programming. In this unit, connecting with the database is discussed with examples and illustrations. Then next two chapters focuses on server side programming by means of Servlet programming and JSP. In third unit, the illustration of how to create and execute servlets is given. Then the concept of cookies and session management is discussed. In the next subsequent unit the Java Server Pages - its overview and programming is studied. In the last three units the advanced concepts of Java programming such as JSF, Hibernate and Java Web Framework : Spring is discussed. The contents of this textbook is supported with numerous illustrations, examples, program codes,

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and screenshots. With its lucid presentation and inclusion of numerous examples the book will be very useful for the readers.

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