

Chapter 3

- 3.1** An algorithm of order $O(n^2)$ takes 5 seconds to compute answers for an input instance size $n = 10$. If the algorithm size is increased to 50, how much time will it take?

Solution:

$$C(10^2) = 5$$

$$\therefore C = \frac{5}{10^2}$$

If the algorithm size is increased to 50, then, $C(50^2) = x$

$$\therefore x = \frac{5}{10^2} \times 50^2 = \frac{5}{100} \times 2500 = 125 \text{ Seconds}$$

- 3.2** Write algorithm for the following problems. Use step count and operation count for finding run time.

a) Matrix addition

The base code is given as follows:

	step	frequency	step X frequency
for i = 1 to n do	1	n+1	n+1
for j = 1 to n do	1	n+1	n(n+1)
c[i,j] = a[i,j] + b[i,j]	1	n(n+1)	n × n
end for	-	-	---
end for	--	---	---

$$\begin{aligned} \therefore \text{Step Count} &= (n+1) + n(n+1) + n^2 \\ &= n+1 + n^2 + n + n^2 = 2n^2 + 2n + 1 \\ &= O(n). \end{aligned}$$

One can analyze this segment using operation count also. The

$$\text{Operation Count} = \sum_{i=1}^n \sum_{j=1}^n 1 = \frac{n(n+1)}{2}.$$

Therefore, the asymptotic complexity analysis is $O(n^2)$.

b) Matrix multiplication

The base code is given as follows:

	step	frequency	step X frequency
for i = 1 to n do	1	n+1	n+1

Design And Analysis Of Algorithms Chapter 3

Seymour E. Goodman, S. T. Hedetniemi



Design And Analysis Of Algorithms Chapter 3:

Introduction to the Design and Analysis of Algorithms Seymour E. Goodman, S. T. Hedetniemi, 1977 **Electronics**

System Design Techniques for Safety Critical Applications Luca Sterpone, 2008-10-10 What is exactly Safety A safety system should be defined as a system that will not endanger human life or the environment A safety critical system requires utmost care in their specification and design in order to avoid possible errors in their implementation that should result in unexpected system's behavior during his operating life An inappropriate method could lead to loss of life and will almost certainly result in financial penalties in the long run whether because of loss of business or because the imposition of fines Risks of this kind are usually managed with the methods and tools of the safety engineering A life critical system is designed to 9 lose less than one life per billion 10 Nowadays computers are used at least an order of magnitude more in safety critical applications compared to two decades ago Increasingly electronic devices are being used in applications where their correct operation is vital to ensure the safety of the human life and the environment These application ranging from the anti lock braking systems ABS in automobiles to the fly by wire aircrafts to biomedical supports to the human care Therefore it is vital that electronic designers be aware of the safety implications of the systems they develop State of the art electronic systems are increasingly adopting programmable devices for electronic applications on earthling system In particular the Field Programmable Gate Array FPGA devices are becoming very interesting due to their characteristics in terms of performance dimensions and cost Facilities Design Sunderesh S. Heragu, 2008-06-19 Delineating the proper design layout and location of facilities this book strikes a healthy balance between theory and practice It provides an understanding of the practical aspects of implementing preliminary designs development through analytical models The third edition of a bestseller it features updated multimedia tools new software an **Design and Analysis of Wavelength-routed Optical Networks** Dhritiman Banerjee, 1996 *Design and Analysis of Computer Communication Networks* Vijay Ahuja, 1982 Data Warehouse Design: Modern Principles and Methodologies Matteo Golfarelli, Stefano Rizzi, 2009-03-03 Foreword by Mark Stephen LaRow Vice President of Products MicroStrategy A unique and authoritative book that blends recent research developments with industry level practices for researchers students and industry practitioners Il Yeol Song Professor College of Information Science and Technology Drexel University Advances in Metaheuristic Algorithms for Optimal Design of Structures A. Kaveh, 2016-11-09 This book presents efficient metaheuristic algorithms for optimal design of structures Many of these algorithms are developed by the author and his colleagues consisting of Democratic Particle Swarm Optimization Charged System Search Magnetic Charged System Search Field of Forces Optimization Dolphin Echolocation Optimization Colliding Bodies Optimization Ray Optimization These are presented together with algorithms which were developed by other authors and have been successfully applied to various optimization problems These consist of Particle Swarm Optimization Big Bang Big Crunch Algorithm Cuckoo Search Optimization Imperialist Competitive Algorithm and Chaos

Embedded Metaheuristic Algorithms Finally a multi objective optimization method is presented to solve large scale structural problems based on the Charged System Search algorithm The concepts and algorithms presented in this book are not only applicable to optimization of skeletal structures and finite element models but can equally be utilized for optimal design of other systems such as hydraulic and electrical networks In the second edition seven new chapters are added consisting of the new developments in the field of optimization These chapters consist of the Enhanced Colliding Bodies Optimization Global Sensitivity Analysis Tug of War Optimization Water Evaporation Optimization Vibrating Particle System Optimization and Cyclical Parthenogenesis Optimization algorithms A chapter is also devoted to optimal design of large scale structures

Uncertainty Quantification in Laminated Composites Sudip Dey,Tanmoy Mukhopadhyay,Sondipon Adhikari,2018-09-19

Over the last few decades uncertainty quantification in composite materials and structures has gained a lot of attention from the research community as a result of industrial requirements This book presents computationally efficient uncertainty quantification schemes following meta model based approaches for stochasticity in material and geometric parameters of laminated composite structures Several metamodels have been studied and comparative results have been presented for different static and dynamic responses Results for sensitivity analyses are provided for a comprehensive coverage of the relative importance of different material and geometric parameters in the global structural responses

Harmony Search Algorithms for Structural Design Optimization Zong Woo Geem,2009-09-30 Various structures such as buildings bridges and paved roads play an important role in our lives However these construction projects require large expenditures Designing infrastructure cost efficiently while satisfying all necessary design constraints is one of the most important and difficult tasks for a structural engineer Traditionally mathematical gradient based optimization techniques have been applied to these designs However these gradient based methods are not suitable for discrete design variables such as factory made cross sectional area of structural members Recently researchers have turned their interest to phenomenon mimicking optimization techniques because these techniques have proved able to efficiently handle discrete design variables One of these techniques is harmony search an algorithm developed from musical improvisation that has been applied to various structural design problems and has demonstrated cost savings This book gathers all the latest developments relating to the application of the harmony search algorithm in the structural design field in order for readers to efficiently understand the full spectrum of the algorithm s potential and to easily apply the algorithm to their own structural problems This book contains six chapters with the following subjects standard harmony search algorithm and its applications by Lee standard harmony search algorithm for steel frame design by Degertekin adaptive harmony search algorithm and its applications by Saka and Hasan ebi harmony particle swarm algorithm and its applications by Li and Liu hybrid algorithm of harmony search particle swarm and parameter calibration of viscoelastic and damage functions by Mun and Geem

Service Robots and Robotics: Design and Application Ceccarelli, Marco,2012-03-31 This book offers the latest research within the field of service

robotics using a mixture of case studies research and future direction in this burgeoning field of technology **Readings in Hardware/Software Co-Design** Giovanni De Micheli,Rolf Ernst,Wayne Wolf,2002 This title serves as an introduction and reference for the field with the papers that have shaped the hardware software co design since its inception in the early 90s

Data Structures and Program Design Robert Leroy Kruse,1994 For sophomore junior level courses in Data Structures This volume explores top down structured problem solving the process of data abstraction and structuring and the comparative study of algorithms as fundamental tools of program design **Developing Assessment Models for Software Reliability at Late Design Phase** Bhagyashri Deshpande,2022-06-03 Doctoral Thesis Dissertation from the year 2021 in the subject Computer Science Software Savitribai Phule Pune University formerly University of Pune Department of Computer Science course Ph D language English abstract In this thesis report the pertinence of the models Neural Network model and Hellinger Net model for better software reliability prediction considering the parameters and software metrics affecting the software design in a real environment is described And a method of software defect detection and software reliability assessment using NN model and Intelligent Water Drop IWD Technique is presented Built on a Neural Network NN two models are developed which predicts the software reliability in a more accurate manner There are two kinds of hybrid models developed One uses IWD with NN and another is IWD with Spiking Neural Network SNN For both the modelling feature selection technique and learning algorithm is implemented and the data representation methods and some metrics associated with software reliability models are discussed Various datasets containing metrics values with software failures are applied to the proposed models These datasets are acquired from variety of software projects Modern Navigation, Guidance, and Control Processing Ching-Fang Lin,1991 M CREATED **Automated Structural Analysis for Computer Integrated Design** Hazem Nizar An-Nashif,1989 **Network Design Using EcoNets** Roshan L. Sharma,1997 Avoid building costly prototypes using a powerful software tool to design networks Includes a tool for simulating LAN WAN broadband networks Casebound book shows how to effectively use simulation tools to predict network performance

Proceedings of the ... Design Engineering Technical Conferences ,1995 *Understanding Program Design and Data Structures with C++* Kenneth Alfred Lambert,Thomas L. Naps,1996 This text provides coverage of object oriented programming while introducing advanced programming and software engineering concepts and techniques along with basic data structures Problem solving is emphasized throughout the text through numerous exercises programming problems and projects It also includes module specifications structure charts Note of Interest boxes Focus on Program Design boxes and running debugging and testing tips This book corresponds to chapters 11 19 of Lambert Nance and Nap s Introduction to Computer Science with C **Mathematical Reviews** ,2006 **Optimal Hierarchical System Design Via Sequentially Decomposed Programming** Sigurd A. Nelson (II.),1997

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