

The Data Compression Book

Now covering both data and image compression, this edition keeps pace with technology. It includes new coverage of fax and compression methods, as well as a range of compression-related tools to display, print, and convert images from one format to another. Reviews of the four most popular archive creation and compression performing programs are also included. Two disks include the coding in BASIC and C for many of the compression algorithms in the book.

This clearly written book offers readers a succinct foundation to the most important topics in the field of data compression. Part I presents the basic approaches to data compression and describes a few popular techniques and methods that are commonly used to compress data. The reader will discover essential concepts. Part II concentrates on advanced techniques, such as arithmetic coding, orthogonal transforms, subband transforms and Burrows-Wheeler transform. This book is the perfect reference for advanced undergraduates in computer science and requires a minimum of mathematics. An author-maintained website provides errata and auxiliary material.

An effective blend of carefully explained theory and practical applications, this book imparts the basics of both information theory and data compression. Although the two topics are related, this unique treatment allows readers to explore either topic independent of the other. The authors' treatment of Information Theory, while theoretical and abstract, is pitched at an elementary level, less daunting than most other texts. After presenting the fundamental definitions and results of the theory, they then bring the theory to bear on noisy channels. A number of computational examples and exercises are included. The Data Compression section acquaints readers with a myriad of lossless compression methods and introduces them to the weirder world of lossy compression and how one can proceed using various transforms. This section allows readers to emerge broadly conversant with and competent in a large range of techniques. The unique, flexible presentation in Introduction to Information Theory and Data Compression provides the background needed to apply information theory to forming and answering theoretical questions in data compression. However, those curious about data compression, but with no interest in information theory and vice versa can profit equally from the book-as can those with a curiosity about the intriguing connections between the two areas.

Each edition of Introduction to Data Compression has widely been considered the best introduction and reference text on the art and science of data compression, and the fourth edition continues in this tradition. Data compression techniques and technology are ever-evolving with new applications in image, speech, text, audio, and video. The fourth edition includes all the cutting edge updates the reader will need during the work day and in class. Khalid Sayood provides an extensive introduction to the theory underlying today's compression techniques with detailed instruction for their

applications using several examples to explain the concepts. Encompassing the entire field of data compression, Introduction to Data Compression includes lossless and lossy compression, Huffman coding, arithmetic coding, dictionary techniques, context based compression, scalar and vector quantization. Khalid Sayood provides a working knowledge of data compression, giving the reader the tools to develop a complete and concise compression package upon completion of his book. New content added to include a more detailed description of the JPEG 2000 standard New content includes speech coding for internet applications Explains established and emerging standards in depth including JPEG 2000, JPEG-LS, MPEG-2, H.264, JBIG 2, ADPCM, LPC, CELP, MELP, and iLBC Source code provided via companion web site that gives readers the opportunity to build their own algorithms, choose and implement techniques in their own applications

This book provides a comprehensive reference for the many different types and methods of compression. Included are a detailed and helpful taxonomy, analysis of most common methods, and discussions on the use and comparative benefits of methods and description of "how to" use them. Detailed descriptions and explanations of the most well-known and frequently used compression methods are covered in a self-contained fashion, with an accessible style and technical level for specialists and nonspecialists. Comments and suggestions of many readers have been included as a benefit to future readers, and a website is maintained and updated by the author.

A comprehensive reference for the many different types and methods of compression, including a detailed and helpful taxonomy, an analysis of the most common methods, and discussions on their use and comparative benefits. The presentation is organized into the main branches of the field: run length encoding, statistical methods, dictionary-based methods, image compression, audio compression, and video compression. Detailed descriptions and explanations of the most well-known and frequently used methods are covered in a self-contained fashion, with an accessible style and technical level for specialists and nonspecialists. In short, the book provides an invaluable reference and guide for all computer scientists, computer engineers, electrical engineers, signal/image processing engineers and other scientists needing a comprehensive compilation for a broad range of compression methods.

Annotation Each edition of Introduction to Data Compression has widely been considered the best introduction and reference text on the art and science of data compression, and the third edition continues in this tradition. Data compression techniques and technology are ever-evolving with new applications in image, speech, text, audio, and video. The third edition includes all the cutting edge updates the reader will need during the work day and in class. Khalid Sayood provides an extensive introduction to the theory underlying today's compression techniques with detailed instruction for their applications using several examples to explain the concepts. Encompassing the entire field of data

compression Introduction to Data Compression, includes lossless and lossy compression, Huffman coding, arithmetic coding, dictionary techniques, context based compression, scalar and vector quantization. Khalid Sayood provides a working knowledge of data compression, giving the reader the tools to develop a complete and concise compression package upon completion of his book.

Do you need different information or graphics? How is the data gathered? What are your current levels and trends in key measures or indicators of workforce and leader development? Who controls the risk? How do you know if you are successful? This valuable Audio Data Compression self-assessment will make you the principal Audio Data Compression domain visionary by revealing just what you need to know to be fluent and ready for any Audio Data Compression challenge. How do I reduce the effort in the Audio Data Compression work to be done to get problems solved? How can I ensure that plans of action include every Audio Data Compression task and that every Audio Data Compression outcome is in place? How will I save time investigating strategic and tactical options and ensuring Audio Data Compression costs are low? How can I deliver tailored Audio Data Compression advice instantly with structured going-forward plans? There's no better guide through these mind-expanding questions than acclaimed best-selling author Gerard Blokdyk. Blokdyk ensures all Audio Data Compression essentials are covered, from every angle: the Audio Data Compression self-assessment shows succinctly and clearly that what needs to be clarified to organize the required activities and processes so that Audio Data Compression outcomes are achieved. Contains extensive criteria grounded in past and current successful projects and activities by experienced Audio Data Compression practitioners. Their mastery, combined with the easy elegance of the self-assessment, provides its superior value to you in knowing how to ensure the outcome of any efforts in Audio Data Compression are maximized with professional results. Your purchase includes access details to the Audio Data Compression self-assessment dashboard download which gives you your dynamically prioritized projects-ready tool and shows you exactly what to do next. Your exclusive instant access details can be found in your book. You will receive the following contents with New and Updated specific criteria: - The latest quick edition of the book in PDF - The latest complete edition of the book in PDF, which criteria correspond to the criteria in... - The Self-Assessment Excel Dashboard - Example pre-filled Self-Assessment Excel Dashboard to get familiar with results generation - In-depth and specific Audio Data Compression Checklists - Project management checklists and templates to assist with implementation INCLUDES LIFETIME SELF ASSESSMENT UPDATES Every self assessment comes with Lifetime Updates and Lifetime Free Updated Books. Lifetime Updates is an industry-first feature which allows you to receive verified self assessment updates, ensuring you always have the most accurate information at your fingertips.

Details the most important techniques used to make the storage and transmission of data fast, secure, and reliable. Accessible to both specialists and nonspecialists: Avoids complex mathematics

This book presents exciting recent research on the compression of images and text. Part 1 presents the (lossy) image compression techniques of vector quantization, iterated transforms (fractal compression), and techniques that employ optical hardware. Part 2 presents the (lossless) text compression techniques of arithmetic coding, context modeling, and dictionary methods (LZ methods); this part of the book also addresses practical massively parallel architectures for text compression. Part 3 presents theoretical work in coding theory that has applications to both text and image compression. The book ends with an extensive bibliography of data compression papers and books which can serve as a valuable aid to researchers in the field. Points of Interest: Data compression is becoming a key factor in the digital storage of

text, speech graphics, images, and video, digital communications, data bases, and supercomputing. The book addresses `hot' data compression topics such as vector quantization, fractal compression, optical data compression hardware, massively parallel hardware, LZ methods, arithmetic coding. Contributors are all accomplished researchers. Extensive bibliography to aid researchers in the field.

A concise guide of essential data compression methods and algorithms for text, audio and imaging data.

Data compression is one of the most important fields and tools in modern computing. From archiving data, to CD-ROMs, and from coding theory to image analysis, many facets of modern computing rely upon data compression. This book provides a comprehensive reference for the many different types and methods of compression. Included are a detailed and helpful taxonomy, analysis of most common methods, and discussions on the use and comparative benefits of methods and description of "how to" use them. Detailed descriptions and explanations of the most well-known and frequently used compression methods are covered in a self-contained fashion, with an accessible style and technical level for specialists and non-specialists.

Advanced technologies have increased demands for visual information and higher quality video frames, as with 3-D movies, games, and HDTV. This taxes the available technologies and creates a gap between the huge amount of visual data required for multimedia applications and the still-limited hardware capabilities. Image and Video Compression for Multimedia Engineering bridges the gap with concise, authoritative information on video and image coding. The tutorial provides a solid, comprehensive understanding of the fundamentals and algorithms of coding and details all of the relevant international coding standards. It presents recent findings on defining methods for generating high quality video bitstreams. The authors present recent research results and cover emerging technologies. With the growing popularity of the applications that use large amounts of visual data, image and video coding is an active and dynamic field. Coverage of both image and video compression in this book yields a unique, self-contained reference, appropriate for all related professions. Image and Video Compression for Multimedia Engineering builds a basis for future study, research, and development.

This book is about compressing data to make digital systems work more efficiently. According to the dictionary, when something is compressed, it is condensed, squeezed, constricted, or pressed together to fit into less space. Air is compressed for a variety of useful purposes. Businesses are downsized to make them more efficient. We pack our daily schedules tighter and tighter to accomplish more. Who has not crushed an empty soda can for recycling? Many different things can be compressed, including the data in computers, communications links, consumer-electronics gear, and all sizes and shapes of digital systems. Are you curious about how data compression squeezes the "air" out of digital bits? Would you like to know where it is used and, increasingly, why the marketplace demands it be used? Would you like to learn the right way to build data compression into your products? Then, this book is for you. This exciting technology and its importance for current and future digital systems are explained in easy to understand terms. No previous knowledge of data compression is required because the necessary technical background is carefully developed. Neither is an extensive understanding of mathematics because there are few equations and important ideas are graphically illustrated. If you read any of the popular or professional monthly magazines that cover the latest advances in digital systems, your background is adequate. If you understand this preface, you are ready to tackle this book.

This book provides a global review of optical satellite image and data compression theories, algorithms, and system implementations. Consisting of nine chapters, it describes a variety of lossless and near-lossless data-compression

techniques and three international satellite-data-compression standards. The author shares his firsthand experience and research results in developing novel satellite-data-compression techniques for both onboard and on-ground use, user assessments of the impact that data compression has on satellite data applications, building hardware compression systems, and optimizing and deploying systems. Written with both postgraduate students and advanced professionals in mind, this handbook addresses important issues of satellite data compression and implementation, and it presents an end-to-end treatment of data compression technology.

Are you using data compression software? Does the NoSQL database provide data compression that supplies real storage savings? Which data compression techniques are available? How does data compression affect the size of your backup data? How does data compression impact applications? This instant Data Compression self-assessment will make you the dependable Data Compression domain authority by revealing just what you need to know to be fluent and ready for any Data Compression challenge. How do I reduce the effort in the Data Compression work to be done to get problems solved? How can I ensure that plans of action include every Data Compression task and that every Data Compression outcome is in place? How will I save time investigating strategic and tactical options and ensuring Data Compression costs are low? How can I deliver tailored Data Compression advice instantly with structured going-forward plans? There's no better guide through these mind-expanding questions than acclaimed best-selling author Gerard Blokdyk. Blokdyk ensures all Data Compression essentials are covered, from every angle: the Data Compression self-assessment shows succinctly and clearly that what needs to be clarified to organize the required activities and processes so that Data Compression outcomes are achieved. Contains extensive criteria grounded in past and current successful projects and activities by experienced Data Compression practitioners. Their mastery, combined with the easy elegance of the self-assessment, provides its superior value to you in knowing how to ensure the outcome of any efforts in Data Compression are maximized with professional results. Your purchase includes access details to the Data Compression self-assessment dashboard download which gives you your dynamically prioritized projects-ready tool and shows you exactly what to do next. Your exclusive instant access details can be found in your book. You will receive the following contents with New and Updated specific criteria: - The latest quick edition of the book in PDF - The latest complete edition of the book in PDF, which criteria correspond to the criteria in... - The Self-Assessment Excel Dashboard - Example pre-filled Self-Assessment Excel Dashboard to get familiar with results generation - In-depth and specific Data Compression Checklists - Project management checklists and templates to assist with implementation **INCLUDES LIFETIME SELF ASSESSMENT UPDATES** Every self assessment comes with Lifetime Updates and Lifetime Free Updated Books. Lifetime Updates is an industry-first feature which allows you to receive verified self assessment

updates, ensuring you always have the most accurate information at your fingertips.

Satellite Data Compression covers recent progress in compression techniques for multispectral, hyperspectral and ultra spectral data. A survey of recent advances in the fields of satellite communications, remote sensing and geographical information systems is included. Satellite Data Compression, contributed by leaders in this field, is the first book available on satellite data compression. It covers onboard compression methodology and hardware developments in several space agencies. Case studies are presented on recent advances in satellite data compression techniques via various prediction-based, lookup-table-based, transform-based, clustering-based, and projection-based approaches. This book provides valuable information on state-of-the-art satellite data compression technologies for professionals and students who are interested in this topic. Satellite Data Compression is designed for a professional audience comprised of computer scientists working in satellite communications, sensor system design, remote sensing, data receiving, airborne imaging and geographical information systems (GIS). Advanced-level students and academic researchers will also benefit from this book.

This book introduces advanced and hybrid compression techniques specifically used for medical images. The book discusses conventional compression and compressive sensing (CS) theory based approaches that are designed and implemented using various image transforms, such as: Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT), Discrete Wavelet Transform (DWT), and Singular Value Decomposition (SVD) and greedy based recovery algorithm. The authors show how these techniques provide simulation results of various compression techniques for different types of medical images, such as MRI, CT, US, and x-ray images. Future research directions are provided for medical imaging science. The book will be a welcomed reference for engineers, clinicians, and research students working with medical image compression in the biomedical imaging field. Covers various algorithms for data compression and medical image compression; Provides simulation results of compression algorithms for different types of medical images; Provides study of compressive sensing theory for compression of medical images.

Fundamental Data Compression provides all the information students need to be able to use this essential technology in their future careers. A huge, active research field, and a part of many people's everyday lives, compression technology is an essential part of today's Computer Science and Electronic Engineering courses. With the help of this book, students can gain a thorough understanding of the underlying theory and algorithms, as well as specific techniques used in a range of scenarios, including the application of compression techniques to text, still images, video and audio. Practical exercises, projects and exam questions reinforce learning, along with suggestions for further reading. * Dedicated data compression textbook for use on undergraduate courses * Provides essential knowledge for today's web/multimedia

applications * Accessible, well structured text backed up by extensive exercises and sample exam questions Information Systems and Data Compression presents a uniform approach and methodology for designing intelligent information systems. A framework for information concepts is introduced for various types of information systems such as communication systems, information storage systems and systems for simplifying structured information. The book introduces several new concepts and presents a novel interpretation of a wide range of topics in communications, information storage, and information compression. Numerous illustrations for designing information systems for compression of digital data and images are used throughout the book.

The Data Compression Book ...The Data Compression BookWiley

Most data compression methods that are based on variable-length codes employ the Huffman or Golomb codes. However, there are a large number of less-known codes that have useful properties and these can be useful. This book brings this large set of codes to the attention of workers in the field and for students of computer science. The author's crystal clear style of writing and presentation allows easy access to the topic.

If you want to attract and retain users in the booming mobile services market, you need a quick-loading app that won't churn through their data plans. The key is to compress multimedia and other data into smaller files, but finding the right method is tricky. This witty book helps you understand how data compression algorithms work—in theory and practice—so you can choose the best solution among all the available compression tools. With tables, diagrams, games, and as little math as possible, authors Colt McAnlis and Aleks Haecky neatly explain the fundamentals. Learn how compressed files are better, cheaper, and faster to distribute and consume, and how they'll give you a competitive edge. Learn why compression has become crucial as data production continues to skyrocket Know your data, circumstances, and algorithm options when choosing compression tools Explore variable-length codes, statistical compression, arithmetic numerical coding, dictionary encodings, and context modeling Examine tradeoffs between file size and quality when choosing image compressors Learn ways to compress client- and server-generated data objects Meet the inventors and visionaries who created data compression algorithms

Today's increased use of digital sound and video makes data compression crucial to computer technology because of its vast storage and transmission requirements. The question in many applications is now not whether to compress data, but what compression method should be applied. Most data compression books have been written for professionals and require a strong background in data compression techniques as well as an understanding of algorithms based on sophisticated mathematical models. This book is one of a handful of textbooks to present Data Compression for students in an academic environment. This is not a simple task since most of the widely used algorithms rely on sophisticated

mathematical models. ELEMENTS OF DATA COMPRESSION addresses the needs of students who will use these techniques on a daily basis. The author accomplishes this through the use of elementary-level representative methods of text, audio, and video compression. Drozdek presents these methods with pseudocode, tables, diagrams, and many worked out examples, all the while employing commonly used techniques that build upon the mathematics students have been exposed to in earlier courses.

Lossy hyperspectral image compression techniques are widely used to solve the problems of data size. In this book, we evaluate lossy vector quantization and JPEG2000 hyperspectral data compression algorithms using red edge indices as end-products that we want to retrieve from our data. Two airborne hyperspectral data-sets for vegetated areas were tested, one acquired from (AISA) sensor for area in Tambisan, Malaysia and the other data-set acquired from (Hypspex) sensor for agriculture area in Norway. Two red edge products: Vogelmann1 and NDVI red edge indices were retrieved from each original data cube and from their decompressed data cubes. The standard deviation of percentage difference between a product retrieved from an original data cube and that from its decompressed data cube was used as a measure to quantify the impact of compression on end products. The minimum, maximum and average values of the original and compressed data were also used to quantify the differences in the red edge products.

Created by the Joint Photographic Experts Group (JPEG), the JPEG standard is the first color still image data compression international standard. This new guide to JPEG and its technologies offers detailed information on the new JPEG signaling conventions and the structure of JPEG compressed data.

The second edition of Introduction to Data Compression builds on the features that made the first the logical choice-for practitioners who need a comprehensive guide to compression for all types of multimedia and instructors who want to equip their students with solid foundations in these increasingly important and diverse techniques. This book provides an extensive introduction to the theory underlying today's compression techniques, with detailed, instruction for their application. All of the coverage has been updated to reflect the state of the art in data compression, including both new algorithms and older methods for which new uses are being found. And the downloadable software gives you the opportunity to see firsthand how various algorithms work, to choose and implement appropriate techniques in your own applications, and to build your own algorithms. * Fully updated to cover the most recent lossy and lossless compression techniques, including wavelets, subband coding, predictive lossless techniques, and Huffman coding variants. * Explains established and emerging standards in depth: JPEG 2000, JPEG-LS, MPEG 2, Group 3 and 4 Faxes, JBIG 2, ADPCM, LPC, CELP, and MELP. * Includes an new chapter providing the mathematical background required for understanding wavelets and subband coding. * Via the companion Web site, provides source code that enables you to experiment with

a wide range of compression techniques, along with sample data and updates on the latest developments in the compression field.

Objectives Computer and communication practice relies on data compression and dictionary search methods. They lean on a rapidly developing theory. Its exposition from a new viewpoint is the purpose of the book. We start from the very beginning and finish with the latest achievements of the theory, some of them in print for the first time. The book is intended for serving as both a monograph and a self-contained textbook. Information retrieval is the subject of the treatises by D. Knuth (1973) and K. Mehlhorn (1987). Data compression is the subject of source coding. It is a chapter of information theory. Its up-to-date state is presented in the books of Storer (1988), Lynch (1985), T. Bell et al. (1990). The difference between them and the present book is as follows. First. We include information retrieval into source coding instead of discussing it separately. Information-theoretic methods proved to be very effective in information search. Second. For many years the target of the source coding theory was the estimation of the maximal degree of the data compression. This target is practically bit today. The sought degree is now known for most of the sources. We believe that the next target must be the estimation of the price of approaching that degree. So, we are concerned with trade-off between complexity and quality of coding. Third. We pay special attention to universal families that contain a good compressing map for every source in a set.

This textbook, apart from introducing the basic aspects of applied mathematics, focuses on recent topics such as information data manipulation, information coding, data approximation, data dimensionality reduction, data compression, time-frequency and time scale bases, image manipulation, and image noise removal. The methods treated in more detail include spectral representation and “frequency” of the data, providing valuable information for, e.g. data compression and noise removal. Furthermore, a special emphasis is also put on the concept of “wavelets” in connection with the “multi-scale” structure of data-sets. The presentation of the book is elementary and easily accessible, requiring only some knowledge of elementary linear algebra and calculus. All important concepts are illustrated with examples, and each section contains between 10 and 25 exercises. A teaching guide, depending on the level and discipline of instructions is included for classroom teaching and self-study.

About 95% of all data transmission consists of blanks, strings of spaces, numeric and alphabetic repetitions, not only buzzing through the airways but also embedded in a large number of data bases. In this book the author shows how to increase the efficiency and cut the cost of data transmission and storage through the application of practical data compression routines. Hyperspectral Data Compression provides a survey of recent results in the field of compression of remote sensed 3D data, with a particular interest in hyperspectral imagery. Chapter 1 addresses compression architecture, and reviews and compares compression methods. Chapters 2 through 4 focus on lossless compression (where the decompressed image must be bit for bit identical to the original). Chapter 5, contributed by the editors, describes a lossless algorithm based on vector quantization with

extensions to near lossless and possibly lossy compression for efficient browsing and pure pixel classification. Chapter 6 deals with near lossless compression while. Chapter 7 considers lossy techniques constrained by almost perfect classification. Chapters 8 through 12 address lossy compression of hyperspectral imagery, where there is a tradeoff between compression achieved and the quality of the decompressed image. Chapter 13 examines artifacts that can arise from lossy compression.

The Data Compression Book Second Edition The Data Compression Book is the most authoritative guide to data compression techniques available. This second edition has been updated to include fractal compression techniques and all the latest developments in the compression field. All the code in the previous edition has been updated to run with today's compilers and has been tested on multiple platforms to ensure flawless performance. You'll learn to write C programs for nearly any environment as you explore different compression methods. Nelson and Gailly discuss the theory behind each method and apply the techniques involved to shrink data down to a minimum. Each technique is illustrated with a complete, functional C program that not only demonstrates how data compression works, but it also can be incorporated into your own data compression programs. You'll also get detailed benchmarks demonstrating the speed and compression ability of each technique. The code in this book has been tested on a variety of platforms and compilers including Microsoft Visual C++ 1.5 with MS-DOS 5.0 and 6.22; Borland C++ 4.0 and 4.5 with MS-DOS 5.0 and 6.22; Symantec C++ 6.0 and 7.0 with MS-DOS 5.0 & 6.22; Interactive Unix System 3.2 with the portable C compiler; Solaris 2.4 with the SunSoft compiler; and Linux 1.1 with the Gnu C Compiler. Topics Include: The Shannon-Fano and Huffman coding techniques Adaptive Huffman coding techniques Lossy compression The JPEG compression algorithm Fractal compression techniques Arithmetic coding Dictionary compression methods

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