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Implementation of Image Compression Algorithm using MATLAB

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ABSTRACT

In current scenario, Internet becomes a handy tool to everyone and everyone wants lot things in a very compact form so-that less amount of data can be stored or captured in a very small space. As Internet is act as medium of transportation of documents (such as multimedia documents). In this paper, a compression technique is being representated to compress the on form of multimedia document such as image using MatLab. Since, image contains a lot of information in dot form and required a huge space on hard disk. The Image compression technique used discrete cosine transform to deal with the real value during the compression of an image. Using DCT in compression leads to easy calculation of image data in frequency domain.

Keywords: Image compression, JPEG, DCT.

I. INTRODUCTION

Video and image contains a lot of information and consumes huge storage space. Generally internet applications have less or very limited space. To overcome the space requirement image compression is must. This paper introduces the basic concept of data compression using Matlab. Which could be applied to modern image and video compression techniques. Basically, compression is done to reduce the data similarity. Discrete Cosine Transform is frequency domain technique. By applying DCT, the data in time (spatial) domain can be transformed into frequency domain.

In this paper an image compression algorithms are being used in Matlab. The necessary bandwidth is required to digitally represent the data in the form of signals. There are many existing applications in video and audio that made it inexpensive because its ability to deal with compressed signals. Compression technology can result in reduced transmission time. In this regard there is less data to be transmitted and decrease the storage requirements, again because there is less data.

There are two types of compression as follows:

1. Lossy compression: This is the technique in which higher compression ratios is achieved. Luckily, the majority of video and image processing applications do not require higher compression ratios. In these applications, lossy compression schemes can be used, achieving higher compression ratios.

2. Lossless compression: In many fields like medical systems, image losses can translate into costly medical mistakes; therefore lossless compression methods are used.

DCT Compression: DCT is a lossy compression scheme in which a MxN image block is transformed from the spatial domain to the Discrete Cosine Transform domain. DCT decomposes the signal into spatial frequencies components called DCT coefficients. The lower frequency DCT coefficients appear toward the upper left-hand corner of the DCT matrix and the higher frequency coefficients are in the lower right-hand corner of the DCT matrix. The Human Visual System (HVS) is tolerant to errors in high frequency coefficients. HVS is not tolerant to lower frequency coefficients. So that the higher frequency components can be changed or quantized. This is done by the quantization technique.

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Implementation of Image Compression Algorithm Using Verilog with Area, Power and Timing Constraints , Image compression is the application of Data compression on digital images A fundamental shift in the image compression approach came after the Discrete Wavelet Transform DWT became popular To overcome the inefficiencies in the JPEG standard and serve emerging areas of mobile and Internet communications the new JPEG2000 standard has been developed based on the principles of DWT An image compression algorithm was comprehended using Matlab code and modified to perform better when implemented in hardware description language Using Verilog HDL the encoder for the image compression employing DWT was implemented Detailed analysis for power timing and area was done for Booth multiplier which forms the major building block in implementing DWT The encoding technique exploits the zero tree structure present in the bitplanes to compress the transform coefficients Lossy Image Compression K K Shukla,M.V. Prasad,2011-08-28 Image compression is concerned with minimization of the number of information carrying units used to represent an image Lossy compression techniques incur some loss of information which is usually imperceptible In return for accepting this distortion we obtain much higher compression ratios than is possible with lossless compression Salient features of this book include four new image compression algorithms and implementation of these algorithms detailed discussion of fuzzy geometry measures and their application in image compression algorithms new domain decomposition based algorithms using image quality measures and study of various quality measures for gray scale image compression compression algorithms for different parallel architectures and evaluation of time complexity for encoding on all architectures parallel implementation of image compression algorithms on a cluster in Parallel Virtual Machine PVM environment

Implementation of Image Compression Algorithm Using Field Programmable Gate Array (FPGA) Zulfakar Aspar,1999 *Digital Image Compression Techniques* Majid Rabbani,Paul W. Jones,1991 In order to utilize digital images effectively specific techniques are needed to reduce the number of bits required for their representation This Tutorial Text provides the groundwork for understanding these image compression tecniques and presents a number of different schemes that have proven useful The algorithms discussed in this book are concerned mainly with the compression of still frame continuous tone monochrome and color images but some of the techniques such as arithmetic coding have found widespread use in the compression of bilevel images Both lossless bit preserving and lossy techniques are considered A detailed description of the compression algorithm proposed as the world standard the JPEG baseline algorithm is provided The book contains approximately 30 pages of reconstructed and error images illustrating the effect of each compression technique on a consistent image set thus allowing for a direct comparison of bit rates and reconstucted image quality For each algorithm issues such as quality vs bit rate implementation complexity and susceptibility to channel errors are considered Still Image Compression on Parallel Computer Architectures Savitri Bevinakoppa,1998-11-30 Still Image Compression on Parallel

Computer Architectures investigates the application of parallel processing techniques to digital image compression Digital image compression is used to reduce the number of bits required to store an image in computer memory and or transmit it over a communication link Over the past decade advancements in technology have spawned many applications of digital imaging such as photo videotex desktop publishing graphics arts color facsimile newspaper wire phototransmission and medical imaging For many other contemporary applications such as distributed multimedia systems rapid transmission of images is necessary Dollar cost as well as time cost of transmission and storage tend to be directly proportional to the volume of data Therefore application of digital image compression techniques becomes necessary to minimize costs A number of digital image compression algorithms have been developed and standardized With the success of these algorithms research effort is now directed towards improving implementation techniques The Joint Photographic Experts Group JPEG and Motion Photographic Experts Group MPEG are international organizations which have developed digital image compression standards Hardware VLSI chips which implement the JPEG image compression algorithm are available Such hardware is specific to image compression only and cannot be used for other image processing applications A flexible means of implementing digital image compression algorithms is still required An obvious method of processing different imaging applications on general purpose hardware platforms is to develop software implementations JPEG uses an 8 8 block of image samples as the basic element for compression These blocks are processed sequentially There is always the possibility of having similar blocks in a given image If similar blocks in an image are located then repeated compression of these blocks is not necessary By locating similar blocks in the image the speed of compression can be increased and the size of the compressed image can be reduced Based on this concept an enhancement to the JPEG algorithm is proposed called Bock Comparator Technique BCT Still Image Compression on Parallel Computer Architectures is designed for advanced students and practitioners of computer science This comprehensive reference provides a foundation for understanding digital image compression techniques and parallel computer architectures *Digital Image Compression* Weidong Kou,2013-03-14 Digital image business applications are expanding rapidly driven by recent advances in the technology and breakthroughs in the price and performance of hardware and firmware This ever increasing need for the storage and transmission of images has in turn driven the technology of image compression image data rate reduction to save storage space and reduce transmission rate requirements Digital image compression offers a solution to a variety of imaging applications that require a vast amount of data to represent the images such as document imaging management systems facsimile transmission image archiving remote sensing medical imaging entertainment HDTV broadcasting education and video teleconferencing Digital Image Compression Algorithms and Standards introduces the reader to compression algorithms including the CCITT facsimile standards T 4 and T 6 JBIG CCITT H 261 and MPEG standards The book provides comprehensive explanations of the principles and concepts of the algorithms helping the readers understanding and allowing them to use the standards in

business product development and R D Audience A valuable reference for the graduate student researcher and engineer May also be used as a text for a course on the subject *Computer Analysis of Images and Patterns* Dmitry Chetverikov,Walter Kropatsch,1993-08-30 This volume constitutes the proceedings of the 5th International Conference on Computer Analysis of Images and Patterns CAIP 93 held in Budapest Hungary in September 1993 Formerly the events in this biennial conference series were thought as a forum where East European researchers and professionals from academia and industry had an opportunity to discuss their results and ideas with Western colleagues active in image processing and pattern recognition Now CAIP 93 has a much more international scope and in the future these conferences will not any longertake place only in East European countries but roam throughout whole Europe Besides invited talks by Belikova Gimel farb Haralick and Roska the volume contains 114 contributions either presented as lectures or posters and carefully selected by a highly competent international program committee from a total of some 230 submissions thus the book gives a thorough survey on recent research results and their applications in image processing and pattern recognition The proceedings is organized in 20 sections for example on image data structures image processing edges and contours Hough transforms and related methods shape motion 3 D vision character recognition and document processing biomedical applications industrial applications and neural networks A Parallel Implementation of a Fractal Image Compression Algorithm Using the Parallel Virtual Machine (PVM) Environment William Albert Stapleton,1997 **Lossy Image Compression** S K Shukla,M.V. Prasad,2011-08-31 Image compression is concerned with minimization of the number of information carrying units used to represent an image Lossy compression techniques incur some loss of information which is usually imperceptible In return for accepting this distortion we obtain much higher compression ratios than is possible with lossless compression Salient features of this book include four new image compression algorithms and implementation of these algorithms detailed discussion of fuzzy geometry measures and their application in image compression algorithms new domain decomposition based algorithms using image quality measures and study of various quality measures for gray scale image compression compression algorithms for different parallel architectures and evaluation of time complexity for encoding on all architectures parallel implementation of image compression algorithms on a cluster in Parallel Virtual Machine PVM environment Efficient Image Compression System Using a CMOS Transform Imager Jungwon Lee,2009 This research focuses on the implementation of the efficient image compression system among the many potential applications of a transform imager system The study includes implementing the image compression system using a transform imager developing a novel image compression algorithm for the system and improving the performance of the image compression system through efficient encoding and decoding algorithms for vector quantization A transform imaging system is implemented using a transform imager and the baseline JPEG compression algorithm is implemented and tested to verify the functionality and performance of the transform imager system The computational reduction in digital processing is investigated from two perspectives

algorithmic and implementation Algorithmically a novel wavelet based embedded image compression algorithm using dynamic index reordering vector quantization DIRVQ is proposed for the system DIRVQ makes it possible for the proposed algorithm to achieve superior performance over the embedded zero tree wavelet EZW algorithm and the successive approximation vector quantization SAVQ algorithm However because DIRVQ requires intensive computational complexity additional focus is placed on the efficient implementation of DIRVQ and highly efficient implementation is achieved without a compromise in performance **Implementation of a Polyline Image Compression Algorithm Using Parallel Architectures** D.P. Richards,1990 **Hardware Implementation of a JPEG-LS Codec** Michael Piorun,2001 The primary goal of this thesis is to implement a hardware version of the JPEG LS or JPEGLossless image compression algorithm in VHDL The JPEG LS algorithm is currently the designated standard for lossless compression of grayscale and color images by the JPEG committee Although lossy image compression is widely used when dealing with grayscale images there are some applications that require lossless image compression so that the original image may be recovered This is often the case for historical and legal document image archives medical and satellite imagery and biometric images The JPEG LS algorithm is much less complex than other current lossless image compression algorithms and offers similar or better compression gains Near lossless compression offers higher compression gains by using a pixel tolerance specified by the user The algorithm uses a predictive technique for compression and the resulting prediction error is encoded not the pixel value itself This prediction error is encoded with Golomb Rice coding which is optimal for a geometric distribution such as prediction error The predictor enters a special run length mode to encode pixels with identical values in lossless mode or nearly identical values within a known value in near lossless mode which maximizes compression further In this thesis the JPEG LS algorithm is implemented in C VHDL and further synthesized using the Synopsys synthesis tool suite Pictorial document medical remote sensing and biometric images are used for testing the project against another standard compliant software implementation The compression ratio for lossless compression is approximately 2 and is greater for near lossless compression The end result is a Synopsys schematic that represents a JPEG LS codec which is capable of lossless and near lossless encoding and decoding Performance characteristics such as chip area speed and power consumption are extracted from the synthesis tool These are approximately 375 000 gates a 15 ns clock cycle and 59 mW respectively A hardware implementation of this algorithm on an FPGA or ASIC would give a digital camera or scanner an edge in the marketplace Abstract Telemedicine: The Computer Transformation of Healthcare Tanupriya Choudhury,Avita Katal,Jung-Sup Um,Ajay Rana,Marwan Al-Akaidi,2022-08-24 This book provides an overview of the innovative concepts methodologies and frameworks that will increase the feasibility of the existing telemedicine system With the arrival of advanced technologies telehealth has become a new subject requiring a different understanding of IT devices and of their use to fulfill health needs Different topics are discussed from the basics of TeleMedicine to help readers understand the technology from ground up to

details about the infrastructure and communication technologies to offer deeper insights into the technology The use of IoT and cloud services along with the use of blockchain technology in TeleMedicine are also discussed Detailed information about the use of machine learning and computer vision techniques for the proper transmission of medical data keeping in mind the bandwidth of the network are provided The book will be a readily accessible source of information for professionals working in the area of information technology as well as for the all those involved in the healthcare environment

Efficient Implementation of Image Compression-postprocessing Algorithm Using a Digital Signal Processor Nadir Sinaceur,1998 **Biological and Medical Data Analysis** Nicos Maglaveras,Ioanna Chouvarda,Vassilis Koutkias,Rüdiger Brause,2006-11-27 This book constitutes the refereed proceedings of the 7th International Symposium on Biological and Medical Data Analysis ISBMDA 2006 held in Thessaloniki Greece December 2006 Coverage in this volume includes functional genomics sequence analysis biomedical models information modeling biomedical signal processing biomedical image analysis biomedical data analysis as well as decision support systems and diagnostic tools

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Multimedia Computing Prathmesh Yelne,2023-05-12 Multimedia Computing is a comprehensive guide that explores the fascinating world of digital media through the lens of computing This book provides an in depth understanding of multimedia technologies including audio video image processing and computer graphics Readers will learn about the underlying concepts algorithms and techniques used to create and manipulate multimedia content The book also covers topics such as multimedia databases multimedia networking and multimedia applications providing a holistic view of the field Whether you re a student researcher or industry professional this book is an essential resource for anyone interested in multimedia computing and its applications *Transputers and Parallel Applications* John Hulskamp,David Jones,1992-11 Presents the proceedings of a Transputer and OCCAM User Group Conference held in Melbourne in November 1992 discussing recent developments in the field of transputers and parallel applications Design and Implementation of Iris Pattern Recognition Based on Wireless Network Systems Thura Ali Khalaf,2019-06-04 Master s Thesis from the year 2016 in

the subject Computer Science Technical Computer Science grade 81 language English abstract The goal of this thesis is to propose a fast and accurate iris pattern recognition system based on wireless network system This thesis presents three parts in the first part Libor Masek algorithm is enhanced to achieve higher recognition rate Another method of iris pattern recognition is proposed which named genetic algorithm The two used iris pattern recognition methods are compared according to their accuracy and execution time When testing persons of the Chinese Academy of Sciences Institute of Automation CASIA database both methods achieved 100% recognition rates because there is at least one image sample for each person which is correct matched and there is no person that is false matched But when testing image samples per persons of CASIA database the genetic algorithm achieved higher recognition rates and lower error rates than Libor Masek algorithm It has been found that the recognition time of genetic algorithm is less than Masek algorithm The second part presents an iris image compression decompression by using Principal Component Analysis PCA for compression process and Inverse Principal Component Analysis IPCA for decompression process It has been proven that PCA is the most suitable method for compressing iris images because of its ability to reduce their size while maintaining the good quality of the reconstructed images Reconstructed images using IPCA have low compression ratios CRs and high Peak to Signal Ratios PSNRs which leads to good quality For more security a multi stage image compression is performed in order to protect network s transmitted data from hackers because hackers cannot guess how much the image has been compressed The third part includes wireless network system consisting of one central Personal Computer PC and four Personal Computers PCs that communicate with each other through router device The central PC takes the responsibility of monitoring and controlling the PCs of the whole network All network PCs communicate with each other by using Transmission Control Protocol Internet Protocol TCP IP protocol suite that use client server sockets to transfer images between PCs on the network **Medical Infrared Imaging** Nicholas A. Diakides,Joseph D. Bronzino,2007-07-23 Rapid evolution of technical advances in infrared sensor technology image processing smart algorithms databases and system integration paves the way for new methods of research and use in medical infrared imaging These breakthroughs permit easy to use high sensitivity imaging that can address key issues of diagnostic specificity and engende

Decoding **Implementation Of Image Compression Algorithm Using**: Revealing the Captivating Potential of Verbal Expression

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