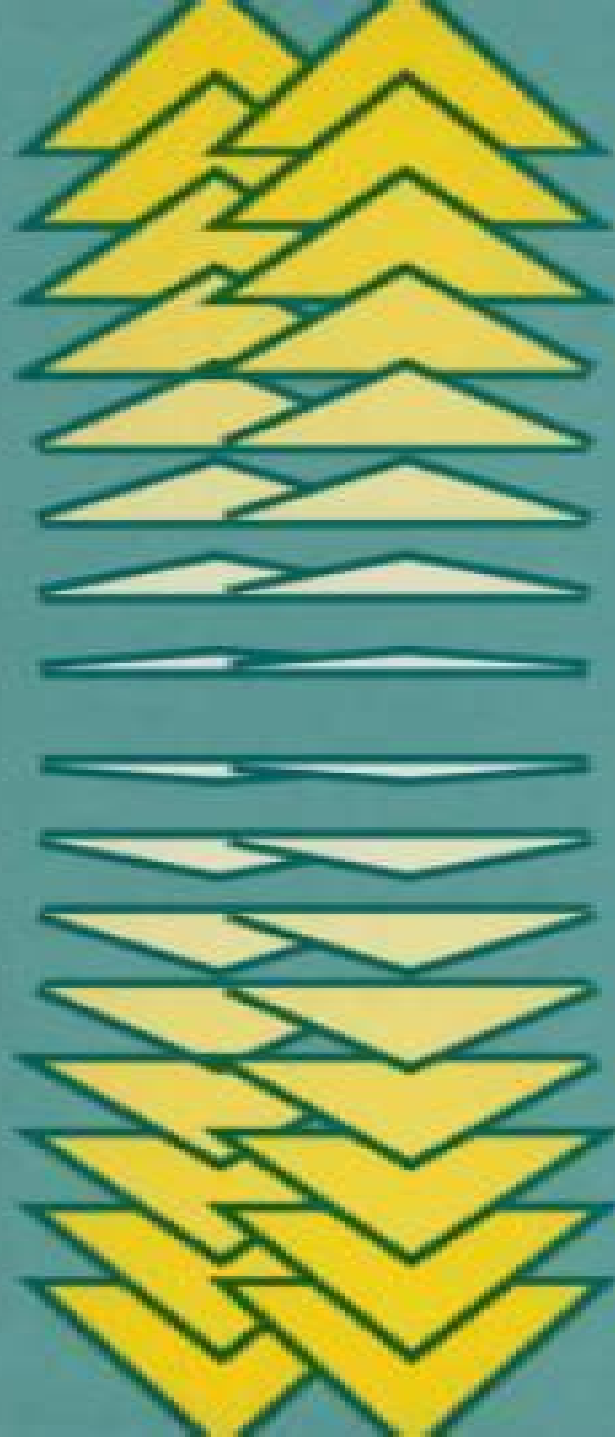




Rate-Distortion Based Video Compression

Optimal Video Frame Compression
and Object Boundary Encoding

Guido M. Schuster
Aggelos K. Katsaggelos

Springer-Science+Business Media, B.V.

Rate Distortion Based Video Compression

Wei Gao

A decorative red circular graphic with a gradient, appearing as a partial circle or a thick arc, located to the right of the author's name.

Rate Distortion Based Video Compression:

Rate-Distortion Based Video Compression Guido M. Schuster, Aggelos Katsaggelos, 2013-03-09 One of the most intriguing problems in video processing is the removal of the redundancy or the compression of a video signal There are a large number of applications which depend on video compression Data compression represents the enabling technology behind the multimedia and digital television revolution In motion compensated lossy video compression the original video sequence is first split into three new sources of information segmentation motion and residual error These three information sources are then quantized leading to a reduced rate for their representation but also to a distorted reconstructed video sequence After the decomposition of the original source into segmentation motion and residual error information is decided the key remaining problem is the allocation of the available bits into these three sources of information In this monograph a theory is developed which provides a solution to this fundamental bit allocation problem It can be applied to all quad tree based motion compensated video coders which use a first order differential pulse code modulation DPCM scheme for the encoding of the displacement vector field DVF and a block based transform scheme for the encoding of the displaced frame difference DFD An optimal motion estimator which results in the smallest DFD energy for a given bit rate for the encoding of the DVF is also a result of this theory Such a motion estimator is used to formulate a motion compensated interpolation scheme which incorporates a global smoothness constraint for the DVF

Intelligent Multimedia Processing with Soft Computing Yap Peng Tan, Kim-Hui Yap, Lipo Wang, 2006-09-15 Soft computing represents a collection of techniques such as neural networks evolutionary computation fuzzy logic and probabilistic reasoning As posed to conventional hard computing these techniques tolerate imprecision and uncertainty similar to human beings In the recent years successful applications of these powerful methods have been published in many disciplines in numerous journals conferences as well as the excellent books in this book series on Studies in Fuzziness and Soft Computing This volume is dedicated to recent novel applications of soft computing in multimedia processing The book is composed of 21 chapters written by experts in their respective fields addressing various important and timely problems in multimedia computing such as content analysis indexing and retrieval recognition and compression processing and filtering etc In the chapter authored by Guan Muneesawang Lay Amin and Lee a radial basis function network with Laplacian mixture model is employed to perform image and video retrieval D Androutsos P Androutsos Plataniotis and Venetsanopoulos investigate color image indexing and retrieval within a small world framework Wu and Yap develop a framework of fuzzy relevance feedback to model the uncertainty of users subjective perception in image retrieval

AI-based Image and Video Coding Wei Gao, 2025-09-20 Unlocking the future of image and video coding with AI based Image and Video Coding Methods Standards and Applications we can explore the revolutionary impact of deep learning technologies on image and video compression This book is a must read for researchers practitioners and students eager to stay ahead of the curve in an ever evolving field where deep learning and artificial intelligence are setting new benchmarks

in coding efficiency With an unparalleled focus on the intersection of deep learning and multimedia coding this book offers cutting edge insights into the latest techniques and standards driving progress in the industry From the core principles of coding technologies to advanced topics like 3D and multimodal coding human and machine vision oriented compression and compression artifacts removal it covers all the related essentials Special attention is given to the practical aspects of implementations open source projects and standardization efforts from leading organizations like IEEE JPEG MPEG and MPAA Whether you are a scholar a professional in the multimedia industry or a student with a foundation in computer science and electrical engineering this book equips you with the fundamental knowledge and tools to master the latest advancements in AI based image and video coding You can gain a deeper understanding of how deep learning reshapes the future of image and video coding and explore new possibilities of optimizing compression performances for both humans and machines

Algorithms, Complexity Analysis and VLSI Architectures for MPEG-4 Motion Estimation Peter M. Kuhn, 2013-06-29 MPEG 4 is the multimedia standard for combining interactivity natural and synthetic digital video audio and computer graphics Typical applications are internet video conferencing mobile videophones multimedia cooperative work teleteaching and games With MPEG 4 the next step from block based video ISO IEC MPEG 1 MPEG 2 CCITT H 261 ITU T H 263 to arbitrarily shaped visual objects is taken This significant step demands a new methodology for system analysis and design to meet the considerably higher flexibility of MPEG 4 Motion estimation is a central part of MPEG 1 2 4 and H 261 H 263 video compression standards and has attracted much attention in research and industry for the following reasons it is computationally the most demanding algorithm of a video encoder about 60 80% of the total computation time it has a high impact on the visual quality of a video encoder and it is not standardized thus being open to competition Algorithms Complexity Analysis and VLSI Architectures for MPEG 4 Motion Estimation covers in detail every single step in the design of a MPEG 1 2 4 or H 261 H 263 compliant video encoder Fast motion estimation algorithms Complexity analysis tools Detailed complexity analysis of a software implementation of MPEG 4 video Complexity and visual quality analysis of fast motion estimation algorithms within MPEG 4 Design space on motion estimation VLSI architectures Detailed VLSI design examples of 1 a high throughput and 2 a low power MPEG 4 motion estimator Algorithms Complexity Analysis and VLSI Architectures for MPEG 4 Motion Estimation is an important introduction to numerous algorithmic architectural and system design aspects of the multimedia standard MPEG 4 As such all researchers students and practitioners working in image processing video coding or system and VLSI design will find this book of interest **Rate-distortion Based Vector Quantization**

Technique and H.264/AVC Video Coding Standard for Video Compression 2007 *Multimedia Networking* Jenq-Neng Hwang, 2009-04-16 This authoritative guide to multimedia networking balances just the right amount of theory with practical design and integration knowledge Encyclopedia of Image Processing Phillip A. Laplante, 2018-11-08 The Encyclopedia of Image Processing presents a vast collection of well written articles covering image processing fundamentals

e.g. color theory, fuzzy sets, cryptography and applications e.g. geographic information systems, traffic analysis, forgery detection. Image processing advances have enabled many applications in healthcare, avionics, robotics, natural resource discovery and defense, which makes this text a key asset for both academic and industrial libraries and applied scientists and engineers working in any field that utilizes image processing. Written by experts from both academia and industry, it is structured using the ACM Computing Classification System (CCS) first published in 1988 but most recently updated in 2012.

Computer Vision - ECCV 2020 Andrea Vedaldi, Horst Bischof, Thomas Brox, Jan-Michael Frahm, 2020-11-03. The 30 volume set comprising the LNCS books 12346 until 12375 constitutes the refereed proceedings of the 16th European Conference on Computer Vision (ECCV 2020) which was planned to be held in Glasgow, UK during August 23-28, 2020. The conference was held virtually due to the COVID-19 pandemic. The 1360 revised papers presented in these proceedings were carefully reviewed and selected from a total of 5025 submissions. The papers deal with topics such as computer vision, machine learning, deep neural networks, reinforcement learning, object recognition, image classification, image processing, object detection, semantic segmentation, human pose estimation, 3D reconstruction, stereo vision, computational photography, neural networks, image coding, image reconstruction, object recognition, motion estimation. *3D-TV System with Depth-Image-Based Rendering* Ce Zhu, Yin Zhao, Lu Yu, Masayuki Tanimoto, 2012-08-15. Riding on the success of 3D cinema blockbusters and advances in stereoscopic display technology, 3D video applications have gathered momentum in recent years. 3D TV System with Depth Image Based Rendering: Architectures, Techniques and Challenges surveys depth image based 3D TV systems which are expected to be put into applications in the near future. Depth image based rendering (DIBR) significantly enhances the 3D visual experience compared to stereoscopic systems currently in use. DIBR techniques make it possible to generate additional viewpoints using 3D warping techniques to adjust the perceived depth of stereoscopic videos and provide for auto stereoscopic displays that do not require glasses for viewing the 3D image. The material includes a technical review and literature survey of components and complete systems solutions for technical issues and implementation of prototypes. The book is organized into four sections: System Overview, Content Generation, Data Compression and Transmission, and 3D Visualization and Quality Assessment. This book will benefit researchers, developers, engineers, and innovators as well as advanced undergraduate and graduate students working in relevant areas. *Cognitive Radio Mobile Ad Hoc Networks* F. Richard Yu, 2011-09-28. Cognitive radios (CR) technology is capable of sensing its surrounding environment and adapting its internal states by making corresponding changes in certain operating parameters. CR is envisaged to solve the problems of the limited available spectrum and the inefficiency in the spectrum usage. CR has been considered in mobile ad hoc networks (MANETs) which enable wireless devices to dynamically establish networks without necessarily using a fixed infrastructure. The changing spectrum environment and the importance of protecting the transmission of the licensed users of the spectrum mainly differentiate classical MANETs from CR MANETs. The cognitive

capability and re configurability of CR MANETs have opened up several areas of research which have been explored extensively and continue to attract research and development The book will describe CR MANETs concepts intrinsic properties and research challenges of CR MANETs Distributed spectrum management functionalities such as spectrum sensing and sharing will be presented The design optimization and performance evaluation of security issues and upper layers in CR MANETs such as transport and application layers will be investigated

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