Complexity Reduction In Hevc Intra Coding And Comparison

This book features selected papers from the International Conference on Power Electronics and Renewable Energy Systems (ICPERES 2021), organized by SRM Institute of Science and Technology, Chennai, India, during April 2021. It covers recent advances in the field of soft computing applications in power systems, power system modeling and control, power system stability, power quality issues and solutions, smart grid, green and renewable energy technology optimization techniques in electrical systems, power electronics controllers for power systems, power converters and modeling, high voltage engineering, networking grid and cloud computing, computer architecture and embedded systems, fuzzy logic control, fuzzy decision support systems, and control systems. The book presents innovative work by leading academics, researchers, and experts from industry.

To push the envelope of DCT-based lossy image/video compression, this thesis is motivated to revisit design of some fundamental blocks in image/video coding, ranging from source modelling, quantization table, quantizers, to entropy coding. Firstly, to better handle the heavy tail phenomenon commonly seen in DCT coefficients, a new model dubbed transparent composite model (TCM) is developed and justified. Given a sequence of DCT coefficients, the TCM first separates the tail from the main body of the sequence, and then uses a uniform distribution to model DCT coefficients in the heavy tail, while using a parametric distribution to model DCT coefficients in the main body. The separation boundary and other distribution parameters are estimated online via maximum likelihood (ML) estimation. Efficient online algorithms are proposed for parameter estimation and their convergence is also proved. When the parametric distribution is truncated Laplacian, the resulting TCM dubbed Laplacian TCM (LPTCM) not only achieves superior modeling accuracy with low estimation complexity, but also has a good capability of nonlinear data reduction by identifying and separating a DCT coefficient in the heavy tail (referred to as an outlier) from a DCT coefficient in the main body (referred to as an inlier). This in turn opens up opportunities for it to be used in DCT-based image compression. Secondly, quantization table design is revisited for image/video coding where soft decision quantization (SDQ) is considered. Unlike conventional approaches where quantization table design is bundled with a specific encoding method, we assume optimal SDQ encoding and design a quantization table for the purpose of reconstruction. Under this assumption, we model transform coefficients across different frequencies as independently distributed random sources and apply the Shannon lower bound to approximate the rate distortion function of each source. We then show that a quantization table can be optimized in a way that the resulting distortion complies with certain behavior, yielding the so-called optimal distortion profile scheme (OptD). Guided by this new theoretical result, we present an efficient statistical-model-based algorithm using the Laplacian model to design quantization tables for DCT-based image compression. When applied to standard JPEG encoding, it provides more than 1.5 dB performance gain (in PSNR), with almost no extra burden on complexity. Compared with the state-of-the-art JPEG quantization table optimizer, the proposed algorithm offers an average 0.5 dB gain with computational complexity reduced by a factor of more than 2000 when SDQ is off, and a 0.1 dB performance gain or more with 85% of the complexity reduced when SDQ is on. Thirdly, based on the LPTCM and OptD, we further propose an efficient non-predictive DCT-based image compression system, where the quantizers and entropy coding are completely re-designed, and the relative SDQ algorithm is also developed. The proposed system achieves overall coding results that are among the best and similar to those of H.264 or HEVC intra (predictive) coding, in terms of rate vs visual quality. On the other hand, in terms of rate vs objective quality, it significantly outperforms baseline JPEG by more than 4.3 dB on average, with a moderate increase on complexity, and ECEB, the state-of-the-art non-predictive image coding, by 0.75 dB when SDQ is off, with the same level of computational complexity, and by 1 dB when SDQ is on, at the cost of extra complexity. In comparison with H.264 intra coding, our system provides an overall 0.4 dB gain or so, with dramatically reduced computational complexity. It offers comparable or even better coding performance than HEVC intra coding in the high-rate region or for complicated images, but with only less than 5% of the encoding complexity of the latter. In addition, our proposed DCT-based image compression system also offers a multiresolution capability, which, together with its comparatively high coding efficiency and low complexity, makes it a good alternative for real-time image processing applications.

This book describes and analyzes in detail the encoding effort and the encoding tool usage applied to 3D-HEVC depth map coding. Based on the analyzed information, the authors introduce efficient algorithms for accelerating the available encoding tools. The contributions discussed in this book include four algorithms for reducing intra-frame encoding effort and three algorithms for reducing inter-frame encoding effort. The presented results demonstrate several levels of encoding effort reduction with different impacts in the encoding efficiency, surpassing state-of-the-art solutions by more than 50% the encoding effort with only 0.3% encoding efficiency loss.

This book reports the latest advances on the design and development of mobile computing systems, describing their applications in the context of modeling, analysis and efficient resource management. It explores the challenges on mobile computing and resource management paradigms, including research efforts and approaches recently carried out in response to them to address future open-ended issues. The book includes 26 rigorously refereed chapters written by leading international researchers, providing the readers with technical and scientific information about various aspects of mobile computing, from basic concepts to advanced findings, reporting the state-of-the-art on resource management in such environments. It is mainly intended as a reference guide for researchers and practitioners involved in the design, development and applications of mobile computing systems, seeking solutions to related issues. It also represents a useful textbook for advanced undergraduate and graduate courses, addressing special topics such as: mobile and ad-hoc wireless networks; peer-to-peer systems for mobile computing; novel resource management techniques in cognitive radio networks; and power management in mobile computing systems.

18th International Conference, Genoa, Italy, September 7-11, 2015, Proceedings, Part II
Proceedings of Fifth International Conference INDIA 2018 Volume 2
High Performance Computing
Selected Papers in Honour of Professor Nikolaos G. Bourbakis – Vol. 2
Intelligent Algorithms in Software Engineering
Computational Intelligence Techniques for Green Smart Cities
AVS China, H.264/MPEG-4 PART 10, HEVC, VP6, DIRAC and VC-1

The book gathers a collection of high-quality peer-reviewed research papers presented at the International Conference on Information System Design and Intelligent Applications (INDIA 2018), which was held at the Universite des Mascareignes, Mauritius from July 19 to 21, 2018. It covers a wide range of

topics in computer science and information technology, from image processing, database applications and data mining, to grid and cloud computing, bioinformatics and many more. The intelligent tools discussed, e.g. swarm intelligence, artificial intelligence, evolutionary algorithms, and bio-inspired algorithms, are currently being applied to solve challenging problems in various domains.

This book provides its readers with the means to implement energy-efficient video systems, by using different optimization approaches at multiple abstraction levels. The authors evaluate the complete video system with a motive to optimize its different software and hardware components in synergy, increase the throughput-per-watt, and address reliability issues. Subsequently, this book provides algorithmic and architectural enhancements, best practices and deployment models for new video systems, while considering new implementation paradigms of hardware accelerators, parallelism for heterogeneous multi- and many-core systems, and systems with long life-cycles. Particular emphasis is given to the current video encoding industry standard H.264/AVC, and one of the latest video encoders (High Efficiency Video Coding, HEVC).

Video is the main driver of bandwidth use, accounting for over 80 per cent of consumer Internet traffic. Video compression is a critical component of many of the available multimedia applications, it is necessary for storage or transmission of digital video over today's band-limited networks. The majority of this video is coded using international standards developed in collaboration with ITU-T Study Group and MPEG. The MPEG family of video coding standards begun on the early 1990s with MPEG-1, developed for video and audio storage on CD-ROMs, with support for progressive video. MPEG-2 was standardized in 1995 for applications of video on DVD, standard and high definition television, with support for interlaced and progressive video. MPEG-4 part 2, also known as MPEG-2 video, was standardized in 1999 for applications of low- bit rate multimedia on mobile platforms and the Internet, with the support of object-based or content based coding by modeling the scene as background and foreground. Since MPEG-1, the main video coding standards were based on the so-called macroblocks. However, research groups continued the work beyond the traditional video coding architectures and found that macroblocks could limit the performance of the compression when using high-resolution video. Therefore, in 2013 the high efficiency video coding (HEVC) also known and H.265, was released, with a structure similar to H.264/AVC but using coding units with more flexible partitions than the traditional macroblocks. HEVC has greater flexibility in prediction modes and transform block sizes, also it has a more sophisticated interpolation and de blocking filters. In 2006 the VC-1 was released. VC-1 is a video codec implemented by Microsoft and the Microsoft Windows Media Video (VMW) 9 and standardized by the Society of Motion Picture and Television Engineers (SMPTE). In 2017 the Joint Video Experts Team (JVET) released a call for proposals for a new video coding standard initially called Beyond the HEVC, Future Video Coding (FVC) or known as Versatile Video Coding (VVC). VVC is being built on top of HEVC for application on Standard Dynamic Range (SDR), High Dynamic Range (HDR) and 360° Video. The VVC is planned to be finalized by 2020. This book presents the new VVC, and updates on the HEVC. The book discusses the advances in lossless coding and covers the topic of screen content coding. Technical topics discussed include: Beyond the High Efficiency Video CodingHigh Efficiency Video Coding encoderScreen contentLossless and visually lossless coding algorithmsFast coding algorithmsVisual quality assessmentOther screen content coding algorithmsOverview of JPEG Series

The requirements for multimedia (especially video and audio) communications increase rapidly in the last two decades in broad areas such as television, entertainment, interactive services, telecommunications, conference, medicine, security, business, traffic, defense and banking. Video and audio coding standards play most important roles in multimedia communications. In order to meet these requirements, series of video and audio coding standards have been developed such as MPEG-2, MPEG-4, MPEG-21 for audio and video by ISO/IEC, H.26x for video and G.72x for audio by ITU-T, Video Coder 1 (VC-1) for video by the Society of Motion Picture and Television Engineers (SMPTE) and RealVideo (RV) 9 for video by Real Networks. AVS China is the abbreviation for Audio Video Coding Standard of China. This new standard includes four main technical areas, which are systems, video, audio and digital copyright management (DRM), and some supporting documents such as consistency verification. The second part of the standard known as AVS1-P2 (Video - Jizhun) was approved as the national standard of China in 2006, and several final drafts of the standard have been completed, including AVS1-P1 (System - Broadcast), AVS1-P2 (Video - Zengqiang), AVS1-P3 (Audio - Double track), AVS1-P3 (Audio - 5.1), AVS1-P7 (Mobile Video), AVS-S-P2 (Video) and AVS-S-P3 (Audio). AVS China provides a technical solution for many applications such as digital broadcasting (SDTV and HDTV), high-density storage media, Internet streaming media, and will be used in the domestic IPTV, satellite and possibly the cable TV market. Comparing with other coding standards such as H.264 AVC, the advantages of AVS video standard include similar performance, lower complexity, lower implementation cost and licensing fees. This standard has attracted great deal of attention from industries related to television, multimedia communications and even chip manufacturing from around the world. Also many well known companies have joined the AVS Group to be Full Members or Observing Members. The 163 members of AVS Group include Texas Instruments (TI) Co., Agilent Technologies Co. Ltd., Envivio Inc., NDS, Philips Research East Asia, Aisino Corporation, LG, Alcatel Shanghai Bell Co. Ltd., Nokia (China) Investment (NCIC) Co.

Ltd., Sony (China) Ltd., and Toshiba (China) Co. Ltd. as well as some high level universities in China. Thus there is a pressing need from the instructors, students, and engineers for a book dealing with the topic of AVS China and its performance comparisons with similar standards such as H.264, VC-1 and RV-9.

Computer Science and its Applications
Proceedings of the 8th International Conference on Signal and Information Processing, Networking and Computers (ICSINC)
Algorithms and Architectures
Proceedings of FSDM 2019
Advances in Multimedia Information Processing, PCM 2012
Approximate Computing Techniques
From Component- to Application-Level

High Efficiency Video Coding and Other Emerging Standards provides an overview of high efficiency video coding (HEVC) and all its extensions and profiles. There are nearly 300 projects and problems included, and about 400 references related to HEVC alone. Next generation video coding (NGVC) beyond HEVC is also described. Other video coding standards such as AVS2, DAALA, THOR, VP9 (Google), DIRAC, VC1, and AV1 are addressed, and image coding standards such as JPEG, JPEG-LS, JPEG2000, JPEG XR, JPEG XS, JPEG XT and JPEG-Pleno are also listed.Understanding of these standards and their implementation is facilitated by overview papers, standards documents, reference software, software manuals, test sequences, source codes, tutorials, keynote speakers, panel discussions, reflector and ftp/web sites – all in the public domain. Access to these categories is also provided. This book gathers the refereed proceedings of the Intelligent Algorithms in Software Engineering Section of the 9th Computer Science On-line Conference 2020 (CSOC 2020), held on-line in April 2020. Software engineering research and its applications to intelligent algorithms have now assumed an essential role in computer science research. In this book, modern research methods, together with applications of machine and statistical learning in software engineering research, are presented.

This book serves as a single-source reference to the latest advances in Approximate Computing (AxC), a promising technique for increasing performance or reducing the cost and power consumption of a computing system. The authors discuss the different AxC design and validation techniques, and their integration. They also describe real AxC applications, spanning from mobile to high performance computing and also safety-critical applications.

2018 IEEE 7th Global Conference on Consumer Electronics (GCCE 2018) is asking for submissions of technical papers for Oral, Demo, and Poster presentations The IEEE GCCE 2018 will bring together top technical professionals from the consumer electronics industry and academia to exchange information and results of state of the art work on systems, circuits, technologies, processes and applications Student papers are particularly encouraged

Intelligent Systems and Applications
Advances in Visual Computing
Versatile Video Coding
12th International Symposium, ISVC 2016, Las Vegas, NV, USA, December 12-14, 2016, Proceedings, Part II
Pattern Recognition and Computer Vision
Algorithms for Efficient and Fast 3D-HEVC Depth Map Encoding
Proceedings of the 9th Computer Science On-line Conference 2020, Volume 1

After completion of High Efficiency Video Coding standardization the relevant international standardization committees have shifted their focus toward the development of several key extensions of its capabilities to address the needs of broader range of applications [25]. The extensions under current development fall into three categories: 1) the range extensions, which expand the range of bit depths and color sampling formats supported by the standard and include an increased emphasis on screen-content coding; 2) the scalability extensions, which enable the use of embedded bitstream subsets as reduced-bit-rate representations of the video content; and 3) the 3D video extensions, which enable stereoscopic and multiview representations. In scalable extension of HEVC, the base layer is coded using normal HEVC codec and the enhancement layers are coded using interlayer prediction for both intra and inter predictions. The prediction process for the enhancement layer in scalable video coding is complex and the proposed algorithm in the thesis concentrates mainly on reducing the complexity of the inter-layer inter prediction to code the enhancement layer.

Digital video is becoming extremely important nowadays and its importance has greatly increased in the last two decades. Due to the rapid development of information and communication technologies, the demand for Ultra-High Definition (UHD) video applications is becoming stronger. However, the most prevalent video compression standard H.264/AVC released in 2003 is inefficient when it comes to UHD videos. The increasing desire for superior compression efficiency to H.264/AVC leads to the standardization of High Efficiency Video Coding (HEVC). Compared with the H.264/AVC standard, HEVC offers a double compression ratio at the same level of video quality or substantial improvement of video quality at the same video bitrate. Yet, HE-VC/H.265 possesses superior compression efficiency, its complexity is several times more than H.264/AVC, impeding its high throughput implementation. Currently, most of the researchers have focused merely on algorithm level adaptations of HEVC/H.265 standard to reduce computational intensity without considering the hardware feasibility. What's more, the exploration of efficient hardware architecture design is not exhaustive. Only a few research works have been conducted to explore efficient hardware architectures of HEVC/H.265 standard. In this dissertation, we investigate efficient algorithm adaptations and hardware architecture design of HEVC intra encoders. We also explore the deep learning approach in mode prediction. From the algorithm point of view, we propose three efficient hardware-oriented algorithm adaptations, including mode reduction, fast coding unit (CU) cost estimation, and group-based CABAC (context-adaptive binary arithmetic coding) rate estimation. Mode reduction aims to reduce mode candidates of each prediction unit (PU) in the rate-distortion optimization (RDO) process, which is both computation-intensive and time-consuming; Fast CU cost estimation is applied to reduce the complexity in rate-distortion (RD) calculation of each CU. Group-based CABAC rate estimation is proposed to parallelize syntax elements processing to greatly improve rate estimation throughput. From the hardware design perspective, a fully parallel hardware architecture of HEVC intra encoder is developed to sustain UHD video compression at 4K@30fps. The fully parallel architecture introduces four prediction engines (PE) and each PE performs the full cycle of mode prediction, transform, quantization, inverse quantization, inverse transform, reconstruction, rate-distortion estimation independently. PU blocks with different PU sizes will be processed by the different prediction engines (PE) simultaneously. Also, an efficient hardware implementation of a group-based CABAC rate estimator is incorporated into the proposed HEVC intra encoder

for accurate and high-throughput rate estimation. To take advantage of the deep learning approach, we also propose a fully connected layer based neural network (FCLNN) mode preselection scheme to reduce the number of RDO modes of luma prediction blocks. All angular prediction modes are classified into 7 prediction groups. Each group contains 3-5 prediction modes that exhibit a similar prediction angle. A rough angle detection algorithm is designed to determine the prediction direction of the current block, then a small scale FCLNN is exploited to refine the mode prediction.

This book collects selected papers from the 8th Conference on Signal and Information Processing, Networking and Computers held in Ji'nan, Shandong, China on September 13-17, 2021. It focuses on the current works of information theory, communication system, computer science, aerospace technologies and big data and other related technologies. Readers from both academia and industry of this field can contribute and find their interests from the book.

The Fuzzy Systems and Data Mining (FSDM) conference is an annual event encompassing four main themes: fuzzy theory, algorithms and systems, which includes topics like stability, foundations and control; fuzzy application, which covers different kinds of processing as well as hardware and architectures for big data and time series and has wide applicability; the interdisciplinary field of fuzzy logic and data mining, encompassing applications in electrical, industrial, chemical and engineering fields as well as management and environmental issues; and data mining, outlining new approaches to big data, massive data, scalable, parallel and distributed algorithms. The annual conference provides a platform for knowledge exchange between international experts, researchers, academics and delegates from industry. This book includes the papers accepted and presented at the 5th International Conference on Fuzzy Systems and Data Mining (FSDM 2019), held in Kitakyushu, Japan on 18-21 October 2019. This year, FSDM received 442 submissions. All papers were carefully reviewed by program committee members, taking account of the quality, novelty, soundness, breadth and depth of the research topics falling within the scope of FSDM. The committee finally decided to accept 137 papers, which represents an acceptance rate of about 30%. The papers presented here are arranged in two sections: Fuzzy Sets and Data Mining; and Communications and Networks. Providing an overview of the most recent scientific and technological advances in the fields of fuzzy systems and data mining, the book will be of interest to all those working in these fields.

Algorithms and Hardware Co-design of HEVC Intra Encoders

Proceedings of the Fifth Euro-China Conference on Intelligent Data Analysis and Applications

A Hardware-Software Collaborative Approach

New Design Perspectives

Extended and Selected Results from the SAI Intelligent Systems Conference (IntelliSys) 2015

Complexity Reduction in Inter Layer Inter Prediction in Scalable High Efficiency Video Coding

Proceedings of 3rd ICSCSP 2020, Volume 1

This two volume set LNCS 10602 and LNCS 10603 constitutes the thoroughly refereed post-conference proceedings of the Third International Conference on Cloud Computing and Security, ICCCS 2017, held in Nanjing, China, in June 2017. The 116 full papers and 11 short papers of these volumes were carefully reviewed and selected from 391 submissions. The papers are organized in topical sections such as: information hiding; cloud computing; IOT applications; information security; multimedia applications; optimization and classification.

The International Conference on Energy, Environment and Materials Science (EEMS2015) was held in Guangzhou, China, from August 25 - 26, 2015. EEMS2015 provided a platform for academic scientists, researchers and scholars to exchange and share their experiences and research results within the fields of energy science, energy technology, environmental science, environmental engineering, motivation, automation and electrical engineering, material science and engineering, the discovery or development of energy, and environment and materials science.

This volume of Advances in Intelligent Systems and Computing highlights papers presented at the Fifth Euro-China Conference on Intelligent Data Analysis and Applications (ECC2018), held in Xi'an, China from October 12 to 14 2018. The conference was co-sponsored by Springer, Xi'an University of Posts and Telecommunications, VSB Technical University of Ostrava (Czech Republic), Fujian University of Technology, Fujian Provincial Key Laboratory of Digital Equipment, Fujian Provincial Key Lab of Big Data Mining and Applications, and Shandong University of Science and Technology in China. The conference was intended as an international forum for researchers and professionals engaged in all areas of computational intelligence, intelligent control, intelligent data analysis, pattern recognition, intelligent information processing, and applications.

The two volume set LNCS 10072 and LNCS 10073 constitutes the refereed proceedings of the 12th International Symposium on Visual Computing, ISVC 2016, held in Las Vegas, NV, USA in December 2016. The 102 revised full papers and 34 poster papers presented in this book were carefully reviewed and selected from 220 submissions. The papers are organized in topical sections: Part I (LNCS 10072) comprises computational bioimaging; computer graphics; motion and tracking; segmentation; pattern recognition; visualization; 3D mapping; modeling and surface reconstruction; advancing autonomy for aerial robotics; medical imaging; virtual reality; computer vision as a service; visual perception and robotic systems; and biometrics. Part II (LNCS 9475): applications; visual surveillance; computer graphics; and virtual reality.

Energy Efficient Embedded Video Processing Systems

Information Systems Design and Intelligent Applications

Advances in Energy, Environment and Materials Science

Dct-based Image/video Compression

MultiMedia Modeling

Advances in Machine Learning/Deep Learning-based Technologies

Image and Signal Processing

This book constitutes the proceedings of the 5th Latin American Conference, CARLA 2018, held in Bucaramanga, Colombia, in September 2018. The 24 papers presented in this volume were carefully reviewed and selected from 38 submissions. They are organized in topical sections on: Artificial Intelligence; Accelerators; Applications; Performance Evaluation; Platforms and Infrastructures; Cloud Computing.

This volume constitutes the refereed proceedings of the 9th International Conference on Image and Signal Processing, ICISP 2020, which was due to be held in Marrakesh, Morocco, in

June 2020. The conference was cancelled due to the COVID-19 pandemic. The 40 revised full papers were carefully reviewed and selected from 84 submissions. The contributions presented in this volume were organized in the following topical sections: digital cultural heritage & color and spectral imaging; data and image processing for precision agriculture; machine learning application and innovation; biomedical imaging; deep learning and applications; pattern recognition; segmentation and retrieval; mathematical imaging & signal processing. This book is a remarkable collection of chapters covering a wider range of topics, including unsupervised text mining, anomaly and Intrusion Detection, Self-reconfiguring Robotics, application of Fuzzy Logic to development aid, Design and Optimization, Context-Aware Reasoning, DNA Sequence Assembly and Multilayer Perceptron Networks. The twenty-one chapters present extended results from the SAI Intelligent Systems Conference (IntelliSys) 2015 and have been selected based on high recommendations during IntelliSys 2015 review process. This book presents innovative research and development carried out presently in fields of knowledge representation and reasoning, machine learning, and particularly in intelligent systems in a more broad sense. It provides state - of - the - art intelligent methods and techniques for solving real world problems along with a vision of the future research. The four-volume set LNCS 11056, 110257, 11258, and 11073 constitutes the refereed proceedings of the First Chinese Conference on Pattern Recognition and Computer Vision, PRCV 2018, held in Guangzhou, China, in November 2018. The 179 revised full papers presented were carefully reviewed and selected from 399 submissions. The papers have been organized in the following topical sections: Part I: Biometrics, Computer Vision Application. Part II: Deep Learning. Part III: Document Analysis, Face Recognition and Analysis, Feature Extraction and Selection, Machine Learning. Part IV: Object Detection and Tracking, Performance Evaluation and Database, Remote Sensing.
Resource Management in Mobile Computing Environments
High Efficiency Video Coding (HEVC)
Signal and Information Processing, Networking and Computers
Emerging Technology Trends in Internet of Things and Computing
Soft Computing and Signal Processing
2018 IEEE 7th Global Conference on Consumer Electronics (GCCE)
High Efficiency Video Coding and Other Emerging Standards

This book presents selected research papers on current developments in the fields of soft computing and signal processing from the Third International Conference on Soft Computing and Signal Processing (ICSCSP 2020). The book covers topics such as soft sets, rough sets, fuzzy logic, neural networks, genetic algorithms and machine learning and discusses various aspects of these topics, e.g., technological considerations, product implementation and application issues.

This book provides developers, engineers, researchers and students with detailed knowledge about the High Efficiency Video Coding (HEVC) standard. HEVC is the successor to the widely successful H.264/AVC video compression standard, and it provides around twice as much compression as H.264/AVC for the same level of quality. The applications for HEVC will not only cover the space of the well-known current uses and capabilities of digital video – they will also include the deployment of new services and the delivery of enhanced video quality, such as ultra-high-definition television (UHDTV) and video with higher dynamic range, wider range of representable color, and greater representation precision than what is typically found today. HEVC is the next major generation of video coding design – a flexible, reliable and robust solution that will support the next decade of video applications and ease the burden of video on world-wide network traffic. This book provides a detailed explanation of the various parts of the standard, insight into how it was developed, and in-depth discussion of algorithms and architectures for its implementation.

This book discusses computational complexity of High Efficiency Video Coding (HEVC) encoders with coverage extending from the analysis of HEVC compression efficiency and computational complexity to the reduction and scaling of its encoding complexity. After an introduction to the topic and a review of the state-of-the-art research in the field, the authors provide a detailed analysis of the HEVC encoding tools compression efficiency and computational complexity. Readers will benefit from a set of algorithms for scaling the computational complexity of HEVC encoders, all of which take advantage from the flexibility of the frame partitioning structures allowed by the standard. The authors also provide a set of early termination methods based on data mining and machine learning techniques, which are able to reduce the computational complexity required to find the best frame partitioning structures. The applicability of the proposed methods is finally exemplified with an encoding time control system that employs the best complexity reduction and scaling methods presented throughout the book. The methods presented in this book are especially useful in power-constrained, portable multimedia devices to reduce energy consumption and to extend battery life. They can also be applied to portable and non-portable multimedia devices operating in real time with limited computational resources.

ITU-T (VCEG) and ISO/IEC (MPEG) collaborated and formed the joint collaborative team on video coding (JCT-VC) in April 2010 to develop the next-generation video coding (NGVC) standard.. HEVC standard doubles the coding efficiency and the approximately 50% less bit rate with respect to H.264/AVC, at nearly the same video quality at expense of increased complexity. In this thesis, a technique is proposed to reduce the complexity of HEVC intra

coding to get better encoding time, involving two steps - first by optimizing the PU (prediction unit) size decision process using texture complexity analysis by intensity gradients and second to obtain the reduced prediction modes by applying a combination of rough mode decision (RMD) and most probable modes (MPM) thereby reducing the number of modes based on rate distortion optimization (RDO) followed by residual quad-tree (RQT) which is used to simplify the entire process The technique developed in this thesis achieved an average gain of 47.25% encoder time when implemented for several test sequences at very less loss in performance with high complexity reduction.

ICPERES 2021

Complexity-Aware High Efficiency Video Coding

Cloud Computing and Security

First International Conference, TIOTC 2021, Erbil, Iraq, June 6–8, 2021, Revised Selected Papers

Fast Intra-frame Coding Algorithm for HEVC Based on TCM and Machine Learning

Proceedings of the International Conference on Energy, Environment and Materials Science (EEMS 2015), Guanghzou, P.R. China, August 25-26, 2015

Fuzzy Systems and Data Mining V

The two-volume set LNCS 8325 and 8326 constitutes the thoroughly refereed proceedings of the 20th Anniversary International Conference on Multimedia Modeling, MMM 2014, held in Dublin, Ireland, in January 2014. The 46 revised regular papers, 11 short papers and 9 demonstration papers were carefully reviewed and selected from 176 submissions. 28 special session papers and 6 papers from Video Browser Showdown workshop are also included in the proceedings. The papers included in these two volumes cover a diverse range of topics including: applications of multimedia modelling, interactive retrieval, image and video collections, 3D and augmented reality, temporal analysis of multimedia content, compression and streaming. Special session papers cover the following topics: Mediadrom: artful post-TV scenarios, MM analysis for surveillance video and security applications, 3D multimedia computing and modeling, social geo-media analytics and retrieval, multimedia hyperlinking and retrieval.

The three-volume set LNCS 11857, 11858, and 11859 constitutes the refereed proceedings of the Second Chinese Conference on Pattern Recognition and Computer Vision, PRCV 2019, held in Xi'an, China, in November 2019. The 165 revised full papers presented were carefully reviewed and selected from 412 submissions. The papers have been organized in the following topical sections: Part I: Object Detection, Tracking and Recognition, Part II: Image/Video Processing and Analysis, Part III: Data Analysis and Optimization.

The two-volume set LNCS 9279 and 9280 constitutes the refereed proceedings of the 18th International Conference on Image Analysis and Processing, ICIAP 2015, held in Genoa, Italy, in September 2015. The 129 papers presented were carefully reviewed and selected from 231 submissions. The papers are organized in the following seven topical sections: video analysis and understanding, multiview geometry and 3D computer vision, pattern recognition and machine learning, image analysis, detection and recognition, shape analysis and modeling, multimedia, and biomedical applications.

This book contains high-quality and original research on computational intelligence for green smart cities research. In recent years, the use of smart city technology has rapidly increased through the successful development and deployment of Internet of Things (IoT) architectures. The citizens' quality of life has been improved in several sensitive areas of the city, such as transportation, buildings, health care, education, environment, and security, thanks to these technological advances Computational intelligence techniques and algorithms enable a computational analysis of enormous data sets to reveal patterns that recur. This information is used to inform and improve decision-making at the municipal level to build smart computational intelligence techniques and sustainable cities for their citizens. Machine intelligence allows us to identify trends (patterns). The smart city could better integrate its transportation network, for example. By offering a better public transportation network adapted to the demand, we could reduce personal vehicles and energy consumption. A smart city could use models to predict the consequences of a change, such as pedestrianizing a street or adding a bike lane. A city can even create a 3D digital twin to test hypothetical projects. This book comprises many state-of-the-art contributions from scientists and practitioners working in machine intelligence and green smart cities. It aspires to provide a relevant reference for students, researchers, engineers, and professionals working in this area or those interested in grasping its diverse facets and exploring the latest advances in machine intelligence for green and sustainable smart city applications.

9th International Conference, ICISP 2020, Marrakesh, Morocco, June 4–6, 2020, Proceedings

13th Pacific-Rim Conference on Multimedia, Singapore, December 4-6, 2012, Proceedings

Third International Conference, ICCCS 2017, Nanjing, China, June 16-18, 2017, Revised Selected Papers, Part II

5th Latin American Conference, CARLA 2018, Bucaramanga, Colombia, September 26–28, 2018, Revised Selected Papers

Second Chinese Conference, PRCV 2019, Xi'an, China, November 8–11, 2019, Proceedings, Part II

Proceedings of International Conference on Power Electronics and Renewable Energy Systems

Ubiquitous Information Technologies

As the 4th Industrial Revolution is restructuring human societal organization into, so-called, "Society 5.0", the field of Machine Learning (and its sub-field of Deep Learning) and related technologies is growing continuously and rapidly, developing in both itself and towards applications in many other disciplines. Researchers worldwide aim at incorporating cognitive abilities into machines, such as learning and problem solving. When machines and software systems have been enhanced with Machine Learning/Deep Learning components, they become better and more efficient at performing specific tasks. Consequently, Machine Learning/Deep Learning stands out as a research discipline due to its worldwide pace of growth in both theoretical advances and areas of application, while achieving very high rates of success and promising major impact in science, technology and society. The book at hand aims at exposing its readers to some of the most significant Advances in Machine Learning/Deep Learning-based Technologies. The book consists of an editorial note and an additional ten (10) chapters, all invited from authors who work on the corresponding chapter theme and are recognized for their significant research contributions. In more detail, the chapters in the book are organized into five parts, namely (i) Machine Learning/Deep Learning in Socializing and Entertainment, (ii) Machine Learning/Deep Learning in Education, (iii) Machine Learning/Deep Learning in Security, (iv) Machine Learning/Deep Learning in Time Series Forecasting, and (v) Machine Learning in Video Coding and Information Extraction. This research book is directed towards professors, researchers, scientists, engineers and students in Machine Learning/Deep Learning-related

disciplines. It is also directed towards readers who come from other disciplines and are interested in becoming versed in some of the most recent Machine Learning/Deep Learning-based technologies. An extensive list of bibliographic references at the end of each chapter guides the readers to probe further into the application areas of interest to them.

This volume constitutes selected papers presented at the First International Conference on Emerging Technology Trends in IoT and Computing, TIOTC 2021, held in Erbil, Iraq, in June 2021. The 26 full papers were thoroughly reviewed and selected from 182 submissions. The papers are organized in the following topical sections: Internet of Things (IOT): services and applications; Internet of Things (IOT) in healthcare industry; IOT in networks, communications and distributed computing; real world application fields in information science and technology.

High Efficiency Video Coding (HEVC) is the latest video coding standard. Compared with the previous standard H.264/AVC, it can reduce the bit-rate by around 50% while maintaining the same perceptual quality. This performance gain on compression is achieved mainly by supporting larger Coding Unit (CU) size and more prediction modes. However, since the encoder needs to traverse all possible choices to mine out the best way of encoding data, this large flexibility on block size and prediction modes has caused a tremendous increase in encoding time. In HEVC, intra-frame coding is an important basis, and it is widely used in all configurations. Therefore, fast algorithms are always required to alleviate the computational complexity of HEVC intra-frame coding. In this thesis, a fast intra-frame coding algorithm based on machine learning is proposed to predict CU decisions. Hence the computational complexity can be significantly reduced with negligible loss in the coding efficiency. Machine learning models like Bayes decision, Support Vector Machine (SVM) are used as decision makers while the Laplacian Transparent Composite Model (LPTCM) is selected as a feature extraction tool. In the main version of the proposed algorithm, a set of features named with Summation of Binarized Outlier Coefficients (SBOC) is extracted to train SVM models. An online training structure and a performance control method are introduced to enhance the robustness of decision makers. When applied on All Intra Main (AIM) full test and compared with HM 16.3, the main version of the proposed algorithm can achieve, on average, 48% time reduction with 0.78% BD-rate increase. Through adjusting parameter settings, the algorithm can change the trade-off between encoding time and coding efficiency, which can generate a performance curve to meet different requirements. By testing different methods on the same machine, the performance of proposed method has outperformed all CU decision based HEVC fast intra-frame algorithms in the benchmarks.

This book constitutes the proceedings of the 13th Pacific Rim Conference on Multimedia, held in Singapore during December 4-6, 2012. The 59 revised full papers presented were carefully reviewed and selected from 106 submissions for the main conference and are accompanied by 23 presentations of 4 special sessions. The papers are organized in topical sections on multimedia content analysis, image and video processing, video coding and multimedia information processing, image/video processing and analysis, video coding and multimedia system, advanced image and video coding, cross media learning with structural priors, as well as efficient multimedia analysis and utilization.

Complexity Reduction in HEVC Intra Coding and Comparison with H.264/AVC

Video coding standards

First Chinese Conference, PRCV 2018, Guangzhou, China, November 23-26, 2018, Proceedings, Part I

Image Analysis and Processing — ICIAP 2015

2019 IEEE 21st International Workshop on Multimedia Signal Processing (MMSP)

Approximate Circuits

Methodologies and CAD

This book provides readers with a comprehensive, state-of-the-art overview of approximate computing, enabling the design trade-off of accuracy for achieving better power/performance efficiencies, through the simplification of underlying computing resources. The authors describe in detail various efforts to generate approximate hardware systems, while still providing an overview of support techniques at other computing layers. The book is organized by techniques for various hardware components, from basic building blocks to general circuits and systems.

The 6th FTRA International Conference on Computer Science and its Applications (CSA-14) will be held in Guam, USA, Dec. 17 - 19, 2014. CSA-14 presents a comprehensive conference focused on the various aspects of advances in engineering systems in computer science, and applications, including ubiquitous computing, U-Health care system, Big Data, UI/UX for human-centric computing, Computing Service, Bioinformatics and Bio-Inspired Computing and will show recent advances on various aspects of computing technology, Ubiquitous Computing Services and its application.

20th Anniversary International Conference, MMM 2014, Dublin, Ireland, January 6-10, 2014, Proceedings, Part I