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Fujifilm X-T3 4K 60FPS (10 Bit HEVC H.265) - London at NightWhy I Export EVERY VIDEO in ProRes ~~What is HEVC / H.265 (High Efficiency Video Coding)?~~

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Webinar- Simple and Efficient HEVC Encoder SolutionAV1

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~~vs. HEVC: Perceptual Evaluation of Video Encoders by Zhou Wang~~ Faster GPU Decoding in Premiere Pro for H.264/HEVC media ~~Standardization of High Efficiency Video Coding (HEVC) BL Quick Tips | H.265 (HEVC) vs H.264 (AVC): Which is Better for 4K Video?~~ How I saved 20 TERABYTES with one basic Script (Updated 2019, HEVC) ~~Complexity Reduction In Hevc Intra~~

A deep convolutional neural network approach for complexity reduction on intra-mode HEVC. Abstract: The High Efficiency Video Coding (HEVC) standard significantly saves coding bit-rate over the proceeding H.264 standard, but at the expense of extremely high encoding complexity. In fact, the coding tree unit (CTU) partition consumes a large proportion of HEVC encoding complexity, due to the brute-force search for rate-

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distortion optimization (RDO).

~~A deep convolutional neural network approach for ...~~

As HEVC is tremendously complex , several approaches can be found in the literature that try to reduce this complexity. For instance, early skip and early CU conditions [18] , [19] , finally adopted by the HM reference software [3] , try to reduce the number of iterations by applying inter prediction.

~~Complexity reduction in the HEVC/H265 standard based on~~

~~...~~

Complexity Reduction of HEVC SAO Intra Modes By Adjustment of Offset Values. ... Complexity Reduction of HEVC SAO Intra Modes By Adjustment of Offset Values)

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6.07%. 8.56 %.

~~(PDF) Complexity Reduction of HEVC SAO Intra Modes By ...~~  
form of HCPM, for reducing the complexity of intra-mode HEVC. □ We develop a deep LSTM structure named ETH-LSTM that learns the spatio-temporal correlation of the CU partition, for reducing the complexity of HEVC at inter-mode. This paper is organized as follows. Section II reviews the related works on HEVC complexity reduction. Section III

~~Reducing Complexity of HEVC: A Deep Learning Approach~~  
for reducing the complexity of HEVC at inter-mode. This paper is organized as follows. Section II reviews the related works on HEVC complexity reduction. Section III presents the

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established CU partition database. In Sections IV and V, we propose ETH-CNN and ETH-LSTM to reduce the HEVC complexity at intra-mode and inter-mode, respectively.

## ~~Reducing Complexity of HEVC: A Deep Learning Approach~~

3D-HEVC is an emerging coding standard for the compression of multi-view video plus depth data. In 3D-HEVC, Depth Modeling Modes (DMMs) searching and coding unit (CU) partition consume a large proportion of the 3D-HEVC encoding complexity. This paper proposes techniques to speed up 3D-HEVC depth intra mode decision and early terminated depth CU partition.

## ~~Complexity Reduction for Depth Map Coding in 3D-HEVC ...~~

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The final structure of the LCU is determined after traversing the quadtree formed by HEVC with CUs of size 64 64 down to 8 8. The proposed approach of complexity reduction targets CUs of size 16 16 and larger only. By terminating CUs of size at least 16 16, only a reduced number of CUs of size 8 8 will be left.

~~Vol. 7, No. 10, 2016 Inter Prediction Complexity Reduction ...~~

The evaluations confirm that our proposed hybrid complexity reduction scheme reduces the 3D-HEVC codec complexity by 67.70% on average for the DVt compared with the unmodified 3D-HEVC encoder, while maintaining the overall video quality. Compared with the state-of-the-art method, it reduces complexity by 25.74% on average.



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## ~~Online Learning Based Complexity Reduction Scheme for 3D-HEVC~~

T. Li, M. Xu and X. Deng, "A deep convolutional neural network approach for complexity reduction on intra-mode HEVC," 2017 IEEE International Conference on Multimedia and Expo (ICME), Hong Kong, Hong Kong, 2017, pp. 1255-1260. JCT-VC, HM Software, [Online].

## ~~GitHub tianyli2017/HEVC-Complexity-Reduction: Source ...~~

M.U.K. Khan, M. Shafique, J. Henkel, An Adaptive Complexity Reduction Scheme with Fast Prediction Unit Decision for HEVC Intra Encoding, in IEEE International Conference on Image Processing (ICIP), 2013 Google

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Scholar

## ~~Complexity Reduction for HEVC Using Data Mining Techniques~~

However, the computational complexity of the typical HEVC encoder dramatically increases because of the recursive searching scheme for finding the best coding unit (CU) partitions. In this paper, an adaptive fast CU size decision algorithm for HEVC Intra prediction is proposed based on CU complexity classification (CC) by using machine learning (ML) technology.

## ~~An Adaptive CU Size Decision Algorithm for HEVC Intra ...~~

To reduce the computational load of intra prediction, the social

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HM software uses a fast encoding algorithm [5,7,10] with two phases through a combination of RMD and RDO process. First, all 35 modes are evaluated with respect to a cost function.  $N_{modes}$  with minimum cost  $J_{SATD}$  are then selected as the most promising candidate modes.

~~Fast Intra Mode Decision for HEVC – CEUR-WS.org~~

HEVC intra coding of Ultra HD video with reduced complexity . ... In this paper, we address the problem of HEVC encoding complexity reduction by proposing a strategy to infer UHD coding modes and quad-tree from those optimized on the lower (HD) resolution version of the input video. A speed-up by a factor of 3 is achieved compared to directly ...

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~~HEVC intra coding of Ultra HD video with reduced complexity~~  
Experimental results illustrate that our scheme achieves a significant reduction in computational complexity of HEVC intra-coding. Compared with the HM encoder, the encoding time is reduced by up to 71% with negligible degradation in coding efficiency.

~~A fast HEVC intra coding algorithm based on texture ...~~

Reading: ETH-CNN & ETH-LSTM □ Reducing Complexity of HEVC (Fast HEVC Intra & Inter Prediction) 39.76% to 59.74%, and 43.14% to 64.07% Time Reduction with Only 1.722% and 1.483% BD-Rate Increase for LDB & RA Configurations Respectively, Outperforms Liu TIP□16 and Li ICME□17

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~~Reading: ETH CNN & ETH LSTM - Reducing Complexity of HEVC ...~~

According to our evaluations, the complexity reduction opportunity of block partitioning is up to 97%, i.e., the encoding complexity would drop down to 3% for the same coding efficiency if the...

~~Complexity Reduction Opportunities in the Future VVC Intra ...~~

COMPLEXITY REDUCTION FOR HEVC INTRAFRAME LUMA MODE DECISION USING IMAGE STATISTICS AND NEURAL NETWORKS. Thumbnails Document Outline Attachments. Previous. Next. Highlight all Match case.

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## ~~COMPLEXITY REDUCTION FOR HEVC INTRAFRAME LUMA MODE...~~

Relying on the correlation between motion information from the depth map and the associated texture video, the same authors introduced a low complexity depth mode decision method for inter and intra prediction to reduce the computational complexity of the 3D-HEVC encoder . Besides the search range motion estimation and the fast disparity estimation, a fast mode decision for depth coding is presented to avoid full rate distortion cost calculation.

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~~Low complexity intra prediction mode decision for 3D-HEVC~~

...

HEVC-deep-learning-pipeline Integrating neural network models in HEVC encoder, to test the complexity reduction using deep-learning-based method in HEVC intra-prediction.

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

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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



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performance with high complexity reduction.

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

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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.

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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,

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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 as H.265, was released, with a structure similar to H.264/AVC but using coding units with more flexible

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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

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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 Coding High Efficiency Video Coding encoder Screen content Lossless and visually lossless coding algorithms Fast coding algorithms Visual quality assessment Other screen content coding algorithms Overview of JPEG Series

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)

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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.

The requirements for multimedia (especially video and audio) communications increase rapidly in the last two decades in

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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



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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

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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

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performance comparisons with similar standards such as H.264, VC-1 and RV-9.

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,

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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).

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

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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 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

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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.

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