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RECENT TRENDS AND LITERATURE REVIEW ON ENHANCED VIDEO COMPRESSION BY USING H.265/HEVC STANDARD

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Abstract
In this paper mainly focused on the necessity and high demand for the quality of video measurements based on video quality for today modern video applications. In this view video compression having wide range of applications especially in video surveillance detection of video tampering, streaming of video frames, required necessary high standard compression techniques. In this paper we discussed about the possibilities of recent research implementations for enhanced video compression by using H.265/HEVC standards coding based on inverse discrete cosine transform (IDCT) to perform video decompression. The latest design using cadence PDK45nm technology library for to carry out the simulation, synthesis, and digital implementation which is similar to ASIC design using Verilog code. The final verification of the design analysis is speed, area, and throughput will be deciding the performance of compression.The operational frequency of this design will support 5K video at up to 40 frames/sec. The core area of this design takes up 12324 µm2 and can operate at max. Frequency of 377 MHz.

Keywords: Video Compression H.265/HEVC standards, Applications, simulation, synthesis, Digital implementation.

1. INTRODUCTION
Video compression techniques and analysis were developed in the last decade years towards many general compression standards and its implementations. As far as computer vision applications are considered, it comprises a long list like; entity moving segmentation, human being action recognition, video capture indexing, video recovery, face revealing, recorded visual media categorization, video tracking, video summarization, and picture change revealing in compressed videos. The current research work is mainly implementing on H.265/HEVC approaches in many areas by using latest compression techniques. The latest applications, AVC used in codec by Google. In the year of 2017 the new technology introduced, called H.265/HEVC came in to the market for different video standards. To get accurate video compression based on availability of

different schemes with frames are used in video flow called group of images. A very challenging research area in In order to effectively compress digital video, HEVC and H.265 use high standard tools and processes to achieve an efficient bit stream of data. The set of input video frames are first divided into minimum blocks in preparation for predictive encoding. Each of all the blocks is then encoded using a block that is in the same frame or in another frame that has been previously encoded andtransmitted.

The next step is to subtract the predicted block from the current block producing a required signal. It is this required signal which is then transformed into the frequency domain.

The transform coefficients are then quantized according to a particular scheme or mode to eliminate high frequency data. The resulting information is then entropy encoded and then transmittedfor storage or to a decoder which performs inverse operations to reconstruct the video. Thelarge components used in the HEVC encoder-decoder path.From this work, it can be observed how the decoder uses the same tools as the encoder but in aninverse step to undue the encoding processsuccessfully.

2. PROBLEM STATEMENT

A video stream contains large amount of information and storing or transmitting these enormous data is a very typical task, specifically at signal processing applications. Hence, the video compression is a thrust area of research due to its large applications in wired or wireless communication and low cost handheld devices with less storage and computing capacity. Many scientists have designed many compression models for low and high bit rate applications. But these implementations are not valid for quality of visual and also limited for high compression.. Based on thoroughrecent investigation, it is identified that there exists a scope for further improvement in video compression scheme to give higher compression efficiency and higher visual quality as well. The video compression schemes to be developed must have low computational complexity, so that they will be easily accommodated to existing video coding standards for real-time applications. Recently, H.265/HEVC platform video compression schemes are widely used in low to medium bit-rate applications [10–11]. Hence, the following research problem has been taken.

To develop efficient and accuracy of high standard video compression schemes, for H.265/HEVC model, that yield higher compression ratio with low power and better visual quality but with lower computational complexities for low and medium resolution applications like mobile based video telephony and conferencing, standard-definition TV broadcasting and web based video related services.

3. LITERATURE SURVEY

The below sectionexplained and highlights the detailedinvestigation studies on each

sub-domains of videocompression towards MPEG and H.264/AVCstandards aswell. In this section, Table 1 summarizes the variantapplications in the line of video compression are neatlytabulated with reference number, target applications,approaches / techniques used and features adopted.

Existing studies on Video Indexing technique inMPEG Series towardsIdeal Video-retrieval System

In countless video library (video database), visual media ordering, rescue are straightforwardly related to cumulating of single visual shot, reference and ordering. To extricate movement direction, video ordering strategy in MPEG propelled [9]. Here, element division sought after by checking of each fragmented unique element performed to gain well movement data. NASM filter created to suppress noise MVs. A strategy for UFC routine used to perceive genuine number of bunches by following the area of each MV in the groups. The proposed algorithm [10] to evaluate dish, tilt and zoom kind camera developments to decide the uniqueness of things being utilized in the low-level classification. Further, it was tried on four surveillance and sports videos. Video examination and ordering framework [10] produced for Air Traffic Service (ATS) observation and sports recordings. Present methodology ready to Real-time and unsupervised segmentationchanges and distractor. Picture of DC, movement vectors, contact, shading and outskirt were considered in the arrangement of highlight. Continuous and solo division technique applied [8] in video ordering and recovery plot, where moving articles are portioned to discover a pathway utilizing a bit by bit MB rejection method.

Existing studies on Information Retrieval onContents in H.26 (Video Histograms for Large Scale VideoClassification)

Color histogram discrete cosine features were considered bythe authors [11] for content based recovery in the domain ofH.264. Approach has also provided higher computational
merits

Existing studies on Object Tracking in MPEG-4Part 10 (H.264)

Segmentation / Detection common algorithm is to classify apixel either as an entity or as background. It can identify greater than one group as a target. In object tracking ofH.264, Thilak et al. presented a segmentation method [6]to segment a binary picture, best possible pixelcategorization & clustering. A method of probabilisticspatial-temporal micro blocks cleaning algorithm [8]employed which will slice and tracks manifold entities inH.264 bit stream.

In H.264, a trajectory appraisal method was proposed fordynamic entities [9], where a Global Motion Estimation(GME) was improved. Object History Images (OHI) connected tostabilize and COG trajectories were also mentioned to fetchsoft splines. These concepts can compete with dynamiccamera specifications. Real-time object tracking approachwas explained by

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Mahmoud et al. [10] in H.264. From thevideo sequence, MVs were fetched to keep informed thetracking model. To integrate spatial and temporal aspects ofobject's motion, ST-MRF designed used [7] in objecttracking. Pre-processing method has applied through PolarVector Median (PVM) introduced.

A method of crease modular proposed [3] for fast blending element cut activity in H.264 region, where researchers incorporated to build a versatile domain models. Unsupervised segmentation algorithm offered by Chen et al. . Vehicle and person ID in H.264 structure analyzed [4] to distinguish the layout and singularity of substance division. Development study applied to get the bearings from extricated includes to recognize individual and vehicle things, where Bayesian classifier utilized for object order on vehicles and people. Tom et al. Proposed a strategy to segment the front line elements relies upon micro-blocks range and QGI.

4. OBJECTIVES

1. Development of Verilog code and test bench code for Standard H.265/HEVC Compression Video Applications sub circuits like control, dequantizer, IDCT, Transpose.
2. To verify the functional verification Simulation of H.265/HEVC video Compression using incisive cadence software for the simulation and behavior of the design.
3. Synthesis of H.265/HEVC video Compression using Cadence GENUS tool is used to optimize the power, area, and timing compare with the existing designs.
4. Digital physical layout implementation of the H.265/HEVC video Compression using Cadence Innovus tool is used to optimize the power, area, and timing compare with the existing designs.
5. Finally the H.265/HEVC video Compression digital physical layout for to Evaluate analysis of speed, area and throughput, the obtain results compare with existing methods and to prove the present designs are fully efficient.

Table 1: Different video compression standards

Standard	Application	Bit Rate
h.261	Video Conferencing over SDN	P x 64Kb/s
MPEG-1	Video on Digital Storage Media CD-ROM	1.5Mb/s
MPEG-2	Digital Television	2-20 Mb/s
H.263	Video Telephony Over PSTN	33.6-? Kb/s
MPEG-4	Object based coding, Synthetic content, interactivity	Variable
H.264/ MPEG-4 AVC	Improved Video Compression	10's to 100's Kb/s
H.265/ HEVC	High Efficiency Video coding	128 to 800,000 Kb/s

5.IMPLEMENTATION STRATEGIES & RESULTS

To implement the explained design for Video compressionH.265/HEVC has two way of implementation is suitable for many applications are complete hardware based implementation or software tool based implantation using nm technology.

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5.1 Hardware Implementation using FPGA

VLSI based architecture design implementation required FPGA hardware is required to check the performance of the conventional video compression H.265 standard, where the hardware can process the hardware modules of the design and also execute the RTL code for the implementation.

5.2 Software Implementation Idea

There are different methods and algorithms are available for to implement the video compression techniques. The current research has good facilities on technology based availability of VLSI architecture tools in the nm scale with better results for suitable applications. The present research work is suitable to use Cadence tool with nm technology for to carry out the simulation, synthesis, and digital implementation of the Video compressionH.265/HEVC. Even it is possible to study about the performance of area, speed and throughput which provides the video compression rate suitable for different applications.

5.3. Key Research Gaps

Interfere ofparticular video frames is a unique relevanceresearch area in the visual media, where higher possibility isopen to find existence of distortion frames of video. Also, moreresearch focus to be rendered and conceiving differentalgorithms in H.265/AVC, VP9 compression visual shots, since itis a better standard having much compression capabilities.

Existing Results

Table 2: Architecture and Performance Comparison

Design Order	Tech	IDCT	IDST	Inverse Quant.	Size(gate count)	Max speed(Mhz)	4K speed	Max throughput
1	130nm	8×8	no	no	8.2k	comb	na	unknown
2	FPGA 28nm	4×4	no	no	na	78.31	23.3	835M
3	65nm	4×4-32×32	yes	no	145.4k	500	412	410M
4	45nm	4×4	yes	yes	17.5k	367[b]	200	690M
Expected Results	28nm	4×4	yes	yes	16.5k	350[b]	190	600M

6. CONCLUSION

High level Video compressionH.265/HEVC is required for the common applications in the storage of data and system bandwidth of transmission capacity will be reduce for today's technology. The research of the present work must be suitable for today high definition data video compression, in the current scenario. The main of the work is to provide efficient design in the analysis of area, speed and throughput will give maximum Video compression rate.To achieve better results use Verilog, synthesis and digital implementation using 45nm technology as per industry standards. The proposed design idea was then discussed at the various stages, beginning with the RTL design and then proceeding to the synthesis and finally the place & route.

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