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Video Compression Using Compact Tool (HEVC)

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Abstract— Video compression has been the object of intensive research in the last thirty years. The field is now mature as is proven by the large number of applications that make use of this technology. Currently, both VCEG and MPEG are launching their next-generation video coding standards. This paper proposes a new HEVC standard tool technique in compressing video as well as provide the subsequent techniques like joint prediction techniques along with skip, motion compensation, adaptive prediction, inter or intra modes, are also presented. HEVC is also known as ISO/IEC 23008-2 MPEG-H Part 2 and ITU-T H.265. HEVC has achieved enormous compression performance improvement. Finally, it is designed to provide high compression efficiency and better video quality.

Keywords— HEVC, MPEG-H, VCEG, H.265/AVC, Video compression, Standards Development.

I. INTRODUCTION

Video coding techniques provide efficient solutions to represent video data in a more compact and robust way so that the storage and transmission of video can be realized in less cost in terms of size, bandwidth and power consumption. ITU-T and ISO/IEC these are the main two international organizations which decides the standards for video compressions. ISO/IEC MPEG standard includes MPEG-1, MPEG-2, MPEG-4, MPEG-4 Part 10 (AVC), MPEG-7, MPEG-21 and M-JPEG. ITU-I VCEG standard includes H.26x series, H.261, H.263, and H.264. Currently, both VCEG and MPEG are launching their next-generation video coding project, which aims to meet the new requirements future applications may impose on the video coding standard. H.265, High Efficiency Video Coding (HEVC) is the latest generation video compression standard. This standard was developed by the ISO/IEC Moving Picture Experts Group (MPEG) and ITU-T Video Coding Experts Group (VCEG), through their Joint Collaborative Team on Video Coding (JCTVC). HEVC is often referred to as ISO/IEC 23008-2 MPEG-H part 2 and ITU-T H.265. It gives better video quality and as much as twice the data compression as the previous standard (H.264/MPEG4 AVC). Video coding standards have evolved primarily through the development of the well-known ITU-T and ISO/IEC standards.

The joint spatio-temporal (space and time) concern is established experimentally to often result in improved video quality and in huge amount instances to offer higher compression rates and righteous computational speed. The three basic data redundancy namely spatial redundancy, which is defined spatial reducing image size by using a smaller number of bits and also correlation between neighbour pixel values, Spectral redundancy, Spectral which defining correlation between different color, Temporal redundancy, which is defining correlation between different frame in sequence of image. The High Efficiency Video Coding standard (HEVC) adopts the skip mode to improve the coding efficiency of compound video. The skip mode's values of pixels in blocks are facsimiled from pixels in the same position in reference frame directly. The Motion Compensation mode pixels in blocks are predicted as X' in the reference frame. It is the same with the inter mode in traditional coding. Joint prediction mode manipulate the pixels in blocks is predicted as joint predict error and covers the most of the images in video sequence.

II. RELATED WORK

Rickard Sjoberg et al., [1] proposes an overview of the HEVC high-level syntax impacts the interface to systems and error resilience, and provides new functionalities including network abstraction layer unit headers, parameter sets, picture partitioning schemes, reference picture management, and supplemental enhancement information messages.

Benoit Martin et al., [2] propose a unified software decoder enabling to decode all HEVC extensions. This solution is based on the open source project OpenHEVC which implements a conforming HEVC decoder. The new tools defined in HEVC extension are implemented and integrated into the OpenHEVC decoder. The GPAC server streams one HEVC base layer and two enhancement layers. At the client side, GPAC player uses the OpenHEVC to decode the base layer for HD resolution and can also decode whether the first EL for 4K resolution or the second EL for 3-D rendering.

Kyungmook Oh et al., [3] proposed slim - HEVC encoder is compliant with HM 10.0 which is developed during standardization of HEVC so that it is consisted of inter and intra prediction modes, in-loop filter and context-based adaptive binary arithmetic (CABAC). Although several functions in HEVC standard are removed, it can make about 1.5 times better performance rather than H.264/AVC. Working frequency of the proposed slim - HEVC encoder is 200MHz when full HD (Full High Definition, 1920×1080) resolution sized video encoded. All of our design has been implemented in Verilog RTL.

Thomas Wiegand and Jens-Rainer ohm [4] called for proposals on HEVC have been actively seeking emerging developments to identify when the next major step forward in compression capability would become feasible.

Muller and Schwartz [5] examined the modified motion compensation and motion vector coding as well as the concept of motion parameter inheritance are part of the HEVC extension. These extensions are used to 3D High-Efficiency video for Multi-view video and Depth data.

III. PROPOSED APPROACH

In this proposed work to evaluate the performance of the proposed new video coding standard tool, the High Efficiency Video Coding (HEVC) standard provides more compression and better video quality. It is designed to provide high compression efficiency and which can be implemented effectively in resource constrained environments making it applicable to wide range of use cases. HEVC uses a pre-processing step. It selects a number of best prediction modes. Then, using skip mode, motion compensation mode and joint prediction mode and bifurcate the frame. Finally, the adaptive prediction is used for generate the video and successfully compressed the video. The processing of the frames made for each pixel makes it better result. The conversion of video frames can be made as our required frame rates.

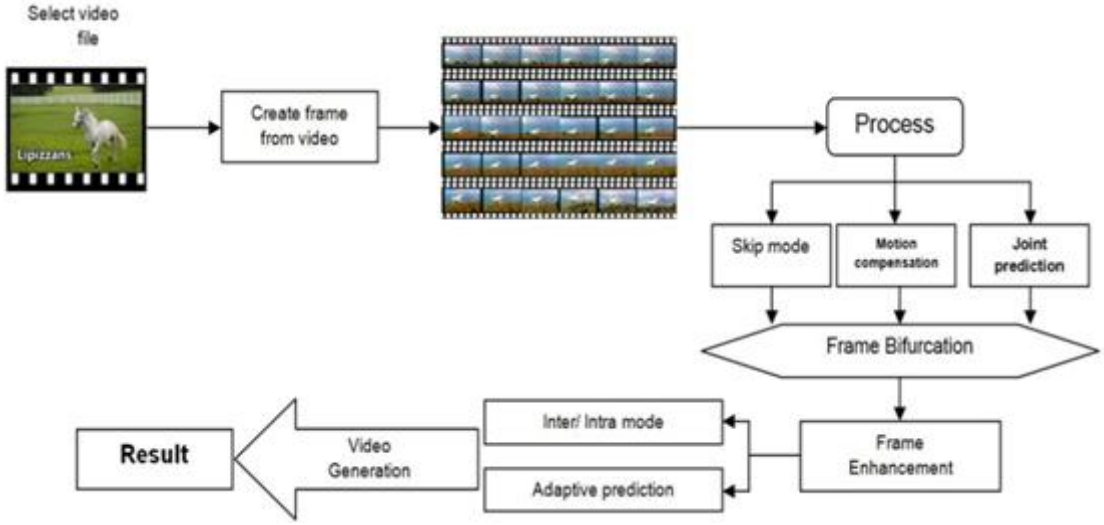

Fig. 1 Flowchart of HEVC tool

IV. METHODOLOGY

In this work to split the frames from video. The video has consists of frames and stored the defined path. The frames conversion done by joint prediction, the joint prediction code used to split the video into frames are inter and intra prediction. A High Efficiency Video Coding that consider them two and lead to better precision in most circumstances. The working operation done with single user interface.

The methodology has 5 processing steps:

A) Authentication
B) Input-Streaming and File upload
C) Frame bifurcation
D) Frame enhancement
E) Video generation

A) Authentication

Video authentication is a process which ascertains that the content in a given video is authentic and exactly same as when captured. For verifying the originality of received video content, and to detect malicious tampering and preventing various types of forgeries, performed on video data, video authentication techniques are used.

B) Input-streaming and file upload

Video upload implies getting the digital video from hard drive into Path. Digital video must be saved in a supported file type such as Mpeg (.mpeg) and (.avi). AVI was not intended to contain video using any compression technique that requires access to future video frame data beyond the current frame. In this paper, to support modern video compression techniques (such as MPEG-H). The digital video camera or disk use the software provided with video camera or disk to transfer it to local hard drive. Before you start uploading video, you must store on particular specified path.

In larger computer system, the transfer of files from one system to another is known as uploading. From a network user's viewpoint, the set up to receive the file is uploading the file is send it to another computer.

C) Frame Bifurcation

A standard Video, known as motion picture, can be characterized as a grouping of a few scenes. A scene is then characterized as a succession of a few seconds of motion recorded without interference. A scene for the most part has no less than three seconds. A movie in the video is appeared as an arrangement of still pictures, at a rate of 24 frames per

second. Additionally, the motion picture originates from the way that a video, each frame is appeared for one small fraction of a second, more precisely milliseconds.

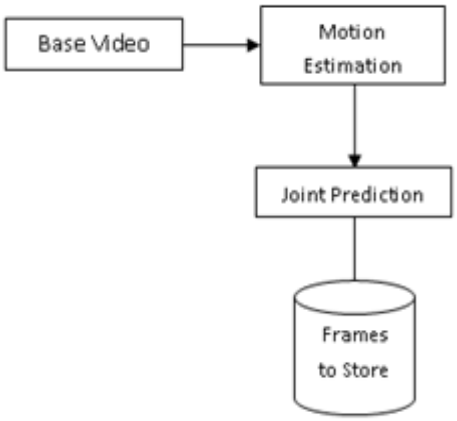

Fig. 2 Flow diagram of Frame Bifurcation

In frame bifurcation, where the frames are captured without interference, one can anticipate that consecutive frames to be quite similar to one another, as almost no time is permitted until the next frame is to be captured. The rest of each frame is quite similar to its previous frame. Such similarity between neighbors frames is known as "temporal redundancy", while the similarity of pixels in a given frame is known as "spatial redundancy". This type of redundancy is known as Spatiotemporal. Such similarity between neighbor's frames is known as "temporal redundancy", even as the similarity of pixels in a given frame is known as "spatial redundancy". This type of redundancy is often called Spatiotemporal. The above concept is base of extract the frames from video. The joint prediction codes to extract the video.

D) Frame Enhancement

In frame enhancement, the brightness of the selected video can be converted within a range of -255 to +255. The Contrast of the selected image can be set of user defined value within the range of -100 to +100.The images in the processing folder taken as input and the modification will likely be made. The selected image can be converted in to gray scale by way of utilizing this alternative. To invert the color properties of an image, this option can be used. Gamma corrections can be made from red, blue and green within the range of 0.2 to 5.The gamma value for each image has to be selected to create a modified frame. The extracted images used to make modification and the output used to create video. Using this option, values of various filters like red, blue and green can be changed. To flip the selected image, this alternative can be utilized. The various available options are original, vertical and horizontal.

E) Video Generation

Video compression stream has a inter frame which is expressed in terms of one or more neighboring frames. The "inter" a component of the term refers to the utilization of Inter frame prediction. This kind of prediction tries to take advantage of temporal redundancy between neighboring frames, allowing achieving higher compression rates.

The term intra frame coding refers to the fact that the various lossless and lossy compression techniques are performed comparative to the information that is contained only within the current frame and not relative to any other frame in the video sequence. The outside of the current picture or frame is performed by no temporal processing. The images modified for our requisites and it is saved in the processed folder. The images in the processed folder used to create video utilizing the frame rate. The images are gathered and analysed and errors are fixed and video is generated.

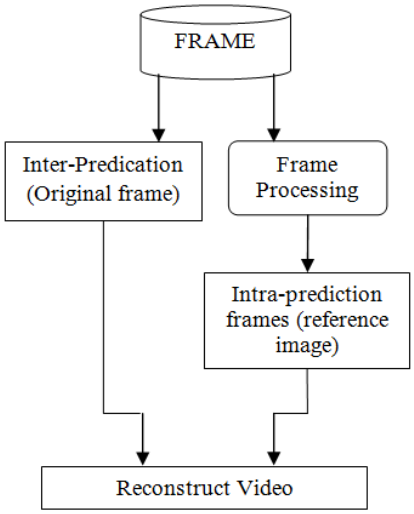

Fig. 3 Flow diagram of Video Generation

V. RESULT

High Efficiency Video coding (HEVC) standard that can enable better compression, at the cost of potentially increased processing power. Based on HEVC standard tool, experimental results prove that the combination of the proposed techniques achieves on average 50% bit-rate saving under the common test conditions used for HEVC development. The implementation result is expected to have better optimal performance.

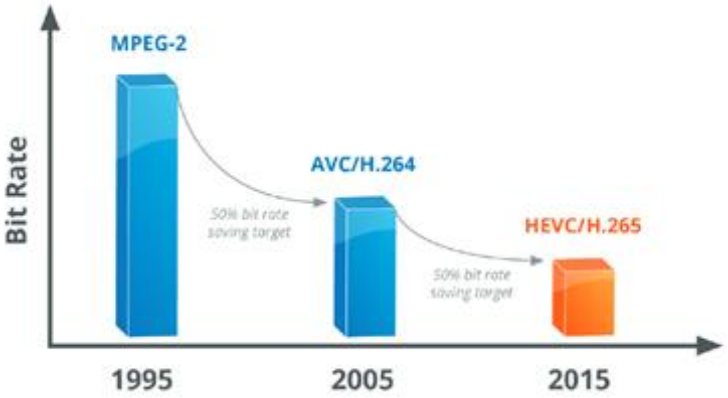

Fig. 4 Comparison Table

VI. CONCLUSION

In this paper we have proposed the basics of video compression techniques. In this paper we have also included latest techniques used nowadays, and explained H.265/AVC. We have seen here that H.265/AVC has been developed by both the ISO/IEC (MPEG) and ITU-T (VCEG) organizations. It has various improvements in terms of coding efficiency; there will be always new development in video compression technique. The main work is to evaluate the performance of the proposed new video coding standard tool; the High Efficiency Video Coding (HEVC) standard provides more compression and better video quality.

VII. FUTURE ENHANCEMENT

The separation of the frame from video can be made with desired frame rate and in video conversion process the frame rate can be controlled and processing time has to be reduced. In future this technique will be supported in all types of media players for video compression.

REFERENCES

[1] Rickard Sjoberg ,Ying Chen , Akira Fujibayashi ,Miska M. Hannuksela, **" *Overview of HEVC High-Level Syntax and Reference Picture Management*"**, IEEE Transactions on Circuits and Systems for Video Technology (Volume:22 , Issue: 12)

[2] Benoit Martin, Wassim Hamidouche, Jean Le Feuvre, Michael Raulet, **"*Unified real time software decoder for HEVC extensions*"**, 2014 IEEE International Conference on Image Processing (ICIP), Pages: 2186 – 2188

[3] Kyungmook Oh, Jaehyuk So, Jaeseok Kim, ***"Low complexity implementation of slim —HEVC encoder design"***, 2016 International Conference on Systems, Signals and Image Processing (IWSSIP), Pages: 1 – 4

[4] Thomas Wiegand, Jens-Rainer Ohm, Gary J. Sullivan, Woo-Jin Han, Rajan Joshi, Thiow Keng Tan, Kemal Ugur, ***"Special Section on the Joint Call for Proposals on High Efficiency VideoCoding (HEVC) Standardization"***,IEEE Transactions on Circuits and Systems for Video Technology Year: 2010, Volume: 20, Issue: 12

[5] K.Muller, H.Schwatrz, ***"3D High-Efficiency Video Coding for Multi-View Video and Depth Data"***, IEEE Transactions on Image Processing, 2013

[6] J.R.Ohm, ***"Comparison of the Coding Efficiency of Video Coding Standards—Including High Efficiency Video Coding (HEVC)"***, IEEE Transactions on Circuits and Systems for Video Technology, 2012

[7] J.Wang, ***"An efficient coding scheme for surveillance videos based on high efficiency video coding"***, Natural Computation (ICNC), 2014

[8] Gary J. Sullivan, Jens-Rainer Ohm, Woo-Jin Han, Thomas Wiegand, ***"Overview of the High Efficiency Video Coding (HEVC) Standard"***, IEEE Transactions on Circuits and Systems for Video Technology Year: 2012, Volume: 22, Issue: 12

[9] B. Bross, W.-J. Han, G. J. Sullivan, J.-R. Ohm, and T. Wiegand, ***"High efficiency video coding (HEVC) text specification draft 8"***, ITU-T/ISO/IEC Joint Collaborative Team on Video Coding (JCT-VC) document JCTVC-J1003, July 2012

[10] Y. Chen , L. Zhang , V. Seregin , Y. K. Wang, ***"Motion Hooks for the Multiview Extension of HEVC"***, IEEE Transactions on Circuits and Systems for Video Technology (Volume:24 , Issue: 12), 2014

