

A Study On H.26x Family Of Video Streaming Compression Techniques

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Abstract— H.264 is a standard was one made in collaboration with ITU-T and ISO/IEC Moving Picture Expert Group. The standard is turning out to be more prevalent as the principle objective of H.264 is to accomplish spatial versatility and to enhance the compression execution contrasted with different standards. The H.264 is utilized as a part of spatial way to encode the video, so that the size is reduced and the quantity of the frames is being decreased and it's in this way it accomplish versatility. It gives new degree to making higher quality of video encoders and also decoders that give extensive level of quality video streams at kept up bit-rates (contrasted with past standards), or, on the other hand, a similar quality video at a lower bitrate. This paper shows an outline of the most recent video compression models identified with the H.26x family including its most recent standard, H.265 also called AVC (Advanced Video Coding)

Keywords— H.261, H.263, H.264/AVC, HEVC, video compression, H.262, H.264, AVC

I. INTRODUCTION

With the ascent of advantageous and progressed advanced sight and sound catch and generation advances, the measure of accessible media substance has expanded hugely. As a result, the Internet activity brought about by substance dispersion has developed also. Web video movement has been measured at more than 33% of all buyer organize activity in 2009 and is anticipated to represent 57 percent by 2014, in this way being on track to wind up distinctly the single greatest Internet activity generator [1]. Video compression is an essential enabler for Internet video streaming, cell media, advanced video camcorders, and video recorders applications and an expanding number of video codec (pressure/decompression) industry standards and exclusive calculations are accessible to make it down to earth to store and transmit video in computerized frame [2]. Video coding methods give effective answers for speak to video information in higher conservative level and overwhelming way so that the capacity and furthermore the transmission of video is acknowledged at a better cost as bandwidth, size, and effective power utilization. ITU-T and ISO/IEC are two crucial overall affiliations which picks the guidelines for the video compressions. ISO/IEC, MPEG standard incorporates MPEG-4, MPEG-1, MPEG-2,

MPEG-4 Part 10 (AVC), MPEG21, MPEG-7 and M-JPEG. ITU-T VCEG standard incorporates H.26x series, H.264, H.261 and H.263. In this paper, distinctive video weight strategies are kept an eye on, starting from H.261 series to the most recent such standard, known as H.265/HEVC. Fig. 1 expounds the evolution of MPEG standards and ITU-T Recommendations [2].

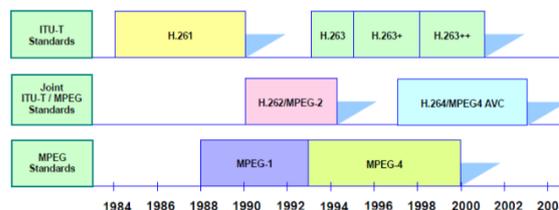


Fig. 1. Evolution of MPEG standards and ITU-T Recommendations

II. H.261 System

A codec named as H.261 for video conferencing was created by ITU (International Telecom Union) by PSTN (Public Switched Telephone Network), it is recommended for video conferencing, video telephone application over ISDN telephone lines. The baselines of ISDN is 64 kbps and fundamental different of (P×64) where p is in the range 1 to 30. It supports just 2 video outline with sizes QCIF(176×144 luma with 88×72 chroma) and CIF(352×288 luma with 176×144 chroma) and utilizing 4:2:0 testing plan. Fig.2 represents an overview of the H.261 CODEC, shows the major components used to code and decode the bit streams [3].

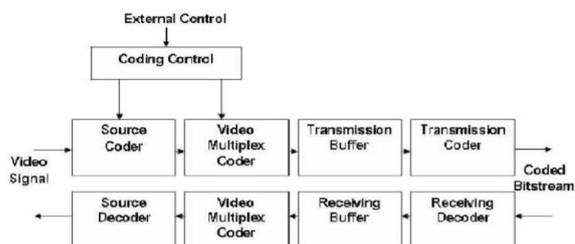


Fig. 2. Block Diagram of H.261

H.261 states 2 variety of coding. Intra coding in which squares size of 8x8 pixels in which every one is encoded exactly with reference to themselves and they are forwarded specifically to the piece change prepare. A prediction error is figured between a 16x16 pixel locale (full scale piece) and the (recouped) reporter large scale obstruct in the past edge. Prediction error of transmitted squares (criteria of transmission is not institutionalized) are then sent to the piece change prepare. H.261 bolsters movement remuneration in the encoder in which a pursuit region is built in the past (recouped) casing to decide the best reference full scale square . In piece change, intra coded outlines and also prediction errors will be created into 8x8 squares. Every piece will be handled by a two-dimensional FDCT work. Fig. 3 represents the block diagram of H.261 Source Coder.

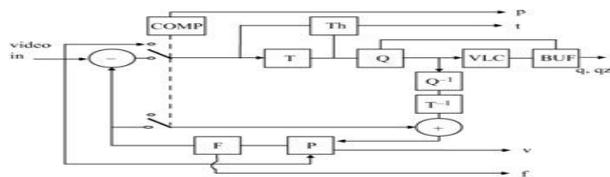


Fig. 3. Block Diagram of H.261 Source Coder

III. H.263 System

H.263 is an individual from category of H.26x video coding measures composed by ITU (International Telecom Union). After H.261 only, H263 was created with an attention to ensure better quality at even lower bitrates. The fundamental calculations are like H.261 however with a few elements. The H.263 standard relies on upon using the discrete cosine change (DCT) to empty spacious redundancies, and development evaluation and paid to get rid of common redundancies. H.263 is being improved with broad extent of bit rates and not just 64K bits/s like that of H.261. The other change is that it gives supports to 5 resolutions. Other than the QCIF (Quarter Common Interchange Format) and CIF (Common Interchange Format) which H.261 reinforces in same manner it supports 16CIF, SQCIF, and 4CIF. 4CIF gives 4 times more times more assurance than that of CIF, and 16CIF gives 16 times more assurance. SQCIF is all about an expansive part for the assurance of QCIF. This surmises H.261 separates itself from MPEG benchmarks[3]. Fig. 4 represents the block diagram of H.263 Video Codec

Table 1. image formats supported by H.263

Luminance Pixels	Luminance Lines	H.261 Support	H.263 Support	Uncompressed Bitrates(Mbit/s)			
				10 Frames/s		30 Frames/s	
				Grey	Color	Grey	Color
128	96		Yes	1.0	1.3	3.0	4.0
176	144	Optional	Yes	2.0	3.0	6.1	9.1
704	576		Optional	8.1	12.2	24.3	36.5
1408	1152		Optional	129.8	194.6	389.3	583.3

IV. H.262 SYSTEM/MPEG-2 PART 2

MPEG-2 Part 2 (officially identified as ISO/IEC 13818-2) or H.262 generally called MPEG-2 (Video), is a video pressure electronic and standard encoding made and kept up commonly by ISO/IEC Moving Picture Experts Group (MPEG) and ITU-T Video Coding Experts Group (VCEG). It is the 2nd component of the ISO/IEC MPEG-2 standard. The ISO/IEC

13818-2 reports and ITU-T Recommendation H.262 are vague. Encoding for compacted video and sound information multiplexed with hailing data in a serial piece stream

V. H.264 SYSTEM/AVC

H.264 is a video compression design that is as of now a standout amongst the most generally utilized configurations for recording, compression and dissemination of video content. Figure 4 displays the Structure for the video encoder H.264/AVC. For managing the requirement of adaptability and adaptability, the standard H.264 consider a Video Coding Layer (VCL), which again is intended for efficient presentation of content of the video and thereby it is a square based half and half approach of video coding, and a Network Abstraction Layer or NAL, whose function is to arrange the Video coding layer representation of the video and gives header data in such a way that, it is fitting for transportation which is done by many capacity media or transport layers. An image can be part into one or a few slices [4]. H.264 cuts are provided with large scale pieces handled in raster filter arrange. A photo then can be part into numerous large scale piece examining examples, for example, interleaved cuts, scattered full scale square designation, the standard of H.264 is more adaptable in the choice for movement remuneration (MC) square sizes and shapes in comparison with any past standard, which has a base luma Macro piece measure little to the extent of 4x4[5]. In comparison to existing standards, H.264/AVC has been able to achieve a significant improvement in rate-distortion efficiency[6]. 3 profiles are there in it. They are the extended profiles, Baseline and Main. It significantly outperforms the other codecs [7]. Fig. 5 represents Structural display of H.264/AVC Video Encoder

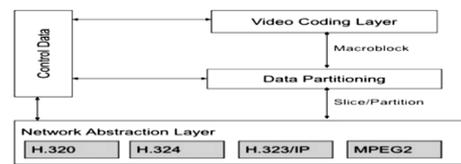


Fig. 5 Structural display of H.264/AVC Video Encoder

VI. H.265 SYSTEM/HEVC

The HEVC or High Efficiency Video Coding, otherwise called MPEG-H Part 2 and H.265, is a standard of video compression, among many of a few potential successors which is generally utilized is AVC (H.264 or MPEG-4 Part 10). Interestingly for AVC, HEVC provides around twofold of compression of data which extent up to a comparative video quality level, or improves video quality fundamentally at a comparable piece rate. Also it manages to support the resolutions up to 8192x4320, which include 8K UHD[8]. ITU-T affiliated the delivery of HEVC, a joint exertion between the ITU-T VCEG and ISO/IEC MPEG. The ISO and IEC assemble alludes it as MPEG-H Part 2 and the ITU-T as H.265. HEVC was intended to significantly enhance coding effectiveness contrasted with H.264/MPEG-4 AVC HP, that is to diminish bitrate necessities considerably with equivalent picture quality, to the detriment of expanded computational unpredictability. The composition of HEVC was with the objective of permitting video substance to have an information

compression proportion of up to 1000:1. Contingent upon the application necessities every coding stage, Fig. 2 delineates a general chart of the HEVC decoder and its coding stages. A critical distinction of HEVC stood out from H.264/AVC is the packaging coding structure. In HEVC each edge is separated into Largest Coding Units (LCUs) that can be recursively part into more diminutive Coding Units (CUs) using a nonexclusive quad tree division structure [10]. CUs can be further part into Prediction Units (PUs) used for intra-and amongst conjecture and Transform Units (TUs) described for change and quantization. Fig. 6 represents block diagram of H.265 Decoder.

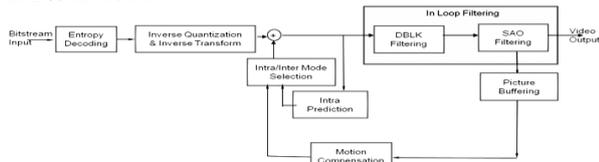


Fig. 6 Block Diagram of H.265 Decoder

VII.H.264/AVC Vs H.265/HEVC

Table 2. H.264/AVC Vs H.265/HEVC

No	H.264/AVC	H.265/HEVC
1	Advanced Video Coding, MPEG 4 Part 10	MPEG-H, High Efficiency Video Coding, Part 2
2	2003	2013
3	Successor to MPEG-2 Part as known as H.222/H.262	Successor to H.264/AVC or MPEG4-part 10
4	* The decline in bit rate compared with MPEG-2 Part is 40%-50%* * Available to deliver High Definition sources for Online and transmit	* 40-50% decline in bit rate at the same visual quality compared with H.264* * It is expected to implement Ultra High Definition, 2K, 4K for Online and Broadcast (OTT)
5	No. It Support up to 4K only	Yes
6	No. It support up to 59.94 fps only	Yes

VIII. COMPARISON OF PREVIOUS STANDARDS

The H.261 coding algorithm was designed to operate at video bitrates between 40kpbs and 2mbps. H.261 supports two video sizes CIF and QCIF using 4:2:0 sampling scheme. H.263 refers to a video compression standard which was originally designed as a low bit rate compressed format to be used for video conferencing. ITU-T VCEG after H.263 develop a next enhanced codec which is the H.264 standard, also known as AVC and MPEG 4 it provides a significant enhancement in capability beyond H.263[11]

Table3. Comparison of Previous Standards

Application	Video Standard	Data Rate
Digital television broadcasting	MPEG-2 H.264/AVC	2-5 mbps 10-20 mbps for HD
Internet video streaming	Proprietary similar to H.263, MPEG-4 of H.264/AVC, VC-1	20 to 600 kbps
Video conferencing, telephony	H.261, H.263, H.264/AVC	20 to 320 kbps
Video over 3G wireless	H.263, MPEG4, H.264/AVC, VC-1	20 to 200 kbps
DVD video, HD DVD, Blue ray disk	MPEG-2 H.264/AVC VC-1	4 to 8 mbps 10 to 20 mbps

IX. CONCLUSIONS AND FUTURE WORK

This paper has presented an overview of the H.26x Series of various compression techniques. It has surveyed a few existing video compression strategies, for example, H.261, which was composed by ITU for video conferencing over PSTN which underpins low information rates and moderately low movement video, where H.263 appeared which concentrate on empowering better quality at even lower bitrates. H.262/MPEG-2 Part 2 which is once in a while in use. At that point the H.264 video coding standard is picking up force and speaks to various advances as far as both coding proficiency upgrade and adaptability for successful use over a broadband assortment of system sorts and application areas. There is no standardized H.264 encoder. And now the Emerging H.265/HEVC is utilized to lessen bit rate prerequisites considerably with practically identical picture quality. The future work will be done on bit rate decrease to enhance the QOS (nature of administration) by diminishing the preparing power and most fundamentally the time postponement of transport for touchy applications.

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