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Video Compression Exploiting Luminance Masking and DWT

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Abstract: Digital video compression techniques have contributed a vital role in the world of telecommunication and multimedia sector where bandwidth is still a valued product to be considered. A big amount of multimedia data to maintain in limited storage space, it needed to be compressed, but during the compression any data loss should not be occurred. Hence, video compression techniques focused on prime importance for reducing the volume of information required for picture sequences/streaming pictures without losing much of its quality. Thus, in order to provide an efficient compression method for multimedia data, Luminance Masking technique was proposed. The proposed method has been integrated into the HEVC reference model for the HEVC Range Extensions and its performance was evaluated by measuring the bitrate reduction against the HEVC Range Extensions. Also, comparison of wavelet compression method with this technique on various parameters has been opted for analysis towards getting improvements and other advancements. Here, Discrete Wavelet Transform (DWT) embedded to achieve the compression for image and then it extended further to series of images which is nothing but a video.

Keywords: HDR, HEVC, wavelet compression technique, DWT.

I. INTRODUCTION

Video compression technique is the most crucial process in the real world environment where sharing of videos across multiple locations are increased in number. Video compression provides the mean to transfer the videos in the less computation time. Video compression needs to be done with more concern to provide the video to the receivers without quality degradation. The main issue that might occurs in the video compression technology is the loss of detailed information while compressing videos which might leads to low quality video reception in the receiver side. Thus this video compression needs to be done by using the methodologies which can preserve the qualified details of the video.

Human Visual System (HVS) is the one of the most prominent technology in the image processing field which is used to process the videos with the physical and biological behaviors of human eye system. This technology is mostly adapted by the various compression techniques to preserve the quality of the videos with out degradation of performance. This compression technique that follows HVS behaviour would find the finer details that are present in the videos which cannot be located by the human eye systems and will remove it. Thus HVS plays key role in the video compression which could also be applicable in the video compression techniques.

The exploration done mainly focuses on the High Dynamic Range (HDR) videos which can cover every color gamuts. These HDR videos can cover every photo metrics and colorimetrics pixel values of the high dynamic range videos which can preserve the finer details of the videos that are present in the system. Most of the technologies in the real world attempts to capture the high dynamic range videos which increase the influences of the video compression techniques.

The main issue that arises while using the HDR videos are technology adaptation where the most of the available display devices in many holds supports only 8 bit video content where the HDR videos consists more amount. Hence to avoid these issues an analysis is done to identify the most preferable system which may lead to the high definition support for low quality videos too. Most of the methodologies attempt to reach this goal by converting the high dynamic range videos into the low dynamic range videos before applying the compression methodologies. By doing so, well qualified videos can be retrieved as output. The main contribution of this work is to find the most suitable and efficient mechanism to proceed the video compression technique in which better quality can be retained than the other approaches in terms of improved quality and the luminesce level.

II. LITERATURE SURVEY

G.Suresh P. Epsiba, Dr. M. Rajaram, Dr. S.N. Sivanandam [1] proposed a video compression tactic which tends to hard exploit the temporal redundancy in the video frames to improve compression efficiency with less processing intricacy. Creates a high video compression ratio. Many experimental tests had been conducted to prove the method proficiency especially in high bit rate and with slow motion video. The recommended method seems to be well suitable for video surveillance applications and for embedded video compression systems.

Tzong-Jer Chen, Keh-Shih Chuang [2] presents a lossless compression which amends the noise component of the bit data to enhance the compression without affecting image quality. Data compression techniques significantly reduce the volume of the image data generated and thus increase the efficiency of the information flow. Method is information lossless and as a result, the compression ratio is smaller.

Qiang L iu, Robert J. S clabassi, Mark L. Scheuer, and Mingui Sun [3] extant a two-step method to compress medical observing video more proficiently. In the first step, a novel algorithm is exploited to detect the motion events of the input video sequence. Then, the video succession is segmented into several rectangle image regions (video object planes), which contain motion activities delimited within these windows. In the second step, the created video object planes are compressed. Tentative results show that the two-step method improves the compression ratio. Considerably when compared with the existing algorithms Object Based Real Time Lossless Video.

Yu-Cheng Fan et al [4] introduced a narrative methodology for compressing the 3D videos without degrading the quality parameters in terms various 3D video depth value. This approach attempts to compress the 3d videos based on motion behavior of videos which would be varied for each pixel of the videos in terms of various parameters. This approach mainly concentrates on the color videos and depth videos from the three dimensional videos. It attempts to find the variable length of videos and the motion vector of videos in different block sizes. This motion is used to predict the different moving behaviour of the 3D videos in terms of their scalability. The issue that has been met by this approach is the wrong motion vector identification. This is happened because of using the same procedure for motion vector detection in all the blocks. This is resolved in this work by introducing the motion depth vector movement identification by using the different motion detection approaches in terms of various blocks. After finding the motion vectors the depth map identification is done in terms of colour parameter in different block level. The main issue that has been detected in the previous research work is it only considers the temporal features of the videos where the compression cannot be done in the proficient manner where the number of redundancy may exist more.

Liu et al [5] introduced an finest compression plane methodology for video coding process where both spatial and temporal features of the videos are considered. Temporal features is the data's present in the x axis plane where the spatial features is the data's present in the y axis plane. This work will perform the initial pre-processing in which the frames would be initialized in which the x axis and y axis plane would be constructed. The surplus features would be identified in those frames in order to reduce the data size which can reduce the bandwidth consumption considerably. The redundancies of features are found by calculating the correlation among pixels that are present in both horizontal and vertical planes. The correlation is used indicate the higher correlation present between the different number of pixels that are present in the videos. This is done in two ways such as: with inter-frame prediction and with out inter frame prediction. This categorization is based on finding the correlation in videos within or out of video frames. Moreover this methodology can conquer the limitation present in the previous methodology in terms of various correlation parameters. The above mentioned research methodologies are about to compress and decompress the videos with good quality. However, these methodologies cannot support the high dynamic range videos effectively which in may lead to the performance degradation of reconstructed videos.

Zicong Mai [6] et al introduced a novel methodology for sustaining high dynamic range videos in turn to provide the better qualified service to the users. The approach used in this work attempts to compress the high dynamic range videos in the efficient manner with the help of consideration of the tone mapping parameters which will compress the videos by converting the videos into low dynamic range videos. This methodology is introduced from the impression of low quality devices which cannot adjust the more than 8 bit video pixels. This approach is works as follows: First the HDR video would be converted in to the LDR by applying the tone mapping operator (TMO) on them. TMO would find the pixels that are not visible to the users by finding the various illustration techniques which could then be processed by the images. After converting it into the LDR video the encoding would be applied on that corresponding video to compress it. In the receiver side, first the decoding would be done on the encoded video which would then be progressed in to the inverse tone mapping process which will retrieve the final HDR video to the users without any violation of pixels. The results of this work prove that this approach leads to better result than the other techniques in terms of improved techniques and methodologies. The above mentioned research methodologies are about to compress and decompress the videos with good quality. However, these methodologies cannot support the high dynamic range videos effectively which in may lead to the performance degradation of reconstructed videos. The above research methodologies cannot support the dynamic variation present between the same pixels that are retrieved from the same video content.

Christoph Posch et al [7] introduced the novel approach that is competent to predict the dynamic variation present between the various pixels present in the environment. This approach is based on the event detection system where the differentiation between the pixels at each time would be calculated in terms of various signaling parameters. This approach would iteratively communicate with the pixels values with the output values whenever the new communication is established between the grey scale parameters. By doing the database of the new pixel environment would be updated dynamically according to which the lossless image compression would be achieved. This would be done in the parallel manner which concentrates mainly on the temporal features of the images that resides in the environment. This approach would reduce the various redundancies that are present in the images in terms of temporal feature analysis (i.e.) on x axis analysis. All of the above methodologies cannot guarantee the assured quality of the decompressed images in terms of performance quality ratio. The system need to

be improved by checking the various performance parameters in order to assure the performance quality.
Chaminda T. E. R. Hewage et al [8] introduced the novel approach to prove the quality reassurance of the decompressed videos at the end side. The main issue that might occur while decompressing the videos at the receiver side is it is more complex to deliver the full reference video for comparison. It is eliminated by introducing the concept called reduce reference video method which attempts to generate the reduce reference video by eliminating the unwanted features. This reference reduction is done based on the color feature value where the redundant color features are indexed and eliminated in different iteration in terms of various performance parameter values. This reduction of features would done with the help of depth map concept in which reluctant temporal color features are identified in dissimilar frames of image. This depth map would eliminate the various edge redundancies and the pixel mapping present in the different pixel levels. This reduced reference concept leads to better comparison of the decompressed video quality in the receiver side by comparing it with the various measures. All of the above mentioned methodologies cannot support the high resolution images in terms of more sequence of images to be processed. The processing methodology of the signal processing system would lead to more computational time in terms of higher resolution.

III. CONCLUSION

Video Compression has widely been adopted by the, multimedia, document storage, film making, video conferencing and industry or organization because of its broad applicability in real life and this has been growing more and more. There are many existing methods for video compression all having some merits and demerits. In this paper different methods for video compression have been discussed on the basis of their advantages and disadvantages. But still more work require to improve compression accuracy.

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