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Development of a New Model of Advanced Video Compression Technique

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Abstract: ***There are many kinds of video format are available in the video technology and there are many techniques to analyse and compress the video with minimum loss of data or quality. Here I am discussing about the new proposed technique of compressing video for more efficient result. In the current scenario, there are two advanced compression method is available MPEG4 and H264, which is more sufficient for video compression. Here, I am presenting the new one for make the video more efficient than MPEG4 or H264, which also improves the advanced video compression technique. The new proposed video compression method improve the video quality and compress the size of the video for stored or transformation over the network.***

Keywords: Frame, Pixel, DCT, H264/AVC, Inter Prediction, Intra Prediction, Quantization

I. INTRODUCTION

There are many kinds of video format are available in the video technology and there are many techniques to analyze and compress the video with minimum loss of data or quality. This chapter discussing about the overall method of a new proposed technique of compressing video for more efficient result. It also discuss about the outcome of the system and compression between various video compressions methods with the proposed video compression method.

Compression is the conversion (encoding) of the data that contain the less number of bits. The process of converting the data in to the compressed mode which take the less storage space with efficient result of then the original form and the reverse process of the compression is called the decompression (decoding). The software and hardware which are used to perform the compression and decompression process is called encoder and decoder.

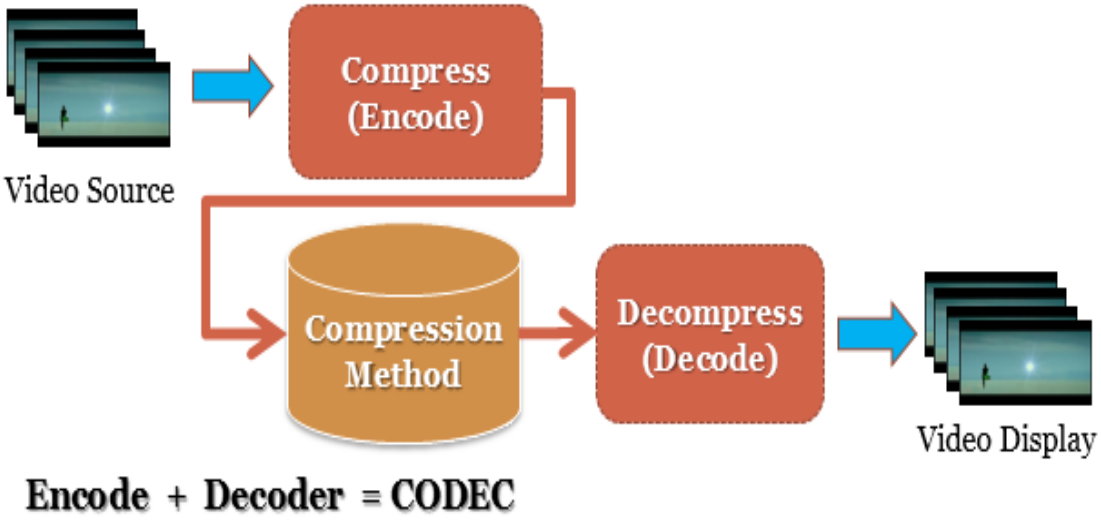

Figure 1 : Architecture of CODEC

II. Literature Survey of Standards And Technique

Discrete Cosine Transform (DCT)

First the JPEG image (or a single frame from a video) is converted into the 8x8 blocks (e.g. the image of 640x480 resolution is converted in to 8x8 blocks then total blocks are 4800). Each block in processed separately. Each block of 64 pixels goes through a transformation called Discrete Cosine Transform (DCT). The 8x8 block is converted in to the new block that contain the DC component which contain the significant value according to the original 8x8 block and other AC components and 0 which depends on the DC component for changing the value. Similarly generate the all other block and combine to make the image after the Discrete Cosine Transformation. After the calculation of DCT components, they are normalized according to a quantization table with different scales [02]. The quantization method is discussed later in this paper [01].

Quantization

As discussed in above the image (or a frame) is converted in 8x8 block and the DCT is applied on it. Now it required to apply quantization. Quantization is the method to minimize to quantum values using the quantization table so that the 8x8 block in reduced to required compression. DCT Data Quantization is used for JPEG and DWT Data Quantization is used for JPEG 2000 [01][03].

MPEG-4

The MPEG-4 was accepted in October 1998 and it is standard for low bit-rate networks and for use in portable application like videophones. The MPEG-4 compression methods are mainly used for Graphics Work (like Flash or 3dMax application work) also used for texture mapping of 2D and 3D meshes, temporal and quality scalability, images and video [01][04].

H.264

H.264 is an advanced and efficient compression method for Industry. The process of converting video into a compressed format with high quality and less amount of data for stored or transmitted. Video Compression is required for converting huge amount of video data used by Television Broadcasting, DVD-file, Videoconferencing and internet video streaming. And it also required to get back the compressed video in to the original form. The H.264 contain the maximum video resolution 4096x2304 and it is standard for current multimedia [01][05][06].

III. Proposed Video Compression Techniques

The main problem in the current scenario of the Computer Graphics Technology is to store the high Definition image or video in huge amount of storage space. And that's way it is required to compress the image or video, so that it occupy minimum storage space. But the main condition is do not change the resolution or quality to compress the video or image file. There are many video compression techniques and algorithm are available in the current tread of Image Processing. Each and every technology has its own rules and regulations to compression the video.

Here, I discuss about my proposed video compression technique to generate the effective output from the input. The purpose of selecting my proposed video compression technique is to optimize the size of the video in such a way that the quality of the video is as it is but the resolution is updated with the lower storage capacity. The flow is based on some technique and terminology which is already done. But the methodology is differ to generate the optimized output. The Block Diagram of Proposed AVC Technique shown in the figure.

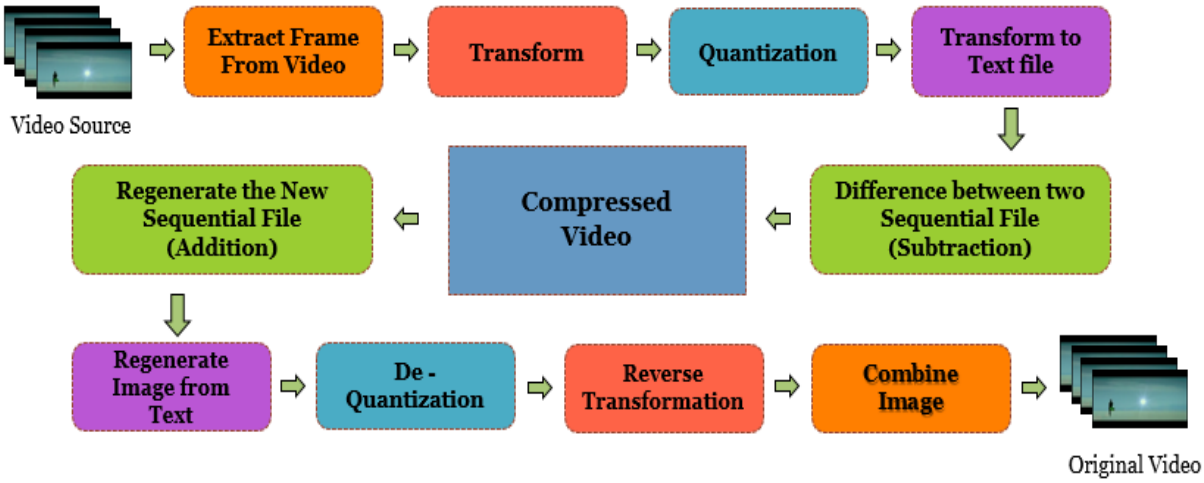

Figure 2 : Block Diagram of Proposed AVC Technique

As shown in the figure the overall system is divided in to eleven section and each and every section take some input from the previous section and generate some optimized output for the next section. In this process, Section: 1 extracting frame from the original video and supplies to the Section: 2 for the transform at this stage the Discrete Cosine Transform method is used to transform the image (or a single frame from a video) is converted into the 8x8 blocks (e.g. the image of 640x480 resolution is converted in to 8x8 blocks then total blocks are 4800). Each block in processed separately [1]. Each block of 64 pixels goes through a transformation. At the Section: 3 each block of 64 pixels is then quantize using the one of the quantization table. The quantization is the method to convert the pixel value into the quantum value. At the Section: 4 the inputted pixel value is stored into the individual text file. In Section: 5 by taking the first I frame as a reference frame take the difference between the sequential frames until the next I frame is found. Each compressed text file is merged to form single compressed file at Section: 6. At this stage the video file is compressed to get the optimized result. But the video is not ready to play because for playing the video, it is required to decompress the video into the original form to view. So that the video can play into the any player. The previous process is compression. Now start to decompress the video and make them to play. At the Section: 7 each text file is added to the I frame which is considered as reference frame until the next reference I frame is found. At the Section: 8 the image file is regenerate from the each text file. At the Section: 9 the image is converted into the 8x8 block and each 8x8 block is de-quantized using the quantization table used in the Section: 3. At the Section: 10 each 8x8 block is transform to the original form using the reverse transformation of DCT which is used in section:2 At the end (i.e. In Section:11) all the frames are combined to generate the video file that will be played in the player.

IV. Conclusion

As a part of research work the new digital video compression model has been designed and implemented. Using this model the basic windows application in C# is developed. According to the survey and my opinion the new developed model is faster and more accurate than the existing MPEG-4 and H.264. This newly designed Digital Video Compression model combines the features of MPEG-4 and H.264, which are the two most accurate compression technique. This research will focus on how the compression is take place and to reduce the size of storage space without decreasing the quality. The limitation of this algorithm is that may be the new version developed in future for video format is not be compatible. So it required to some change to make the compatible. It may be some difficulty to manage the new format for the 2D or 3D movie format. For the current market of video this compromise is not an issue as far as it improves frame rate than other algorithm. As discussion in the limitation, it is required to modify the current model or algorithm to overcome limitations of this new model. It is required to make more improvement and add some more efficient function.

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