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Object Based Real Time Lossless Video Compression – A REVIEW

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Abstract- This paper describes video compression in real time. The aim is to achieve higher compression ratio in lossless compression. Efficient compression is achieved by separating the moving objects from stationary background and compactly representing their shape, motion, and the content. Video compression techniques are used to make efficient use of the available bandwidth. Lossless means that the output from the decompressor is bit-for-bit identical with the original input to the compressor. The decompressed video should be completely identical to original. In addition to providing improved coding efficiency in real time the technique provides the ability to selectively encode, decode, and manipulate individual objects in a video stream. The technique used results in video coding that a high compression ratio can be obtained without any loss in data in real time.

Index Terms: Compression Ratio, Motion Detection, Video Compression.

I. INTRODUCTION

In this paper we are proposing a technique by which we can separate the stationary and moving objects in real time so as to result in a lossless video compression. Lossless video compression means that the compressed file after decompressing will be exactly same as the original video. Now a days the techniques which are being used for video compression are all lossy compression type unlike ours "Object repetition based video compression".

In this paper we present an object repetition based video coding approach that retains the relative advantages of both the hybrid based and block-based coders while minimizing the drawbacks of both. By employing motion segmentation techniques to separate moving objects from stationary backgrounds, the coder optimizes the bit allocation to those areas that are changing most frequently. This technique also provides the ability to selectively encode, decode, and manipulate individual objects in a video stream and, hence, supports content-based functionalities such as object scalability and object manipulation easily.

II. METHODOLOGY OF WORK

- First of all we are going to read a video file in our MATLAB2011a based algorithm to start compression with that. Our input file may be of either in AVI or MPEG format.
- Both of these universal formats have the information regarding FPS and size of the images it contains. Than our next goal is to determine the stationary objects in each frame corresponding to the next frame so that we will only store non stationary objects for the very next frame and all these data will be stored in a watermarked corner for every frame having its own information which is very much needed at the time of decompress video processing.
- We are referring a base paper in which we have this work for video compression technique but not very much good for the real time video compression techniques either have a demerit of loosely techniques like DCT and DWT but here we are going to present a noble technique in which we will use object position change finding algorithm to get our video process in real time and having lossless decompressions.

III. LITERATURE REVIEW

In this section, we are presenting the research work of some prominent authors in the same field and explaining a short description of various techniques used for video compression.

1: G.Suresh, P.Epsiba, Dr.M.Rajaram, Dr.S.N.Sivanandam **"A Low Complex Scalable Spatial Adjacency Acc-Dct Based Video Compression Method",2010** proposed a video compression approach which tends to hard exploit the temporal redundancy in the video frames to improve compression efficiency with less processing complexity. Produces a high video compression ratio. Many experimental tests had been conducted to prove the method efficiency especially in high bit rate and with slow motion video. The proposed method seems to be well suitable for video surveillance applications and for embedded video compression systems.

2: Tzong-Jer Chen, Keh-Shih Chuang **"A Pseudo Lossless Image Compression Method",2010** present a lossless compression which modifies the noise component of the bit data to enhance the compression without affecting image quality. Data compression techniques substantially 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.

3: Qiang L iu, Robert J. S cl a b a s s i, Mark L. Scheuer, and Mingui Sun **"A Two-step Method For Compression of Medical Monitoring Video"2010** present a two-step method to compress medical monitoring video more efficiently. In the first step, a novel algorithm is utilized to detect the motion activities of the input video sequence. Then, the video sequence is segmented into several rectangle image regions (video object planes), which contain motion activities restricted within these windows. In the second step, the generated video object planes are compressed. Our experimental results show that the two-step method improves the compression ratio. Significantly when compared with the existing algorithms while still retaining the essential video quality.

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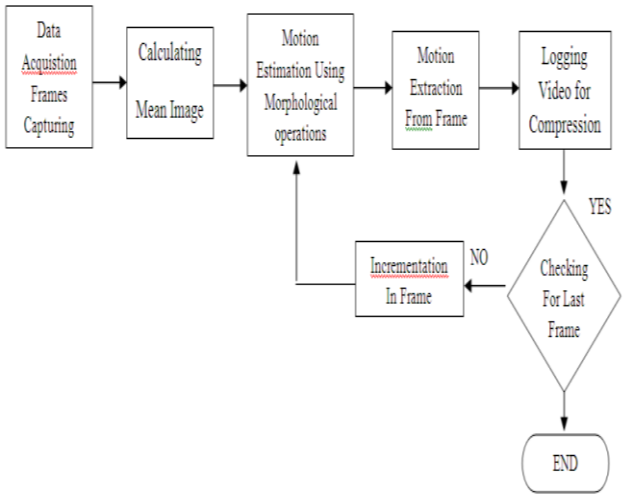
4: Raj Talluri, , Karen Oehler, Thomas Bannon, Jonathan D. Courtney, Arnab Das, and Judy Liao "**A Robust, Scalable, Object-BasedVideo Compression Technique for Very Low Bit-Rate Coding"** 1997 describes an object-based video coding scheme (OBVC) this technique achieves efficient compression by separating coherently moving objects from stationary background and compactly representing their shape, motion, and the content. In addition to providing improved coding efficiency at very low bit rates, the technique provides the ability to selectively encode, decode, and manipulate individual objects in a video stream. Applications of this object-based video coding technology include videoconferencing,video telephony, desktop multimedia, and surveillance video.

5: Ian Gilmour, R. Justin Dávila **"Lossless Video Compression for Archives: Motion JPEG2k and Other Options"2011** algorithm is clearly for end-user distribution through narrow bandwidths, and where no subsequent re-coding or re-puposing is required. The optimisation of image quality within individual frames allows true lossless data-reduction for applications such as archiving, where no loss of image quality is acceptable.

6: Yucel Altunbasak, A. Murat Tekalp, and Gozde Bozdagi **"Two-Dimensional Object-Based Coding Using A Content-Based Mesh And Affine Motion Parameterization" 1995** present a complete system for 2-D object-based video compression with a method for 2-D content-based triangular mesh design, two connectivity preserving affine motion parameterization schemes, two methods for temporal mesh propagation, a polygon-based adaptive model failure detection/coding scheme, and bitrate control strategies.

7: Raj Talluri **"A Hybrid Object-Based Video Compression Technique"1996** describes a hybrid object-based video coding scheme that achieves efficient compression by separating coherently moving objects from stationary background and compactly representing their shape, motion and the content. In addition to providing improved coding efficiency at very low bit rates.

IV. FLOWCHART



V.RELATED WORK

As mentioned above in the flow chart the video to be compressed is either captured directly using a webcam or is read from the harddisk (only for .avi and .mpg videos). The video is divided in images and numbered frame wise. The stationary and moving objects are identified, separated, compressed and extracted frame wise. After extraction they combine together to form a compressed video. This compressed video is then decompressed which frame wise extract, decompress and brings in together the moving and stationary objects and makes the video similar to the original bit by bit, thus making it LOSSLESS.

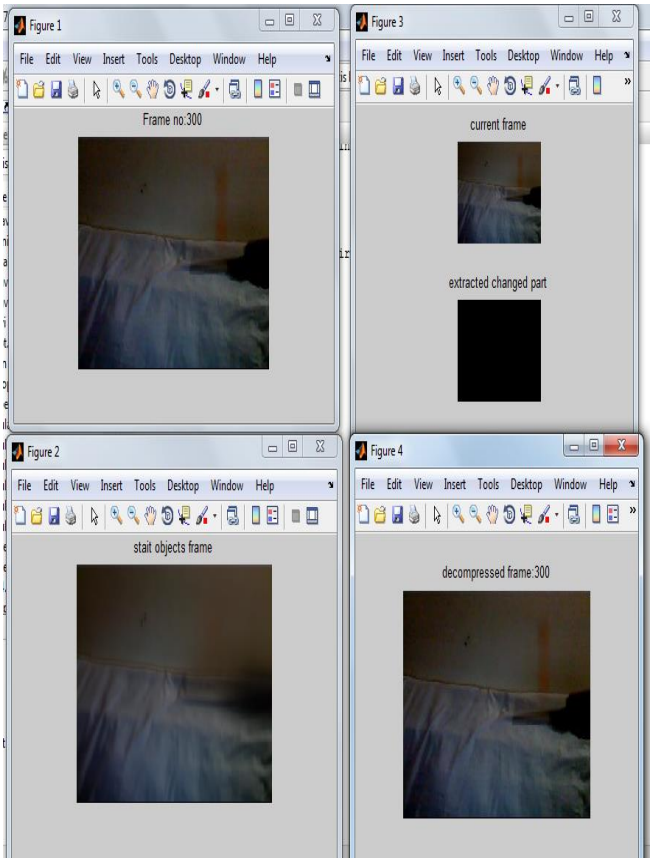
Following attached figures describes the above mentioned:

Fig 1: Video is taken (directly from the webcam in this case) and is divided into 300 equal frames.

Fig 2: Compares the stationary and moving objects frame wise.

Fig 3: Extract and compresses frame wise the moving objects. The stationary part of each frame is compared with the its previous frame. If it's the same there are no changes made and if stationary objects are added or removed, those objects are compressed frame wise.

Fig 4: Decompresses the compressed video and makes it similar to the original bit by bit, thus making it LOSSLESS.



VI. CONCLUSION & FUTURE SCOPE

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The object-based nature of the coding technique provides methods to selectively encode, decode, and manipulate individual objects in the real time. The value of PSNR is infinite because our compression process is completely lossless "lossless" means that the output from the de compressor is bit-for-bit identical with the original input to the compressor and compression ratio is high.

With the test results it was observed that the Compression Ratio increases with the increase of number of frames, thus, we can say that CR is directly proportional to the number of frames.

In future we wish to increase upon the speed and compression ratio. Also to make it more accurate with more moving objects and also to implement on 3-Dimensional videos.

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