COMPARATIVE STUDY ABOUT THREE IMPORTANT TECHNIQES PREFERED IN DATA HIDING

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ABSTRACT : In this paper we discussed about stenography algorithm in a video stream. In previous methods spatial or transformed domain is used for data hiding. But in proposed method we hide secrete data in compressed video, we use candidate motion vector based on the motion vector attributes such as the magnitude and phase angle, etc. A greedy adaptive threshold is searched for every frame to achieve robustness while maintaining a low prediction error level. Secrete Message bits are replace with the least significant bits of motion vectors. This algorithm was tested on different types of videos .three important techniques discussed below.

Keywords: Data hiding, Motion Vectors, CMV, Intra prediction, Steganography.

I.INTRODUCTION

For secrete communication copy right protection and authentication for new applications data hiding is required for image and video processing. To avoid illegal activity or reproduce or manipulate them in order to change their owners identity. Digital water marking and data hiding are the techniques providing best embedding and copy right information in images and videos [1].The aim of water marking is not to restrict to the original image to access and ensure that embedding data again recoverable [1].Developers seeking for providing protection on top of data encryption and scrambling for content protection. Developers seeking for protect owner information (water mark) embedded in original image or video. Cryptography converts in to cipher text it cannot understand.in fig.1,

A basic model of embedding and steganography shown below

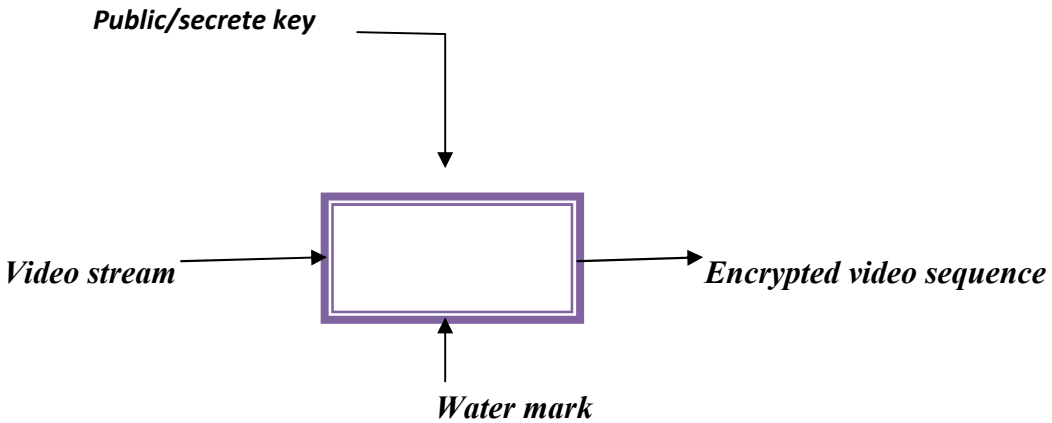


Fig1: model of embedding technique

Data hiding techniques has become more important since two decades in various applications. For data hiding so many techniques and algorithms introduced for digital images and videos. Now a day's audio and video and

picture frames with hidden copy right symbol helps to avoid un etherized copying directly[2].hackers may modify the script of particular organization or revel the information to others. A lot of researches have been done in this field and many techniques are introduced but due to drawbacks in techniques, quality of video like sudden change in frames or noise is disturbing .for all above problems solved by high hiding techniques and steganography. Even though the host data is damaged, this steganography make more complexity to obtain the data.

II.RELATED WORK

VIDEO COPRESSION: Video compression techniques are used to minimize redundancy in video data with unchanged video quality, it mostly used in video conferences and military communication applications and real time applications [3].For motion based video compressed process, motion estimation and motion compensation techniques are used for temporal redundancy in frames. We target the motion vectors to encode and reconstruct the video, both the predictive (p)-frame and bidirectional (b)-frames used for getting motion vectors to embed the secrete data by LSB method.

For motion vectors we have two successive methods one is associated macro block prediction error and other is by using magnitude and phase angle in motion vectors and before this the most common method is temporal differencing is used [4].it compares the current frame with previous frame then the current frame is threshold to segment out four ground object but this technique has disadvantages. Due to these reasons authors suggested video coding by motion vectors. Basic idea behind these techniques is all consecutive frames is having same similarities both before and after frames

The aim is to reduce this redundancy by block based motions, for this approach motion estimation is required. The consecutive frame are similar but except some objects moving the within the frames. The most accurate motion is estimated and matched for residual error nearer to zero and coding efficiency will be high. In the motion vectors the predicted frame is subtracted from current frame, the data bits are hidden in some of motion vectors that too in CMVs.These CMVs magnitude is having an above a predefined threshold value.
Here we have two approaches,

1. ***Embedding in motion vectors (i.e. candidate motion vectors).***
2. ***Intra prediction modes.***

III.EMBEDDING IN MOTION VECTORS

We hide the data in video using phase angle between two consecutive CMVs the data bit code is embedded depend up on phase angle criteria, depends on phase angle sectors[5].this method used for entire CMVs in all frames, and at data retrieving place also.

The below figure explains each macro block in a predicted frame can be encoded as motion vector.

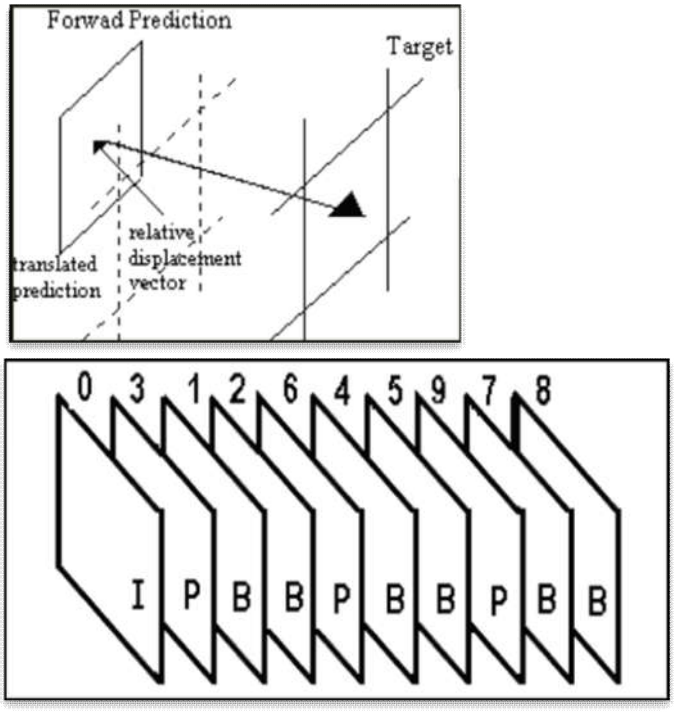
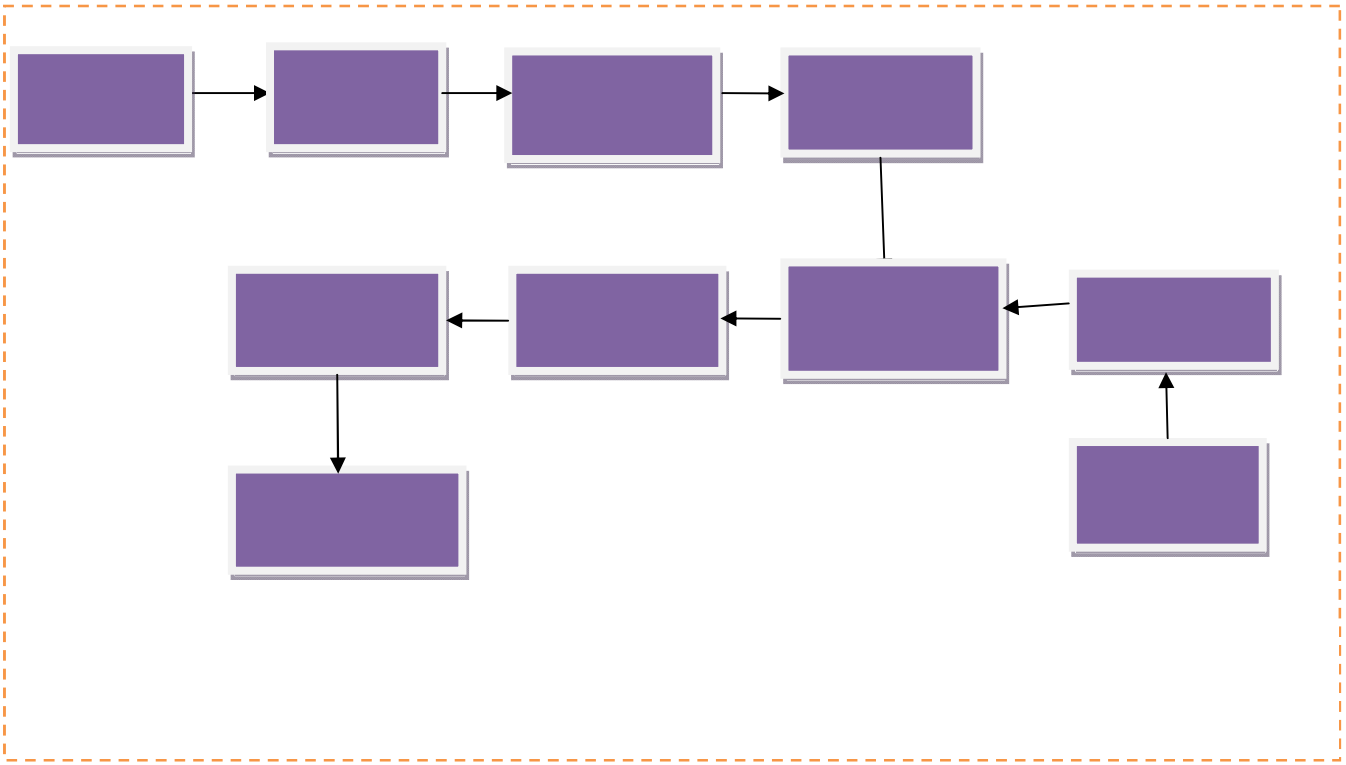


Fig2: forward prediction and GOP in compressed video

Up to now we know data hiding and water marking in digital [10].images and raw videos data hiding in motion vector for compression. The message should be surviving video lossy compression and without loss extracted. A novel video water mark technique in motion vectors explained with simple diagram mention below.



The above figure explains for video compression basic step is continue video is converted in to number of frames, depends up on mpeg format we have predictive (p)-frame and bidirectional (b)-frame, after conversion of frames with motion estimation process we can reduce temporal redundancy, Motion estimation compares adjacent frames, the displacement of macro block from reference frame to current frame called motion vector [6].by motion compensation an algorithm employed for video compression.

In general the video format have 'IPBBPBBPI' of frames, we select p-frame and b-frame for embedding. In intra frame we need no remember search area is limited for best match. In general MBs usually multiple of 4(16x16, 16x8, 8x16, 8x8), And further dividing in to transform blocks, and again sub divide in to predictive blocks, after making fixed transform blocks, block search starts in reference frame with current frame, search is continues for best matching for least prediction error. If matched block is found it is it is encoded by vector called motion vector.

1. *Candidate motion vectors (CMVs):* candidate motion vector means encoder find best matched block for encode by vector for motion vector [7], in those motion vectors some of the motion vectors having magnitude greater than threshold value called candidate motion vectors. We find best motion vectors are arranged as set **S,** which is having magnitude greater the threshold **T.** Embedding single bit in phase angle between two successive CMVs.Embedding is done using least significant approach.

S = {MV0, MV1 ….MVn-1}, |S|=n

Where |MVi|≥T, 0≤ i ≤ n, we can compute phase angle $\theta i = \arctan\left(\frac{MViv}{MVih}\right)$, Where MViv, MVih are vertical and horizontal components

***ALGORITHM*:**

Step 1: *Video is converted in to frames (frame separation).*

Step 2: *Select P-frame and B-frames for embedding.*

Step 3: *Performing motion estimation and motion selecting best*

Match block motion

Step 4: *Embedding bits in phase angle between two successive CMSs.*

Step 5: *Apply secrete key for encryption.*

Step 6: *Generate stego video*.

For encryption steganography is the process to convert message in to cipher text, [9].The advantage of steganography is data keeps in secrecy key is need in encryption process RSA algorithm is best suitable for data secrecy we get good PSNR value after extraction .

2. Another Advanced Method:

Because of data size increased at extraction time for video [2].the new method explains as up to now we are considering p-frame and b-frame for embedding now I-frame is also encoded for using regular method like jpeg, At decoder will extracted independently I-frame, p-frame, b-frame. We know video is making like no of group of pictures in each GOP I-frame-frame and P-frame will be there as for mpeg format. The relative information or redundancy is employed by temporal redundancy by using block based motion estimation, here also single bit hidden in CMVs.In this scheme data bits will increase by block size decreasing ,here code efficiency is increasing because micro blocks increased in intra frame, it is increasing the more searching option for best match, it increases best video quality.

INTRA PREDITION MODES

Another important data hiding technique is data hiding using intra prediction modes. For video coding several methods have been proposed in H.264/AVC compressed video standard. Coding efficiency is more compare to previous standards. For this standard the 4x4 spatial Intra predictions provide good quality at decoder.

Some work has been done [8]' on data hiding with the Intra prediction modes. Authors have penned the data hiding methods by modifying the intra 4x4 prediction modes with a technique that is mapping between the modes and hidden private data. For this In the H.264/AVC standard the intra prediction uses in the spatial correlation method. A desired macro block can be predicted from macro blocks which have been encoded and decoded. [11].The subtraction from the current macro block is coded and represented with a few number of bits analyzed with the macro block used for the processing of the macro block itself. In all modes we need to select one 4x4 mode for embedding and coding.

This intra prediction mode shows convenient for area of significant details in the picture. one block divide in to sixteen 4x4 macro blocks in that A TO M are the already encoded samples and other are to be encoded. The modes are decided by formula called rate distortion optimization (RDO).

$$J = d + \lambda \text{ mode} * R$$

Where R and D are represents bit rate and distortion λ mode represents lagrangian multiplier which represents quantization parameter

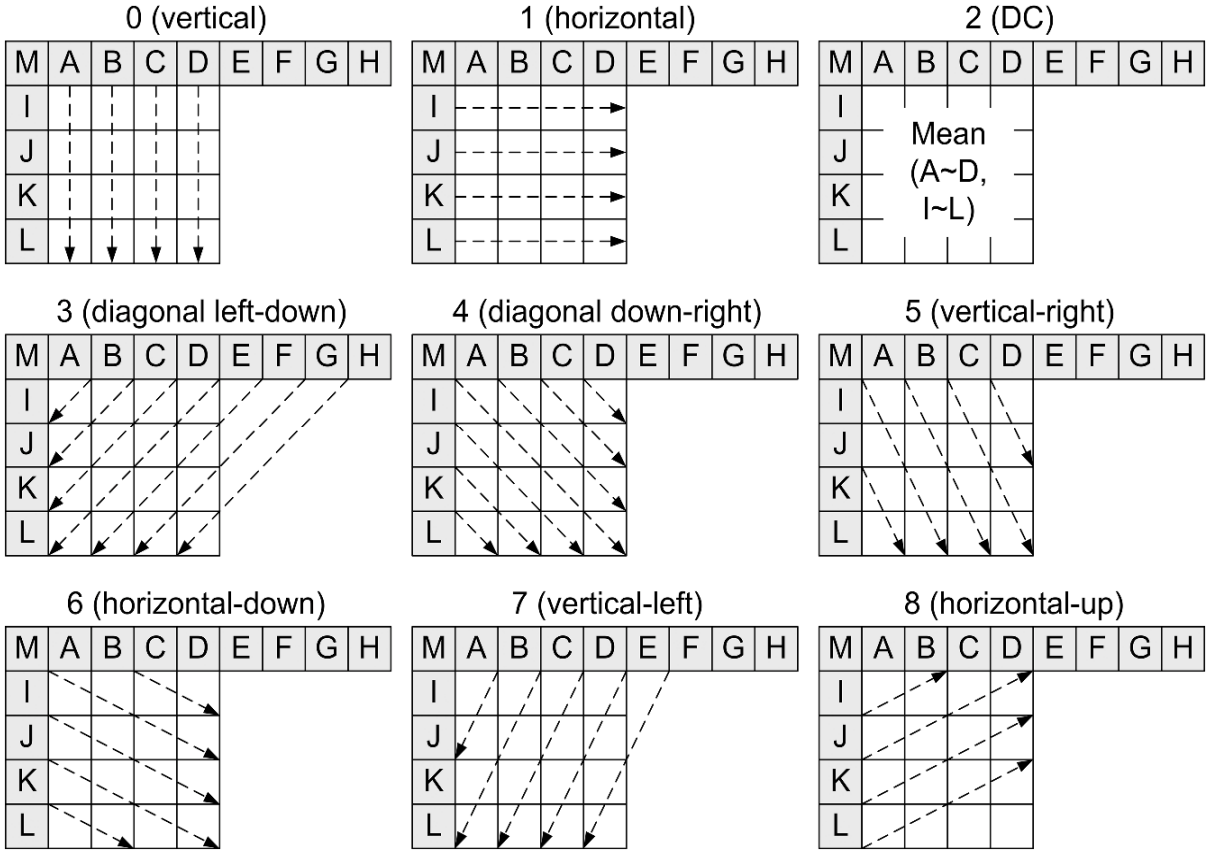


Fig4: types of modes in intra prediction

The modes classified an groups listed below

In Group one: Mode 1 and mode8.

In Group two: Mode 3 and mode7.

In Group three: Mode 2, mode4, mode5 and mode6.

In Group four: Mode 0 and mode2.

The embedding process as fallows for group1 the horizontal mode unchanged by embedding 1.same way if we embed 0 to mode 8 its remains same. Similar way by modification '00' to mode 4 it becomes 2,'01' to mode4 it is equal to 6.in this way embedding and extraction takes place.

III ONOTHER PRAPOSED METHOD

Our data-hiding algorithm is applied at the encoder side,uses the regular pair(d,E)produced, tampers d to become dhand thus replaces them by the pair(d^h,E^h) for each P and B-frame in the GOP as shown in Algorithm 1. The secretmessage is organized as a bit stream $m(k),\ 0 < k < K$ message length. A subset of d is selected to be the CMV.The selection of (line 6 of Algorithm 1) is performed iftheir associated macro block prediction error measured inPSNR is below an initial threshold value. The leastsignificant bit (LSB) of both components, are replaced bybits of the message. After data embedding (lines 7 to 13 of Algorithm 1), we validate the used value of by callingAlgorithm 2. The algorithm tests the robustness of thehidden message to the quantization effect of the JPEGcompression. For the

prediction error E^h. It performs thecompression by the encoder followed by the decompression performed by the decoder (lines 1 and 2 of Algorithm 2). Ifthe reconstructed prediction error E_r^h maintains the samecriterion

$$(10\log_{10}(b^2/\sum_{\mathfrak{B}_{i,j}} E_r^h(\mathbf{x})) < \tau_{\text{key}})$$

can be identified by the data extractor for the given value of τ_{key}. If any macro block associated with fails to maintain the criterion (line 5 of Algorithm 2), then will not be identified by the data extractor and the message will not be extracted correctly. Hence, we propose to use an

adaptive threshold by iteratively decrementing b decibel (dB) for this frame until either the criterion is satisfied for all macro blocks or the stopping valueisreached for which we embed no data in this frame (line 19in Algorithm 1). Since the threshold used for each frame is different, we hide their eight values for that GOP in the I- frame using any robust image data- hiding technique or sending them on a separate channel based on the application. Decreasing will decrease thepayload and vice versa, thus Algorithm 1 tries to find the maximum feasible for each frame[9].

V.CONCLUSION

We discussed improved methods for data hiding. Depending up on macro block size and best matched motion vectors, we can embed single bit in phase angle between two successive CMVs and also suggested popular steganogrphy method for data secrecy. We can decrease bandwidth of video by small micro block intra frame for best match block. This algorithm can extend in future for different transform domain with embedding techniques for good perceptual quality.

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