Reversion-based Features Video Steganalysis for Images and Image Fusion Technique using Fuzzy Logic

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ABSTRACT

Video Steganography is a method toward hide some kind of files within any expansion keeps on carrying Video file. Video steganography in spatial / transformation area, motion vector (MV)-based method objective is to target the interior dynamics of video compression and embed messages whereas performing arts motion estimation. Several methods adopt nonoptimal collection of rules and adapt the changes in MVs arbitrary manners which break the encoding principles a lot. It aims on the fault of the video steganography. To conquer these difficulties we intend a calibration-based approach and proposition of MV reversion- based features used for steganalysis. MV-based steganography share a number of features into common, i.e., they primary choose a subset of MVs follow a predefined selection rule (SR).Motion-compensated prediction be an essential part of video compression and its necessary idea to predict the frame toward be coded using one or more earlier coded frames. We enhance our work by means of image fusion technique .Image Fusion produces a single image through by combining information beginning a set of source images together using pixel, feature. The fused image contains superior information content intended for the scene than any one of the character image sources only. In image fusion technique is a hypothetical framework for the aggregation procedure based on the make use of fuzzy logic approach .The fusion operators to improve the conventional fusion process with the introduction of spatial information modelling. Fuzzy logic modelling utilizes the fuse images from different scenes. In a novel hybrid multispectral image fusion based on fuzzy logic approach is proposed using combine framework of wavelet transform and it provides narrative resolution among the spectral and spatial fidelity. An image fusion algorithm based on fuzzy logic and wavelet proposed algorithm based on the discrete wavelet transform. It uses a nonlinear fuzzy fusion rule to combine features that are extracted from the original images.

Index term

image fusion, wavelet transform, genetic algorithm, fuzzy logic.

1.INTRODUCTION

Network multimedia appliance have been significantly facilitate during high piece networking along with compression technologies. Steganography employ compressed video stream be capable of easily attain a large capacity yet with low embedding rates. Furthermore, covert communications via internet television, video telephony or video conference are not trouble-free to stimulate suspicion. Nowadays the Internet as an entire does not use secure links, thus information transport might be susceptible to interception as well. The rapid development of the Internet and the digital information revolution cause important change in the global society, ranging beginning the influence on the world economy to the way people nowadays communicate. The presented steganalytic advance targets the video steganography construction of MVs.

Steganography using compressed video stream can easily achieve a large capacity even with low embedding rates. Moreover, covert communications via internet television, video telephony or video conference are not easy to arouse suspicion. While the information is concealed inside a video or hiding the information usually performed by the use of DCT (Discrete Cosine Transform) method. DCT performed by slightly altering original or each of the source image in the video, since it’s isn’t easily noticeable by the human eye. To be more specific concerning DCT works, alternatively changing the certain parts of images it usually roundup them the result. LSBs of MVs’ based horizontal or vertical mechanism are used for embedding.

Fang and Chang [12] designed a technique for utilizing MVs’ phase angles. These two methods select candidate MVs (CMV) according to their magnitudes with the hypothesis with the intention of modifications applied to MVs with higher magnitudes introduce less distortion. Compared to the efforts devoted to image steganalysis, video steganalysis remainder largely unexplored.

We focal point on these methods designed for the following two reasons: primary, since the MV values are leveraged because of the information carrier, since the statistical individuality of the spatial/frequency coefficients be indirectly affected. Secondly as the motion compensation procedure is adopt through the majority of advanced firmness standards and MVs be lossless coded, little degradation of the reconstruct visual quality. The compensation of outline makes the MV-based steganography fewer measurable compared to individuals utilizing spatial/frequency coefficients directly. Representative of MV-based steganography share a few features in general, i.e., they first choose a subset of MVs follow a predefined selection rule (SR), then make certain modifications.

Most present steganalyzers methods representation the video information as consecutive still images and embedding procedure the same as adding independent mean zero Gaussian noises. The dependability of this model is probable to get worse, while MV values are used for data hiding. Because MVs are leveraged, detectable MV statistical changes should be exploited when designing specific steganalysis. In the direction of the best of our knowledge, the only achievement was made by Zhang et al. Their steganalytic features be directly drawn from certain MVs’ statistics, except not very effective with low embedding strengths as tested in our experiments.

In this latter, we propose a calibration-based approach to perform dynamic steganalysis. As will be demonstrated later, if we decompress a stegovideo to the spatial domain and compress it again with no embedding involved, the altered MVs are disposed to regress to their prior values. Strong tendency of MV reversion would pointer the existence of hidden messages. Hence, calibration is done by recompression and MV reversion-based features are resultant from the differences among the original and the calibrated videos.

Image fusion is be present toward reduce uncertainty and reduce redundancy in the output whereas maximizing pertinent information from two or more images that is more informative and is more suitable for visual perception or processing tasks like medical imaging, remote sensing, concealed weapon detection, weather forecasting, biometrics etc. Image fusion combine register imagery towards to produce a high value of fused image by way of spatial and spectral information. The fused image with high information motivation to get better performance of image investigation algorithms used in different applications. At this point, we proposed a fuzzy logic method to fuse images starting from dissimilar sensors, in order to improve the quality and compare proposed method with two new methods i.e. image fusion by using wavelet transform and weighted average discrete wavelet transform based image fusion using genetic algorithm (GA) .

1.1 PROBLEM DEFINITION

Various methods implement nonoptimal selection rules and adapt changes of MVs in subjective manners which break the encoding principles a lot. It aims on the fault of the video steganography. Toward conquer this difficulty we design a calibration-based approach and propose MV reversion- based features for steganalysis. Motion-compensated prediction is an essential part of video compression and its necessary idea is to predict the frame to be coded by means of one or more prior coded frames. We proposed our work through image fusion technique .Image Fusion produces a single image by combining information from a set of basis images together, using pixel and feature.

1.2 OBJECTIVE OF THE PROJECT

Perceptive towards the tendency of MV reversion, if a number of optimized procedures are adopted to weaken this embedding effect, the discovery of performance is likely to drop. Steganography is the fine art of undetectable communication. Its purpose is to secrete the very presence of communication by embedding messages into innocuous-looking cover objects. Objective of the scheme is to improve adaptability of the proposed features. Image Fusion produces a single image by combining information from a set of basis images together, using pixel and feature. Novel fuzzy logic method to fuse images starting from dissimilar sensors, in order to improve the quality and compare proposed method with two new methods i.e. image fusion by using wavelet transform and weighted average discrete wavelet transform based image fusion using genetic algorithm (GA) along with quality evaluation parameters.

1.3 MOTIVATION OF THE PROJECT

Steganography via compressed video stream preserve easily accomplish a huge capacity even by way of low embedding rates. Furthermore, covert communications using internet television, videocassette telephony or video conference is not easy to stimulate suspicion. The main incentive of the project is to recover the accurateness and conquer the weakness of the video steganography. Image fusion is be present toward reduce uncertainty and reduce redundancy in the output whereas maximizing pertinent information from two or more images that is more informative and is more suitable for visual perception or processing tasks like medical imaging, remote sensing, concealed weapon detection, weather forecasting, biometrics etc.

1.4 SCOPE OF THE PROJECT

The scope of the proposed system fuzzy based image fusion approach improves quality of fused image as compared to earlier reported methods, wavelet transform based image fusion and weighted average discrete wavelet transform based image fusion using genetic algorithm.

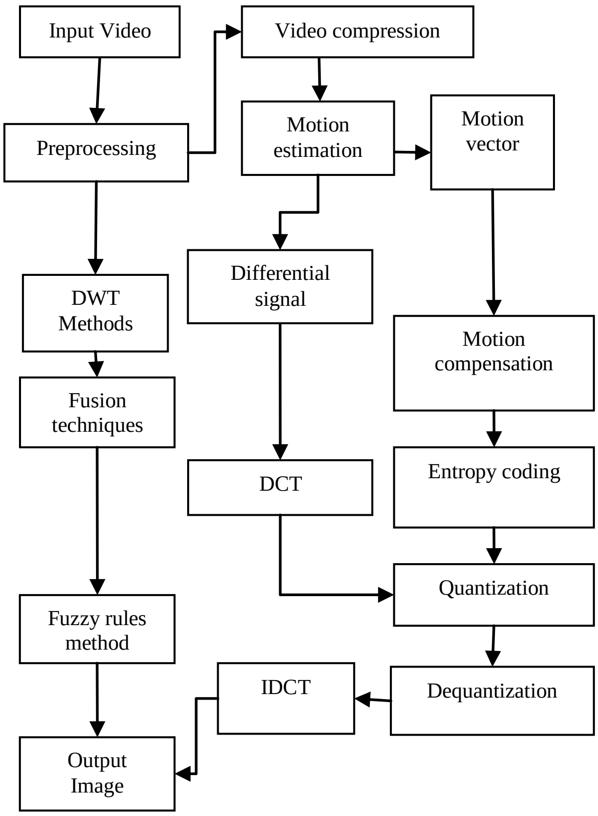


Figure 1: Architecture of the proposed system

2. RELATED WORK

Stenography procedure in a video stream, earlier stenography approaches spatial or changed area is used for data hiding. But Deepika R.Chaudhari [2] proposed technique we remain by using compressed video to hide the conceal data; we usage motion vectors toward encode and rebuild together the forward predictive (P)-frame and bidirectional (B)-frames in compress video. Motion vectors remain calculated by using macro block prediction error, which is dissimilar from the methods based on the motion vector characteristics such as the magnitude and phase angle, etc. A greedy adaptive threshold is examined for each frame to attain toughness whereas preserving a low prediction error level. Secrete Message bits are exchange through the least significant bits of motion vectors.

Pioneered by Memon and Farid [1] a blind detector learns what a typical, unmodified image looks like in a multi-dimensional feature space. A classifier is then trained to learn the differences between cover and stego image features. The 72 features proposed by Farid are calculated in the wavelet decomposition of the stego image as the first four moments of coefficients and the log error between the coefficients and their globally optimal linear prediction from neighboring wavelet modes. This methodology combined with a powerful Support Vector Machine classifier gives very impressive results for most current steganographic schemes. Farid demonstrated a very reliable detection for J-Steg, both versions of Outguess, and for F5 (color images only). The biggest advantage of blind detectors is their potential ability to detect any embedding scheme and even to classify embedding techniques by their position in the feature space. Among the disadvantages is that the methodology will always likely be less accurate than targeted approaches and it may not be possible to accurately estimate the secret message length, which is an important piece of information for the steganalyst.

Stenographic algorithm in MPEG compacted video stream was proposed by Chang yang Xu [3]. In every GOP, the controller data for to simplify data extraction remained embedded in I frame, in P frames and B frames, the really communicated data were frequently surrounded in motion vectors of macro-blocks that consume greater moving speed, for to resist video processing. Data abstraction was also performed in compressed video stream deprived of requiring original video. On a GOP via GOP basis, controller data in I frame would be removed initially, then the embedded data in P and B frames can be extracted based on the control information.

The Spyridon K. Kapotas [4] proposed scheme might consequence in extremely high capacity relative to the multitude video sequence size. Its most important benefit is that it does not affect the image quality of the video sequence and if the hiding parameters are properly controlled it does not affect the coding efficiency, either. In addition to that, it is very difficult for the decoder to identify the data hiding interference and this increase the invisibility of the hidden message. A new method for high capacity data hiding in H.264 streams is presented. It takes the advantage of the dissimilar block sizes second-hand by the H.264 encoder throughout the inter prediction stage in order to classify or hide the desirable information. It is a sightless data hiding scheme, i.e. the message can be extracted straightly from the encoded stream without the required of the original host video.

The presence of hidden messages in digital images. This discovery is achieved through either linear or non-linear pattern categorization techniques, by means of latter providing considerably better performance.

Siwei Lyu and Hany Farid [5] described techniques now would almost definitely advantage from several extension:

(1)The higher-order statistical model is supposed to integrate correlations inside and among all three color channels;
(2) The classifier is supposed to be trained individually on different classes of images
(3) The classifier is supposed to be trained individually on images by means of varying compression rates.

Cryptography is the fine art and discipline of keeping messages top secret. At the same time as in the case of cryptography it is observable for an illegal party to facilitate a secret message is transmitted, steganography attempts to hide the existence of the secret message itself. Roman Tzschoppe [6] proposed HPDM conserve the histogram of the original; it is entirely secure in Cachin's security concept. We demonstrate to facilitate stego messages entrenched with Eggers' image steganography algorithm based on HPDM2 can be detected with Farid's method not as good quality as steg embedded messages, but nonetheless, can be detected quite well. This is due to the fact that Cachin's assumption of the data elements is not valid for natural images. Eggers previously mention to facilitate statistical dependencies between different DCT sub channels and between different data elements within one sub channel include to be considered by the information embedded since a steganalyst could exploit those dependencies.

Image fusion where the fused image is obtain by opposite transforming a synthetic wavelet transform array which combine information from the two input images. A health image fusion based on discrete wavelet transform by Java technology approach described to come together the salient feature of images obtained from different compatible medical devices and integrated this method into a distributed application [7]. In [8] a novel image fusion scheme based on biorthogonal wavelet decomposition is accessible in which two images are decomposed into sub-images with different frequency, and information fusion is performed.

In [9] an introduction to wavelet transform theory and an summary of image fusion technique are specified, and the consequences from a number of wavelet based image fusion approach are compare and it have been proved that, in general, wavelet based schemes achieve better while minimizing color distortion. A Region based Pan Sharpening Method using Match Measure and Fuzzy Logic approach provide narrative trade off solution to conserve spectral and spatial quality using fuzzy logic in which match measure, region based approach and fuzzy logic methods are combined to produce quality Pan sharp image [10].

In [11] proposed a hypothetical structure mimic the aggregation procedure, based on happening the use of fuzzy logic approach, fusion operators to improve the traditional fusion process with the introduction of spatial information modelling. Multisensor image fusion was proposed for surveillance systems in which fuzzy logic modelling utilized to fuse images from different sensors, in order to enhance visualization for surveillance systems.

3. PROPOSED METHODOLOGY

Steganography is the fine art of imperceptible communication. Its principle is to secrete the very existence of communication by embed a messages into innocuous-looking cover objects. Every steganographic communication scheme consists of an embedding algorithm and an extraction algorithm. To accommodate a secret message in a digital image, the original cover image is somewhat changed by the embedding algorithm. As a consequence, the stego image is obtained. Steganography is considered secure if the stego images do not contain any detectable artifacts due to message embedding. In other words, the set of stego images be supposed to encompass the same statistical properties as the set of cover-images. Calibration is well known method, since an image steganalytic concept which estimates the macroscopic property of the cover from the stego image. Calibration is done by recompression and MV reversion-based features are resultant from the differences among the original and the calibrated videos. Calibration based system was proposed in the following manner,

3.1 Motion-Compensated Prediction

Motion-compensated prediction is an essential part of video compression and main idea Motion-compensated prediction is to predict the related frame toward be there coded by using one or more prior coded frames. This is probable throughout practice since video data is essentially a sequence of highly correlated still images and the temporal redundancy can be greatly reduced by inter-frame coding. This method of video coding standards tries to eliminate the temporal redundancy via block-based motion estimation applied to b x b pixels macro blocks (MB).Common inter-MB coding design of the system is depicted in Fig. 2. To encode the present MB (motion block) C, the encoder use one prior coded frame F as the reference and explore C for approximation within it. To measure the prediction error between C and one candidate MB $E\epsilon F$, the sum of absolute differences (SAD) is commonly used,

$$e = SAD(C,E) = \sum_{1\le i,j\le b} c_{i,j} - e_{i,j}$$

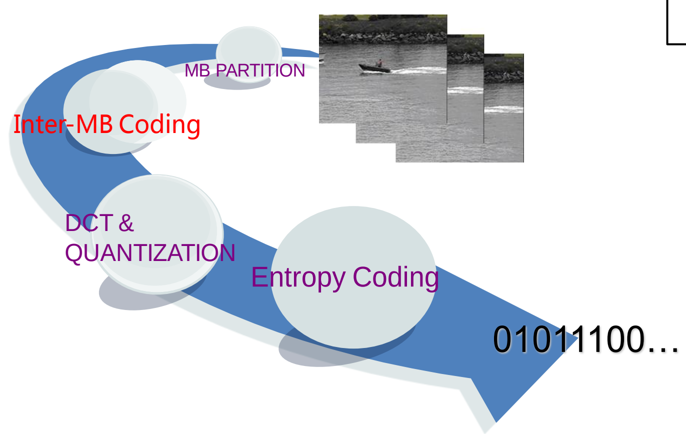


Figure 2.Typical inter-frame coding

Where $c_{i,j}$ and $e_{i,j}$ are luminance values. From the result MB with minimum SAD is taken as 's best prediction and denoted by BP . Accordingly, only the MV mv_c representing the spatial displacement offset and differential signal block $D = C - BP$ need to be further coded and transmitted. Here MC-Motion Compensation, DS- Differential Signal, DQ-DeQuantization, Q-Quantization, RF- Reference frame, ME-Motion Estimation, MV-Motion Vector, EC- Entropy coding.

Next, we explain how messages are embedded during inter-frame coding. The raw video is essentially a series of highly correlated image frames, and the temporal redundancy that exists between frames can be greatly reduced by inter-frame coding. Our embedding process takes place in its inter-MB coding stage.

Motion estimation is very important to inter-MB coding. In regular motion estimation, For example, to encode current inter-MB *C*, the encoder typically uses a prior coded frame as its reference and search for a good matching MB within it. As a result, the candidate with the largest similarity is taken as *C'*s best prediction, and denoted as R. The motion vector is then calculated based on the coordinates of R and C.

$$Similarity(C,R) \ge Similarity(C,Others)$$

In order to embed secret bits, the motion estimation has to be slightly perturbed. Of course, not all inter-MBs will participate in the embedding process. Perturbed motion estimation merely applies to those MBs which satisfy certain conditions. In this approach, if C is applicable, it should satisfy two conditions, first other than its best prediction R, a substitutes MB R dash is found, secondly, the two motion vectors meet certain parity function constrain. Then one bit can be embedded by making choice between the two motion vectors.

$$Similarity(C,R) \approx Similarity(C,R')$$
$$P(\vec{v}) \oplus P(\vec{v}') = 1$$

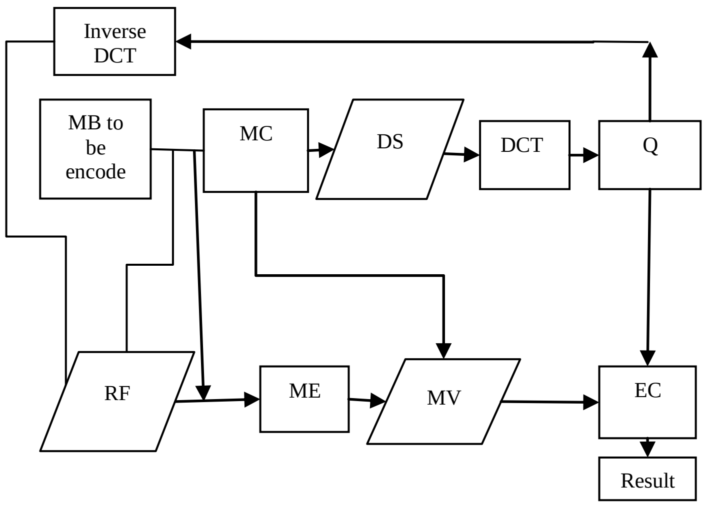


Figure 3: Common inter-MB coding design

3.2 MV Reversion While Recompression

Calibration is well known method, since an image steganalytic concept which estimates the macroscopic property of the cover from the stego image. In this step representative of calibration-based steganalyzer reconstruct an evaluation of the cover from the stego object and draws features are resultant from the differences among the original and the calibrated videos. Since the target steganographic methods are MV-based, interested in certain statistical uniqueness of MVs. For compressed videos, calibration can be able to done by decompressing the videos and compressing yet again with no message embedded. The MVs of the calibrated videos have most macroscopic features similar to those of the clean videos.

The first step of calibration is decompression, during which C is retrieved as, $\overline{C'} = \overline{BP'} + \overline{D'}$

Where $\overline{D'}$ is the D's reconstruction.

In the second step, recompression is performed without embedding. As the case in the first compression, when applying motion estimation $\overline{C'}$,

$\acute{e}_1 = SAD\left(\overline{C'}, \overline{BP'}\right)^1$ and $\acute{e}_2 = SAD(\overline{C'}, \overline{BP'})$ will be calculated for comparison as

$$\hat{e}_1 = \sum_{1\le i,j\le b} \left|\overline{C'}_{i,j} - \overline{BP'}_{i,j}\right|$$

And similarly

$$\hat{e}_2 = \sum_{1\le i,j\le b} \left|c_{i,j} - \overline{BP'}_{i,j} + \Delta d'_{i,j}\right|$$

Thus the expectations of $\hat{e}_1$ and $\hat{e}_2$ can be estimated as

$$E[\hat{e}_1] = \sum_{1\le i,j\le b} E\left[\left|c_{i,j} - \overline{BP'}_{i,j} + \Delta d'_{i,j}\right|\right]$$
$$= SAD(C, \overline{BP})$$
$$E[\hat{e}_2] = SAD(C, \overline{BP'})$$

3.3 MV Reversion-Based Features

Modified MVs include the preference to revert during recompression;
We define a differential operator δ applied to an inter-MBC as,

$$\delta C = \left(\delta_{mv_C}, \delta_{e_C}\right)$$
$$= (SD(mv_c), |\, e_C, \hat{e}_C|)$$

Where e_C and $\hat{e}_C$ are's prediction errors before and after recompression. The first part of the record measures the MV shift distance while the second changes in prediction errors. Features are definite as follows wherever denotes the inter-MB and the upper bound of MV shift distance.

Features of category 1: These features estimation of probabilities MV shift distances are defined $f'(k)$as

$$f'(k) = \frac{\left|\{X_i | \delta mv_{X_i} = k)\}\right|}{n}, k = (0,1, \ldots, u)$$

Features of category 2: These features are proportions of correspond to given shift distances defined $f''(k)$as

$$f''(k) = \frac{1}{\alpha} \sum_{\delta mv_{X_i}=k} \delta e_{X_i}$$

Where

$$\alpha = \sum\nolimits_{i=1}^{n} \delta e_{X_i}$$

Features of category 3: These features are derivative from category 2 features by taking MV shift distances into account and $f'''(k)$defined as,

$$f'''(k) = \frac{1}{\beta} \sum_{\delta mv_{X_i}=k} \left(\left|\left|mv_{X_i} - \widehat{mv}_{X_i}\right|\right| + 1\right) \times \delta e_{X_i}$$

Where

$$\beta = \sum_{i=0}^{n} \left(\left|\left|mv_{X_i} - \widehat{mv}_{X_i}\right|\right| + 1\right) \times \delta e_{X_i} \;,,$$

$$\left|\left|mv_{X_i} - \widehat{mv}_{X_i}\right|\right| = \sqrt{\,(h_{X_i} - \hat{h}_{X_i})^2 + \;(v_{X_i} - \hat{v}_{X_i})^2}$$

Steganalyzer Designing

We select five features from each of the 3 category types and form a 15-d feature vector for training$\vec{\square} = (\square_0, \square_2, \ldots, \square_{14})$ and classification. To be more explicit, the initial 5 features are of category 1,

$$f_k = \begin{cases} f'(k), & k = 0,1,2,3 \\ \sum\nolimits_{i=4}^{u} f'(i), & k = 4 \end{cases}$$

The second and the last five features are of category 2 and category 3 respectively which are processed analogically. The classifier is implemented using Chang's support vector machine (SVM).

3.4 Image fusion procedure using Discrete Wavelet Transform (DWT) and fuzzy logic

Image fusion using wavelet transform and weighted average discrete wavelet transform based image fusion using genetic algorithm. GA's are being used in different applications for finding optimized result. A region based multi-focus image fusion algorithm using spatial frequency and genetic algorithm was introduced a necessary idea to divide the basis images into blocks and after that choose the consequent blocks with higher spatial frequency value to make the resultant fused image in which GA is designed for quality assessment of images. The procedural steps in Genetic Algorithm are given as follows.

Step 1: Choose initial population with random numbers
Step 2: Evaluate all individuals in the present population, assigning a numeric rating or fitness value to each one.
Step 3: If the termination criterion is fulfilled, then execute
Step 4: Then last step. Otherwise continue.
Step 5: Select best-ranking individuals to reproduce a new Population
Step 6: Apply the genetic operations to all individuals selected. Breed new generation through crossover and mutation to give birth to offspring.
Step 7: Replace worst ranked part of population with offspring and go back to Step 2.
Step 8: Until some termination condition is met.

Discrete Wavelet Transform (DWT)

Image fusion using wavelet method decomposes a source images $\square_1$(a, b) and $\square_2$(a, b)into approximation and comprehensive coefficients at required level using DWT. The approximation and comprehensive coefficients together images are combined using fusion rule. The fused image might be obtained through taking the inverse discrete wavelet transform (IDWT) as

$$I(a,b) = \frac{DWT\{I_1(\mathrm{a},\mathrm{b})\} + \mathrm{DWT}\{I_2(\mathrm{a},\mathrm{b})\}}{2}$$

Weighted Average DWT

In this approach additional weights are selected along with the DWT of the images. The fused image can be obtained by taking the inverse discrete wavelet transform (IDWT) as

$$I(a,b) = \frac{w_1 * DWT\{I_1(\mathrm{a},\mathrm{b})\} + w_2 * \mathrm{DWT}\{I_2(\mathrm{a},\mathrm{b})\}}{w_1 + w_2}$$

Weighted Average DWT using GA

In this process additional weights are anticipated using GA along with DWT of the images. The fused image can be obtained by taking the inverse discrete wavelet transform (IDWT) as

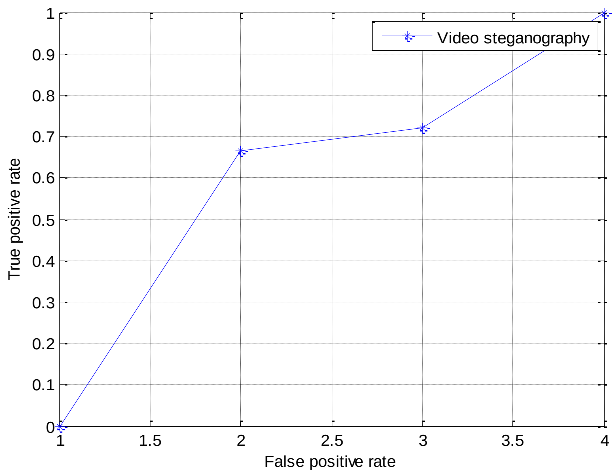
$$I(a,b) = \frac{GA(w_1) * DWT\{I_1(\mathrm{a,b})\} + GA(w_2) * \mathrm{DWT}\{I_2(\mathrm{a,b})\}}{GA(w_1) + GA(w_2)}$$

Fuzzy image processing is not a unique theory. It is a group of dissimilar fuzzy approaches that understand, represent and process the images, their segments and features as fuzzy sets. The representation and processing depend on the selected fuzzy technique and on the problem to be solved. Fuzzy logic has three major stages like image fuzzification, modification of membership values and image defuzzification.

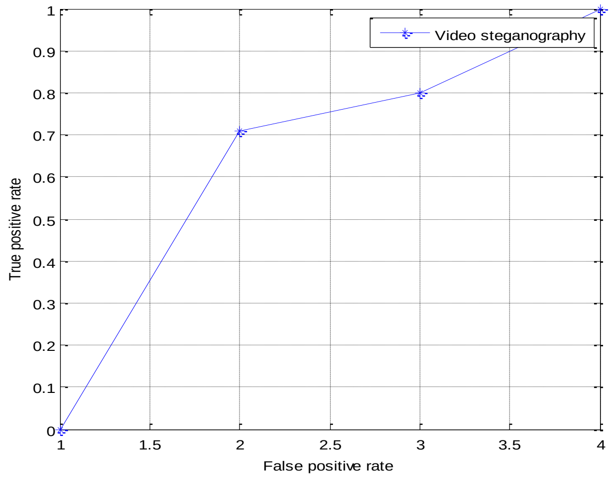
4. EXPERIMENTAL RESULTS

In this step we analyze and compare the performance of the proposed and existing system with TP and TN rates .The selected steganalytic features are also leveraged for comparison. The true negative (TN) rates and true positive (TP) rates are computed by counting the number of detections after a whole scanning over each subsequence in the test set. The performances of the steganalyzers with different sliding window sizes are tested, and the corresponding results.

A database of 22 CIF video sequences in the 4:2:0 YUV format is used for experiments. Video Parameters consists of 15.00 frames per second, RGB24 160x120.Totally 92 video frames available.



(a)



(b)

Figure 4. ROC Curve of (a)foreman video and (b) car race video

The MV reversion, of existing method if some optimized measures are adopted to weaken this embedding effect, The detection performance is likely to drop.

Table 1. Performance of stego and non stego foreman video

Actual Classes

	1	*2*
TP	*17.00*	*12.00*
FP	*7.00*	*3.00*
FN	*3.00*	*7.00*
TN	*12.00*	*17.00*
Prec.	*0.71*	*0.80*
Sensi	*0.85*	*0.63*
Speci.	*0.63*	*0.85*

Model Accuracy is 0.74

Prediction accuracy 74.359

The table 1 illustrate the performance of stego and nonstego video. Here 1 denotes non stego video and 2 denotes stego video performance. The vales of True positive and negative rate and false positive and negative rates are obtained. And this model gives prediction accuracy 74%.

Table 2. ***Performance of stego and non stego car race video***

Actual Classes

	1	2
TP	13.00	14.00
FP	5.00	7.00
FN	7.00	5.00
TN	14.00	13.00
Preci.	0.72	0.67
Sensi.	0.65	0.74
Speci.	0.74	0.65

Model Accuracy is 0.69

Prediction accuracy 69.231

The table 2 illustrate the performance of stego and nonstego video. Here 1 denotes non stego video and 2 denotes stego video performance. The vales of True positive and negative rate and false positive and negative rates are obtained. And this model gives prediction accuracy 69%.

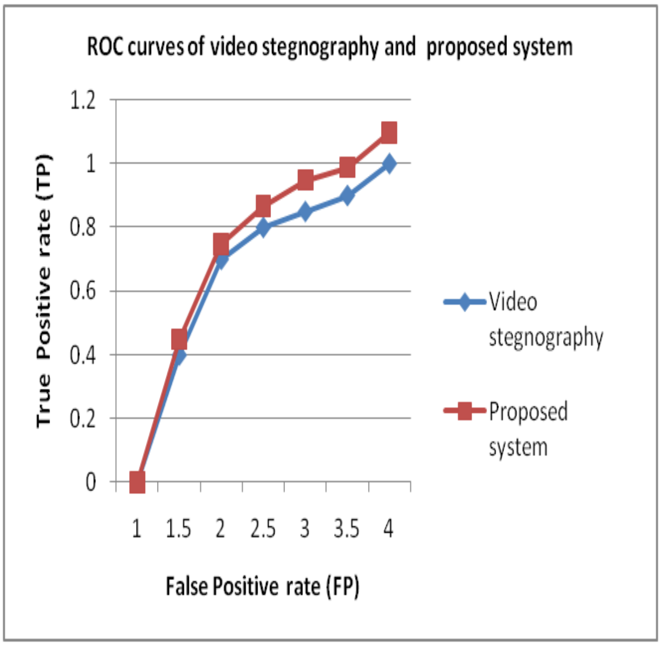


Figure 5 : ROC curves of video stegnography and proposed system

In Figure 2, we examine and evaluate the performance comparison ROC curves of video stegnography and proposed system .Evaluate Proposed schema and existing scheme results with two parameters false positive rate and true negative rate . Based on the performance results from the experiment show the proposed approach works better than the other existing systems.

5. CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

The proposed system features be considered directly through the DCT domain like main and higher order statistics of DCT coefficients. This enable easier clarification of the impact of embedding modification on discovery as well as direct understanding of the detection outcome and simple formulation of design principle intended for upcoming steganographic methods. Proposed pixel level image fusions using fuzzy logic approach have been explored all along with quality assessment evaluation measures. Fused images are mainly used to human being observer on behalf of viewing or interpretation and to be further processed by a computer using dissimilar image processing techniques. The experimental results obviously demonstrate that the proposed image fusion using fuzzy logic give a substantial improvement on the quality of the fusion system.

5.2 FUTURE WORK

In the future, we also map to change the Fisher Linear Discriminant (FLD) with additional sophisticated classifiers, such as Support Vector Machines, to further improve the detection reliability of the proposed steganalytic algorithm.

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