Increase The Security Strengths of Digital Watermarking Technique Against Geometrical Attack

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Abstract - Geometrical attack degraded the quality of digital watermarking technique and extracts the water mark symbol form cover image and increases the possibility of piracy of digital multi-media data. Now a day's digital watermarking play an important role in different multi-media data such as digital image, video , audio and many more for the protection of piracy of multimedia data. Various authors proposed various method for enhancement of security strength of watermarking technique such as DWT, DCT and pixel based technique. The process of watermarking faced a problem of geometrical attack. For the minimization of geometrical attack used various techniques such as feature selection based watermarking and support vector based multi-class coefficient selection technique. In feature selection based watermarking technique used wavelet transform function for feature extraction. The extracted feature selected by searching technique such as direct search and heuristic based searching technique. The searched coefficient of wavelet transform used for embedding process. In this dissertation proposed a support vector machine based watermarking technique. Support vector based watermarking technique used a classification of feature attribute of digital image. After the classification of feature attribute estimate the correlation coefficient of attribute and apply embedding process, the process of embedding done by person's coefficient. Person's coefficient selects a position of embedded water mark in host image. The proposed method implemented in MATLAB 7.8.0 software. MATLAB have very rich library for image processing and wavelet transform Function. For the experimental process used Google photo gallery library. The size of image is 256×256 as host image and watermark symbol sixe is 64×64.Our experimental result shows better result instead of support vector based water marking technique. For the estimation of result used three standard parameter PSNR embedding time and number of correlation of feature of watermark image.

Keywords - Security, Digital Watermarking, MATLAB.

I. INTRODUCTION

Digital media have become common and have increasingly taken over and have extended the applications of traditional analog media. There are a great number of technical reasons for favoring digital media. Infrastructure such as computers, printers and high rate digital transmission facilities are becoming very inexpensive, widely available and more widespread. Digital networks also provide an efficient cost-effective means of distributing digital media. The popularity of the World Wide Web has clearly demonstrated the commercial potential of the digital multimedia market and consumers are investing heavily in digital audio, image and video recorders and players. Unfortunately however, digital networks and multimedia also afford virtually unprecedented opportunities to pirate copyrighted material. Digital storage and transmission make it trivial to quickly and inexpensively construct exact copies. The idea of using a robust digital watermark to detect and trace copyright violations has therefore stimulated significant interest among artists and publishers. As a result, digital image watermarking has recently become a very active area of research. Techniques for hiding watermarks have grown steadily more sophisticated and increasingly robust to lossy image compression and standard image processing operations, as well as to cryptographic attack. Watermarking is a pattern of bits inserted into digital image, audio or video file that identifies the file's copyright information such as author and rights. Thus, watermarking is an approach to make sure the data are protected. Watermarking is designed to be completely invisible. The actual bits representing the watermark must be scattered throughout the file in such a way that they cannot be identified and manipulated. Thus, the watermark must be highly robust so that it can withstand normal changes to the file such as reductions from lossy compression algorithms.

There are a few techniques in digital watermarking used to imperceptibly convey information by embedding the watermark into the cover data. But, problem arises in establishing identity of owner of an object. To solve this problem, an identity is established by printing the name of the owner or logo on the objects. However, in the modern era where objects have been patented or the rights are reserved (copyright), more modern techniques to establish the identity and leave the object unhampered have come into

picture in contrast to printed watermarks. Digital watermarking is a technique where bits of information are embedded in such a way that they are completely invisible. The problem with the traditional way of printing logos or names is that the logos or names may be easily tampered or duplicated. In digital watermarking, the actual bits are dispersed in the image in such a way that they cannot be identified and they show elasticity against attempts to remove the hidden data. Watermarking can be applied for both analogue and digital media. An invisible portrait is embedded directly during the currency note making process and only becoming visible as a result of a special viewing process. Besides being invisible, the watermark signifies the authenticity of the note. Digital watermarking means embedding secret messages within digital media such as text, audio, video and image and can be extracted using specific algorithm. As commonly known, digital media can be easily shared over the Internet using various communication technologies and the watermark can be removed from the content for the redistributions purpose. [1]

II. PROBLEM FORMULATIONS

The rapid growth of the Internet in the past years has rapidly increased the availability of digital data such as text, audio, images and videos to the public. As we have witnessed in the past few years, the problem of protecting multimedia information becomes more and more important and a lot of copyright owners are concerned about protecting any illegal duplication of their data or work. Some serious work needs to be done in order to maintain the availability of multimedia information.

Feature extraction and classification based digital water marking is new area of research in current privacy protection and copyright technique. In this area of research various authors used feature extraction technique such as wavelet transform function and for classification purpose used support vector machine. In the process of feature based water marking technique feature extraction is most important part and the classification depends on selected feature. In this dissertation digital watermarking technique based on integer wavelet transform with attribute based classification technique is proposed. For the selection of feature attribute RBF function is used. The selection of attribute depends on extracted feature by integer wavelet transform.

The proposed method is simulated in MATLAB software and tested some common attacks such as noise attack, shear attack and translation attack.

Our empirical evaluation result shows better performance in comparison of DWT watermarking technique.

The proposed work focuses on the following problems:-

1. Some ad-hoc method and scattered tools available for copyright protection, but the deeper study is required to frame set of necessary tools.
2. The proposed method will be a novel watermarking technique for protecting copyright digital media.
3. The quality of digital media in process of embedding water marking will be improved.
4. Reduce the loss of data in process of transformation.
5. Improve the value of PSNR.
6. Reduce the effect of geometrical attack ,compression attack and noise attack
7. Reduce the embedded time and decoding time of watermark.[3]

III. PROPOSED METHODOLOGY AND ARCHITECTURE

The proposed methodology of digital watermarking technique based on support vector machine and wavelet transform function, the feature of transform function passes through support vector machine. The support vector machine classified the data of feature extracted by transform function, the extracted feature of transform function. Here used an important function for estimate the correlation coefficient of both the pattern host image pattern and watermark symbol pattern. If the correlation coefficient factor estimate the value of correlation is zero then embedding process is done. The process of proposed model divide into three section first section deals with initially take host image and water mark image passes through wavelet transform function for feature extraction after the feature extraction applied classification task done by support vector machine. Support vector machine generates the pattern of feature of host image and watermark image. Finally apply person's coefficient correlation measure the strength of pattern for embedding process.

1. step feature extraction
   a. input the host image and water mark symbol image
   b. apply separately DWT function for feature extraction
      F(x)=I(x,y) is host image F1(x)=I1(x1,y1) is water mark image

      $M(F)= F(x) \times G(x)$

The convolution is perform in host image through transform function here M (F) stored the texture feature matrix of host image.

Then a feature vector is constructed using TX1,TX2……TXn:

f= [F1,F……Fn] ……..(1)

N (F) =F1(x) ×WT(x)

The convolution is perform in host image through transform function here (F) stored the texture feature matrix of host image.

Then a feature vector is constructed using Tx1 and $_{Tx2}$ as feature coefficient:

This moment feature value stored in N (F) matrix.

2. Both the feature matrix convent into feature vector and pass through support vector machine
3. step two used here support vector machine for classification of pattern
   Transform data to the format of an SVM that is X is original data R is transform data such that Xi$\in R^d$ here d is dimension of data.

   Conduct scaling on the data

   $\alpha = \sum_{i=1}^{m}\sum_{j=1}^{n} sim(Xi, xj) \therefore m * k$ here α is scaling factor and m is total data point and k is total number of instant and sim find close point of data.

   Consider the RBF kernel K(x; y)

   H(x) = $\exp((-(\delta - c)2 / (r2)$ this is kernel equation of plane.

   Use cross-validation to 2nd the best parameter C and

   Use the best parameter C and to train the whole training set

   Ro=$\alpha\frac{1}{p}\sum_{i=1}^{p} min\,(xi - yi)$ where Ro is learning parameter of kernel function.

   Generate pattern of similar and dissimilar pattern of both image.
4. Estimate the correlation coefficient of both patterns using person's coefficient.
   Estimate the feature correlation attribute as

   $\mathbf{Rel(a,b)} = \frac{\mathbf{cov(a,b)}}{\sqrt{\mathbf{var(a)}\times\mathbf{var(b)}}}$ Here a and b the pattern of host image and water mark image.

   The estimated correlation coefficient data check the total value of MSE

   $\mathbf{x(t)} = \mathbf{w0} + \sum_{j=1}^{total\ data} \mathbf{wj}\ \mathbf{exp}\ (\frac{-(total-xj)}{\sigma^2})$

   Create the relative feature difference value

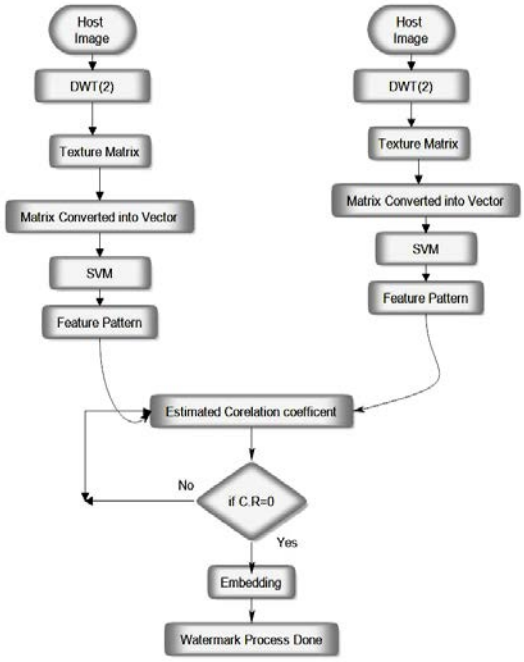
   $\mathbf{Rc} = \sum_{k=1}^{r}\sum_{i=1}^{m}(\mathbf{hi} - \mathbf{h})(\mathbf{eik} - \mathbf{et})$

   if the relative pattern difference value is 0

5. watermark embedding process is done
6. calculate PSNR value of watermark image
7. calculate NC value of watermark image
8. Calculate embedding time of watermark image.

9. The water mark extraction process from a watermarked image are given below

1. apply 2-D wavelet transform function
2. find the texture feature of composite image
3. separate pattern of support vector machine
4. measure the correlation coefficient value
5. the correlation pattern value is dissimilar[4].



3.1 Proposed Model Of Water Marking Technique.

IV. RESULT ANALYSIS

In this case study a one-piece composite drive shaft is considered to be replaced a two-piece steel drive shaft. Its design procedure is studied and some important parameters are obtained. The composite drive shaft made up of high modulus carbon / epoxy multilayered composites has been designed.

The replacement of composite materials has resulted in considerable amount of weight reduction about 72% when compared to conventional steel shaft. Also, the results reveal that the orientation of fibers has great influence on the dynamic characteristics of the composite shafts.

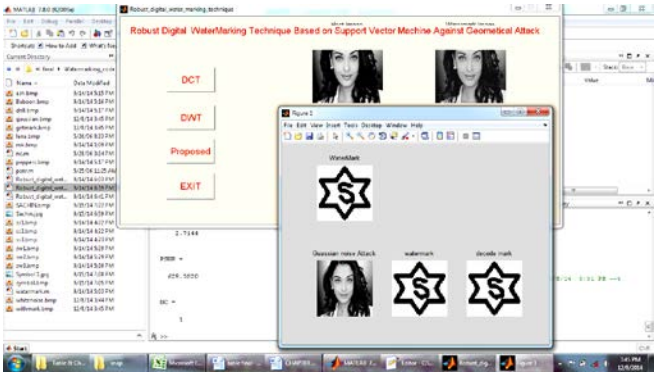


Fig.4.1 Shows that the Ash Image for Robust Digital Image Watermarking Based on PROPOSED Method on Guassian Noise Attack.

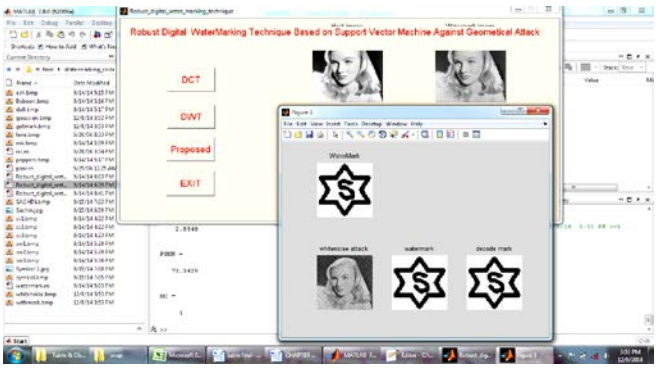


Fig.4.2 Shows that the Doll Image for Robust Digital Image Watermarking Based on PROPOSED Method on White Noise Attack.

The result analysis of Digital image Watermarking based on various image based on three methods. DCT, DWT, Proposed method apply on Ash image. and we performs White Noise Attack , Guassian Noise Attack, JPEG Compression Attack, Transform Attack, Cropping Attack, Decoding Attack and find the value of Attack Recover time, PSNR and NC.[2,4]

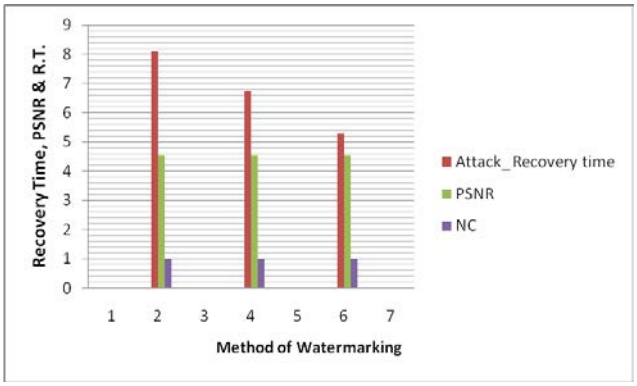


Fig.4.3 Shows Cropping Attach on Ash image based on the DCT,DWT and Proposed method. We find the value of Attack Recover time,PSNR and NC.

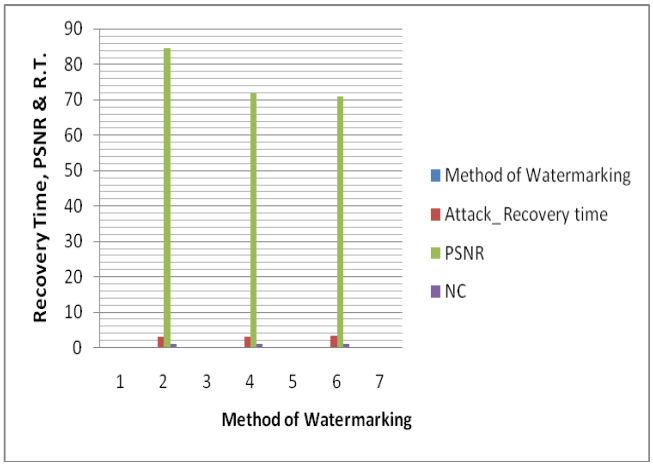


Fig. 4.4 Shows Trasform Attack on Doll image based on the DCT,DWT and Proposed method. We find the value of Attack Recover time,PSNR and NC.

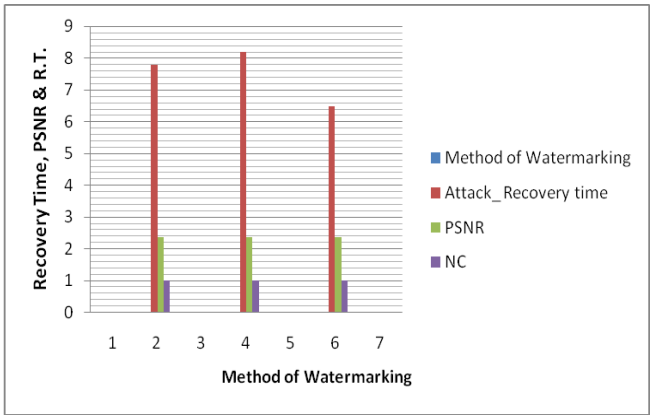


Fig.4.5 Shows Cropping Attack on Doll image based on the DCT,DWT and Proposed method. We find the value of Attack Recover time,PSNR and NC.

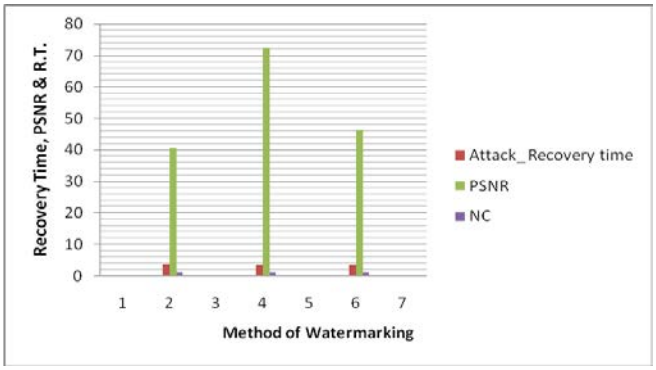


Fig.4.6 Shows Trasform Attack on Baboon image based on the DCT,DWT and Proposed method. We find the value of Attack Recover time,PSNR and NC.

V. CONCLUSION

This paper proposed a feature selection based watermarking technique. The feature based watermarking technique for image used wavelet transform function for feature extraction. The extracted features going through support vector machine classifier for classification of feature pattern. The classified feature pattern of host and watermark image, for the selection of coefficient used person coefficient selection method. The person coefficient selection is mathematical function that function estimate the correlation of two feature pattern one is host pattern and other is watermark symbol feature pattern. If the value of feature pattern difference 0 then watermark embedding process is done. In that fashion of watermarking technique the watermark image is stronger instead of DWT and another technique of water marking process. In the proposed method also consider the reduction of embedding time of watermark technique.

The proposed model is combination of wavelet transform function, support vector machine and persons coefficients. The proposed method provides a more security strength for geometrical attack for watermarking technique. The geometrical attack performs on digital watermarking measure the security strength. The strength of security is stronger in compression of DWT-SVM.

Our empirical valuation of result analysis shows that better PSNR value and NC value for watermark image. The process of embedding time is also reduces. The reduces time increase diversity and flexibility of watermarking technique.

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