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Detection of Copy-Move Forgery in Digital Images Using Discrete Cosine Transform and Fast Independent Component Analysis

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ABSTRACT

Today people are living in digital era, images are sharing and storing use for everywhere in media, magazines, newspapers, court rooms, medical imaging, websites and television, etc. Digital images and videos are the fast propagate in real world, over the past decade powerful computers, editing software packages and quality cameras are affordable and available to large number of people at low price. Then common operators (users) can easily do illegal modification in digital photographs, it is not good for our society.

The forged region of image detection process develops with the block-based in passive detection approach method, it advantage takes more time but gives accuracy results. It works mainly focusing to detect Copy-Move Forgery (CMF) in images using Discrete Cosine Transform (DCT) and Fast Independent Component Analysis (FICA). The function of DCT is transform spatial co-ordinates into frequency coefficients of forgery image, then the applied with FICA in which possible turn increases the true positive rate and reduces the false positive rate result. When DCT applied to input image, it decomposes into extract the low frequency coefficients. After use the FIC Analysis is reduces dimensionality of the input image, it is basically overcomes efficient features matching method. This research methodology worked on various database images.

Keywords:— *Copy-Move Forgery, Block based method, Discrete Cosine Transform, Fast Independent Component, Forged region*

I. INTRODUCTION

Copy-move is one of the most commonly used image tampering operation, where a part of image content is copied and then moved to another part of the same image, it is called CMF or Splicing image. The tampering of digital images is very easy due to the accessibility of sophisticated and editing software's then easy to create image manipulation. The tampered images can be used as a deceiving tool for hiding the actual facts. For instance, tampered images presented in digital media (TV and newspapers) mislead the people, as important objects may be replicated or concealed from the images. This exhibits that image forgery is a serious threat, therefore it has become a key concern for the researchers of digital image forensics in the recent times. Image tampering is defined as "adding or removing important features from an image without leaving any obvious traces of tampering". In terms of image processing, tampering can be defined as changing original image information by modifying pixel values to new preferred values so that the changes are not perceivable. This means enhancing an image by tampering the image in order to clearly express the information content of the image should not be taken as tampering, but tampering to deliberately digital images from their time of capture with an intention to change its original information is called digital image tampering. It is called as image forgery.

In recent years, an exciting field digital image forensics, has emerged which finds the evidence of forgeries in digital images. The primary focus of the digital image forensics is to investigate the images for the presence of forgery by applying either the active or the passive techniques. The active techniques such as watermarking and digital signatures depend on the information embedded a priori in the images. However, the unavailability of the information may limit the application of active techniques in practice. Thus, passive techniques are used to authenticate the images that do not require any prior information about them. Digital image forensic is fast growing field of image processing area to find the authenticity of the digital images. In this research, a combination of DCT and FIC Analysis method is proposed for CM detection in digital images. The proposed method majorly concentrates on the feature dimensionality reduction. Moreover, decreases the false detection rate and it improves the detection accuracy.

In the literature survey of image forgery, numerous existing approaches are proposed but the significant limitation is difficult to detect the actual forgery region. So, the false matches are the significant issue in this research. Here, challenging task to detecting same regions in an image. According to reduce false positive rate then remain accuracy parameters are increased (precision, recall and F-measure), it is good accuracy results for this research work.

A. Contribution of the research work

In digital tampered image detection is performed using proposed using DCT and FIC Analysis. The proposed FICA algorithm is decreases the feature vector size in block representation that minimizes the computational time for forgery detection. Moreover, the proposed method is well performed in feature dimensionality reduction and false positives. In this work result show in various database images such as FERET and AR images one section discussed.

B. Detection of Copy-Move region using DCT and FICA

Image forgery detection is currently one of the interested research fields of image processing. The CMF is one of the frequently used techniques, to detect the duplicated regions, the most commonly used method is block matching, where the image is dividing into equal-size overlapped blocks, and then each block is matched with all other possible blocks in the same image. Each block corresponds to some features, some of which are extracted as representative of such blocks for matching with the other blocks. In this section, describes the new CMF image detection technique namely DCT and FIC Analysis method. An input image is divided into small overlapping blocks with the help of DCT method. In order to facilitate the length reduction, DCT coefficients have been reshaped to a row vector in zigzag order. Next step, the Fast ICA is used for dimensionality reduction of features, decrease the irrelevant and redundant features.

i. Data Acquisition and Pre-processing

The CMF images were taken from the FERET, AR databases images (100 images) and image features are simulated in mat-lab.

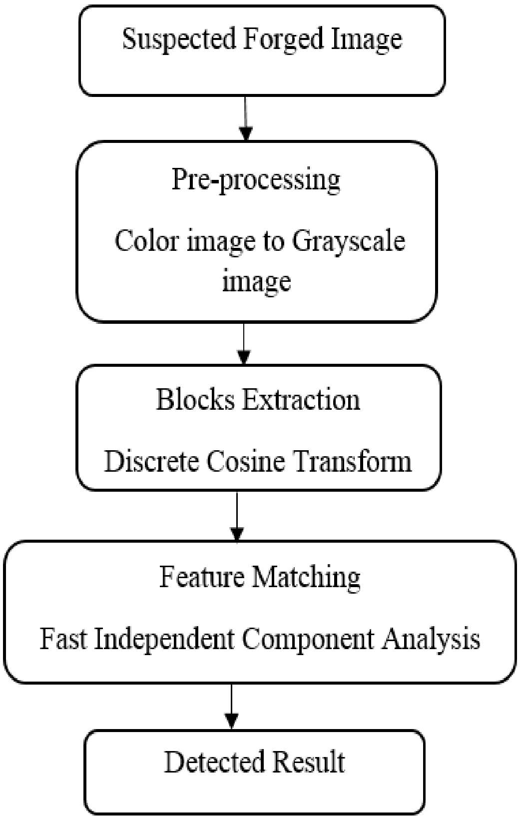


Figure 1: Proposed framework of detection duplicated region in images

The proposed architecture of CMF detection technique working process is shown in the Figure 1. The Figure 2(a) represents the example of original image and Figure 2(b) represents the forged image. In the Figure 3 represents the color image to pre-processed image. The color images are not appropriately detecting the duplicate regions. Also, difficult to identify the similar region of pixels in the image so, it's degrades the proposed method performance. Hence, detection of CMF region gray scale images more suitable.

(a) *(b)*

Figure 2:(a).Original image (b).Preprocessed image

ii. Block Processing using DCT

The most common features available in the image include color, texture and Shape. Feature extraction is mainly dependent on these three types of features and performance of any desired task is also dependent on these extracted features. Generally, feature representation methods are divided in three categories namely region-based, global-based and block-based features. The DCT to transform image spatial co-ordinates into frequency co-efficient is introduced. The 2D-DCT is applied to each sub blocks of tampered image and the high frequency co-efficient of each sub blocks are extracted as a feature vector. These feature vectors are matched and tampered regions are located.

For an image block $B_{rc}(x, y)$ of size $h \times w$, where x, y are 0, 1, 2,…, N-1 decompose the block $B_{rc}(x, y)$ in terms of 2D DCT basis function. The result occurs in the form of a coefficient matrix $\bar{C}(p,q)$ of size $h \times w$ that contains the DCT coefficients,

$$\bar{C}(p,q) = \alpha_p \alpha_q \sum_{x=0}^{h-1} \frac{\sum_{h=0}^{w-1} \frac{A_{hw} \cos \pi(2x+1)\, p}{2h} \cos \pi(2y+1)\, q}{2w}$$

$$0 \le p \le h-1, \qquad 0 \le q \le w-1 \qquad \ldots\ (1)$$

Where,

$$\alpha_p = \begin{cases} \frac{1}{\sqrt{h}}, & p = 0 \\ \frac{\sqrt{2}}{h}, & 1 \le p \le h-1, \end{cases} \quad \text{.......... (2)}$$

$$\alpha_q = \begin{cases} \frac{1}{\sqrt{w}}, & q = 0 \\ \frac{\sqrt{2}}{w}, & 1 \le q \le w-1, \end{cases} \quad \text{......... (3)}$$

The matrix $\bar{C}(p,q)$ is the DCT co-efficient value of spatial gray scale value. $B_{rc}(x,y)$ The DCT is very important for many compression applications as it allows us to filter relevant information from information which is perceptually irrelevant for the human auditory and visual system. As the human eye is more sensitive to low frequencies with few and coarse details than to high frequencies with much and fine details, we can reduce the amount of data stored by leaving out the irrelevant high frequencies with the aid of quantization step without perceivable loss of quality. The large image is divided into small groups due to the large image are inherently more challenging, since an overall higher number of feature vectors exists, and thus there is a considerably higher probability of matching wrong blocks. On the large image set when using lexicographic sorting, only color features and DCT were able to detect duplicated regions with acceptable error rates.

Figure 3: DCT working procedure (Input image, zigzag order scanning, Re-construction image of input image by using 1/4 DCT coefficients)

Figure 3 is input image (left), then the DCT is applied to this image, after that, extract the low frequency DCT coefficients (middle) of Figure 3 in a zigzag order, Figure 3 is an example of zigzag order, the red line area is the low frequency part, which occupies the 1/4 energy of the entire DCT coefficients. Figure 3 right image is the reconstruction image of line after extracting the 1/4 DCT coefficients of Figure 3 in a zigzag order. Through the analysis, if the image block under goes DCT transform, we can use four-part energy to represent the whole image while without losing any important information [1].

iii. Feature Matching using FICA

The dimensionality reduction is the process of decreasing the number of random variables under the consideration of set of principle variables. These variables are performed in feature extraction and feature selection. The feature extraction process is extracts the relevant features from the input image. The feature selection method is decreases the feature dimensionality, eliminate the unrelated data and improving the overall performance accuracy. But, the feature dimensionality issue is the more critical problem which is degrades the system performance. To overcome these problem efficient features matching method is proposed namely FIC Analysis.

Generally ICA is a linear transformation method that helps to separate the multi-variate components into additive sub-components. Here the additive sub-components are non-Gaussian approach that is statistically free from other independent scheme. ICA helps to solve the higher order data and also determines the independent source point for the linear mixture components. Hence, ICA delivers a significant data representation by applying image decomposition and representation. Usually, an effective algorithm is employed to estimate the independent components, which is very tough to define the energies and the order of independent components. To overcome this concern, several ICA algorithms are proposed that are differing in their objective functions for statistical independence.

The rationale of the FICA is to determine a target function by maximizing negentropy and to obtain the optimal value of the target function by using Newton's iterative method. Negentropy can be used to measure the non-Gaussianity. The negentropy of a random variable y is given by,

$$J(y) = H(y_{gauss}) - H(y) \quad \text{.................. (4)}$$

Where $H(.)$ is the entropy function and y_{gauss} and y are the Gaussian variable and the random variable, respectively, with the same mean and normalized variance. If negentropy is zero, then y obeys the Gaussian distribution. If y is a non-Gaussian measurements reaches its maximum when negentropy is maximized. Meanwhile, the approximate formula of negentropy can be written as follows:

$$J(y) \alpha [E\{G(y)\} - E\{G(y_{gauss})\}]^2 \quad \text{........... (5)}$$

Where, G(.) is an arbitrary non-quadratic function. After iterative trails, it was discovered that the rate if convergence is faster and the convergence effect is better where $G(y) = \frac{y^4}{4}$

To maximize negentropy, the optimal $E\{G(w^T x)\}$ must be achieved. According to the Kuhn-Tucker conditions, under the constraint, $E\{xg(w^T x)\} = \|w\|^2 = 1$ the optima are obtained at point where the gradient of the Lagrangian is

$$E\{xg(w^T x)\} - \beta x = 0 \quad \text{........... (6)}$$

Where β is a constant that can be easily evaluated as $\beta = E\{w_0{}^T x\}, w_0$ is the value of w at an optimum and g(.) is the first order derivative function of G(.). Assuming the data are bounded, $E\{x^T x\} = I,$ the left part of (7), can be written as F and obtain the Jacobian matrix JF(w) as,

$$JF(w) = E\{xx^T g'(w^T x)\} - \beta I \quad \text{.......... (7)}$$

By the introduction of Fast ICA, it is known that the time-consuming course is computing Jacobian matrix. Reducing the time of Jacobian matrix will improve the performance of Fast ICA algorithm [2]. To simplify the matrix inversion, we can reasonably approximate the first item of (8) as,

$$E\{xx^T g'(w^T x)\} \approx E\{xx^T\} E\{g'(w^T x)\} = E\{g'(w^T x)\} I \quad \text{........ (8)}$$

If w_0 is approximated as w in, β then JF(w) is transformed into a diagonal matrix. Thus we can obtain the approximate Newton iterative formula as,

$$w^* = w - \frac{[E\{xg(w^T x)\} - \beta w]}{[E\{g'(w^T x)\} - \beta]} \quad \text{........... (9)}$$

$$w = \frac{w^*}{\|w^*\|} \quad \text{.............................. (10)}$$

Where w^* is the new value of w an. $\beta = E\{w^T x g(w^T x)\}$ After simplification, we can derive the iterative formula of the FICA algorithm 11

$$w^* = E\{xg(w^T x)\} - E\{g'(w^T x)\} w \quad \text{.... (11)}$$

ICA is sensitive to high-order statistic in the data and finds not necessarily orthogonal bases, so it may better identify and reconstruct high dimensional image data. But, ICA algorithms are time-consuming and sometimes converge difficultly. A Fast ICA algorithm is developed, which compute Jacobian Matrix one time in once iteration and achieves the corresponding effect of Fast ICA. So according method computation is decreased and interaction speed is fast [3]. The Figure 4 represents the desired output of duplicate image detected portion.

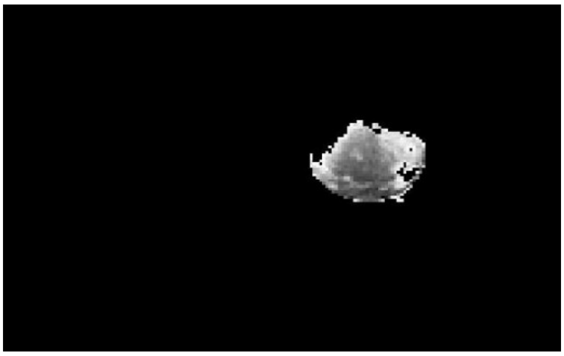


Figure 4: Detected Output using FICA

II. Experimental Result and Discussion

In experimental simulation, MATLAB (version 2017a) was employed on PC with 3.2 GHz with i5 processor. In order to estimate the efficiency of proposed algorithm, the performance of the proposed method was compared with various techniques. In this proposed method uses three reputed databases: FERET, AR images and in each database 50 images are taken. In experimental analysis, DCT with FICA method is applied to the 100 sample images.

Performance Measure:

The proposed DCT+FICA method based CMF detection system performance is measured using different evaluation metrics such as Accuracy, Precision, Recall, F-measure, True Positive Rate (TPR) and False Positive Rate (FPR). These evaluation parameters are described below.

Precision: The precision rate is defined as the ratio of correctly detected parts to the sum of correctly detected parts plus false positive. The precision parameter is defined in equation (12),

$$Precision = \frac{TP}{TP+FP} \quad \ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Recall: The Recall rate is defined as the ratio of correctly detected parts to the sum of correctly detected parts plus false negatives. An equation (13) describes the recall parameter.

$$Recall = \frac{TP}{TP+FN} \quad \ldots\ldots\ldots\ldots (13)$$

F-measure: Is the ratio of precision and recall measurements and displayed in the percentage value. The F-measure equation is described in equation (14),

$$F - Measure = 2.\frac{TP}{TP+FN+FP} \quad \ldots.. (14)$$

True Positive Rate: TPR is the percentage of forged images, which are correctly identified. The TPR parameter is defined in the equation (15),

$$TPR = \frac{images\ detected\ as\ forged\ being\ forged}{Total\ number\ of\ forged\ images} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (15)$$

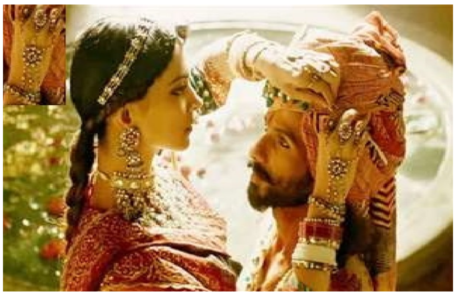
False Positive Rate: FPR is the percentage of the original image which is wrongly identified as a tampered. The FPR is defined in the equation (16)

$$FPR = \frac{images\ detected\ as\ forged\ being\ original}{Total\ number\ of\ original\ images} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Performance Evaluation of AR database images

In experimental analysis, 50 images are taken from AR database and one sample image is shown in the Figure 5. The several existing methods are used for Copy-Move Forgery image detection in digital images. The DCT algorithm is applied to the each block of pixels. DCT is a passive category of methods due to its does not required any primary information of an image to perform operation. DCT has been widely used to represent the image in frequency domain due to its ability to represent most of the intensity distribution details with fewer coefficients. The proposed forgery detection algorithm is based on DCT and FICA. The FICA method is gradually decreases the dimensionality of the feature and removes the irrelevant features. Also, FICA is computationally efficient and needs less memory also, computational load. According to the figure 5 represented that one sample image of AR database. The Figure 5(a) indicates the original input image and Figure 5(b) is the CMF image.

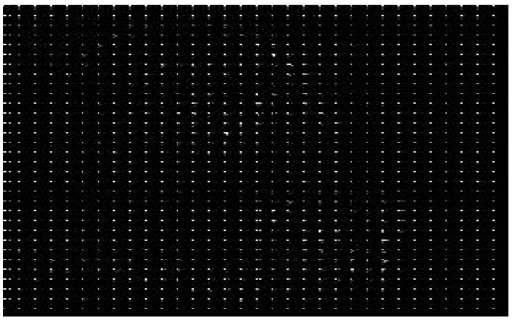
(a)



(b)

Figure 5: Sample input image of AR database (a) Original image (b) CMF image.

(a)



(b)

(c)

Figure 6: DCT+FICA method AR sample image (a) Pre-processed image (b) DCT result (c) Output image

Table 1: Dimensionality reduction in AR images

Method	FD	DB	Prec	Rec	F-Me
DWT+PCA	7	CoMo-FoD	55.6	97.4	68.7
DCT	16		64.5	96.5	75.1
DWT+DCT	10		72.5	96.3	81.8
Proposed	5	AR	98.9	98.5	99.0

Figure 6 shows the process of detection same regions in one image and Table1 depicts the performance of AR database with respect to different evaluation metrics. The different existing methods are used in dimensionality reduction in CMF image such as DWT+PCA, DCT, and DWT+DCT. These methods are compared with proposed method. The graphical representation of AR database images using feature dimensionality reduction performance is shown in the figure 7.

Figure 7: Performance analysis of AR images

The figure 7 represents the performance of dimensionality reduction using AR database and performance is measured using different evaluation metrics such as precision, recall and F-measure. An accuracy performance of the size of overlapping blocks is influenced by the size of the duplicated regions, the distance measure between the duplicated regions represented by feature vectors and the threshold value used in the algorithm. DCT+PCA method is uses feature length is 7 and DCT method employs feature length is 16. If the feature length is increases, the detection CMF image detection performance is slowly degraded [4]. The proposed DCT + FICA method decreases the feature length up to 5. Therefore, compare to the other methods the proposed method achieves better results.

Table 2: Performance evaluation of AR images

Methods	TPR	FPR
SURF+HAC [7]	73.64	3.64
Modified SIFT [8]	95.8	9.02
SURF [9]	87.37	10.17
SIFT [10]	88.6	10.31
EM [11]	75.49	14.81
HCSLBP [12]	92	8
Proposed	98.9	2.53

Table 2 indicates the performance of various methods using CMF image detection. The performance is measured using two efficient parameters such as TPR and FPR. The SURF algorithm is detects the key points and extracting their corresponding features. The feature matching is performed in between selected key points by applying best bin first search procedure. After detection of duplicate regions HAC technique is applied. An experimental performance of SURF+HAC method is achieves 73.64% of TPR and 3.64% of FPR. The SIFT descriptor is key-points distribution strategy is developed for interspersing the key-points evenly throughout an image. Finally, key-points are descripted by an improved SIFT descriptor which is enhanced for the CMFD scenario. The SURF feature instead of SIFT, which greatly reduce the processing time [5]. But the detection result is hardly improved since the transformation invariance of SURF is little more than SIFT. They all were hard to expose the forgeries which were mirror transformed. Furthermore, they all practically failed to detect the forgery which was covered by the highly uniform texture region [6].

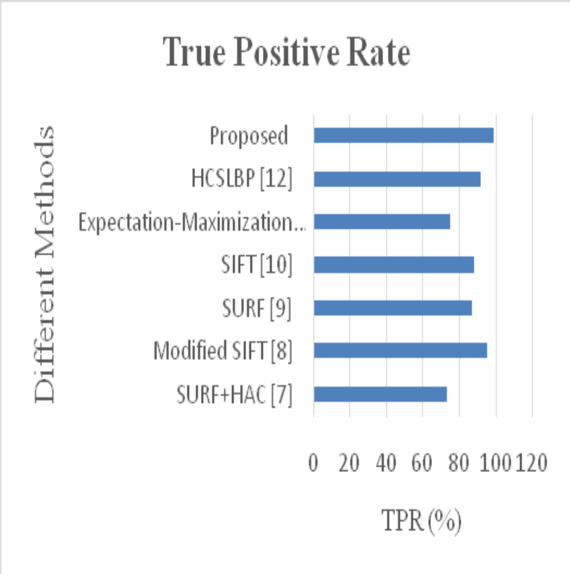


Figure 8: True Positive Rate (TPR)

The SURF algorithm, a set of key points and corresponding descriptors are extracted. The descriptors are passed through the matching process and the duplicated regions are detected. Basically, an automatic detection for the found duplicated region and also in images with a high level of uniformity for certain areas, SURF key points will not be retrieved, resulting in a low probability of finding a match. The SURF achieves the 87.37% of TPR and 10.17% of FPR but, false detection rate is somewhat maximum.

The SIFT algorithm starts by estimating the transform between matched scale invariant feature transform (SIFT) key points, which are insensitive to geometrical and illumination distortions, and then finds all pixels within the duplicated regions after discounting the estimated transforms. The proposed method shows effective detection on an automatically synthesized forgery image database with duplicated and distorted regions. SIFT algorithm cannot find reliable key points in regions with little visual structures. Similarly, as smaller regions have fewer key points, they are also hard to detect with our method. Second, there are images that have intrinsically identical areas that cannot be differentiated from intentionally inserted duplicated regions by our method.

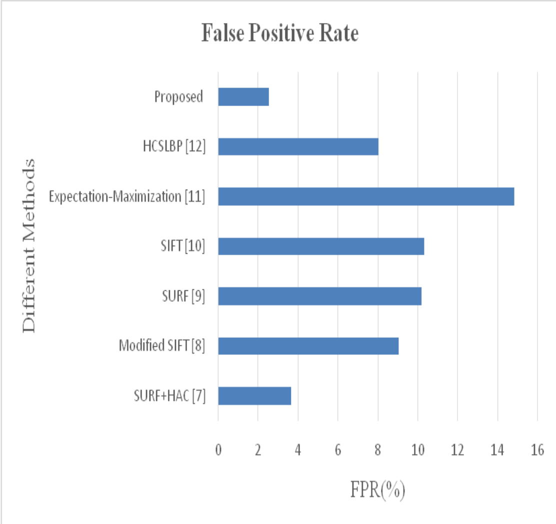


Figure 9: False Positive Rate (FPR)

An Expectation-Maximization (EM) algorithm is used for CMF image detection but the major weakness is that it is currently only applicable to uncompressed TIFF images, JPEG and GIF images with minimal compression. However, that this technique will still prove useful in a number of different digital forensic settings for example, a court of law might insist that digital images be submitted into evidence in an uncompressed high-resolution format. This technique is not able to uniquely identify the specific Re-sampling amount, as different Re-sampling will manifest themselves with similar periodic patterns. The best TPR and FPR are observed in one of old proposed method at 92% and 8% respectively. Finally, this work proposed DCT+FICA method is proposed achieves 98.9% of TPR and 2.53% of FPR. The proposed method decreases the detection error and false detection. Compare to the traditional methods the proposed method shows the better results and decreases the irrelevant information's.

Performance Evaluation of FERET database images

In experimental analysis, FERET database images are used and taken 50 sample images. The input sample image is shown in the Figure 10. The figure 10(a) shows the original image and figure 10(b) depicts the copied image.

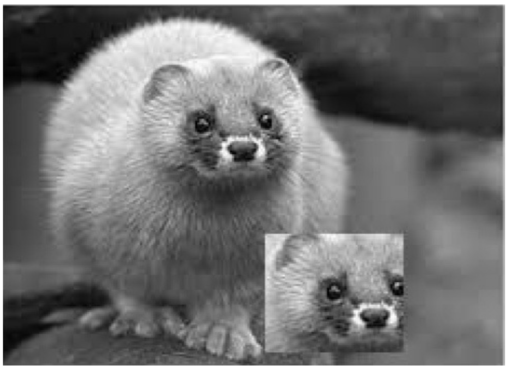
(a)

(b)

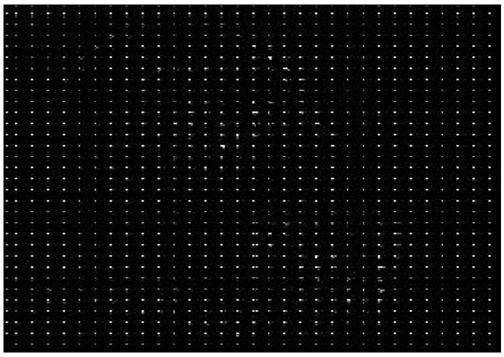
Figure 10: Sample input image of FERET (a) Original image (b) Copied image

According to the Figure 10 represents the proposed DCT+FICA method performance of duplication image detection in digital image. The difference between the original image and duplicate image is animal face region is copy and pasted into the same image but different part. An extra added portion is detected using proposed DCT+FICA method. The Table 3 represents the dimensionality reduction performance of FERET database.

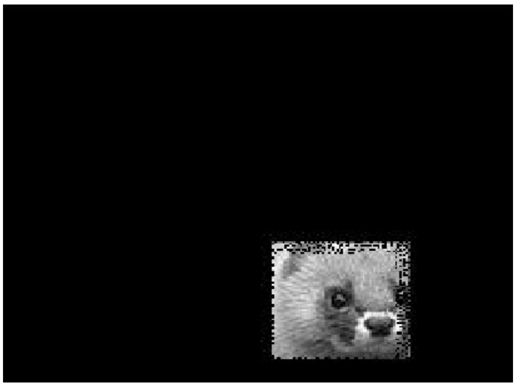
According to the table 3, the various different methods and databases are used for duplicate image detection. The existing methods and proposed method performance is measured using effective evaluation metrics such as precision, recall and F-measure. SIFT algorithm to represent the features of the input image. SIFT algorithm is invariant to changes in illumination, rotation, scaling, etc.



(a)



(b)



(c)

Figure 11: DCT+FICA method of sample image (a) preprocessed image (b) DCT result (c) Output image

Also, detecting whether an image has been forged or not specially using copy move forgery by using SIFT, it allow to understand that copy move forgery has occurred, and it also recovers from geometric transformation used for cloning, using this method we can also deal with multiple copy move forgery. An efficiency of detection ranked much higher than the previously available methods.

Table 3: Dimensionality reduction in FERET

Method	DB	Prec	Rec	F-Me
SIFT[13]	MICC-F220	95	74	83.1
DyWT+SIFT [13]		88	80	83.8
PCT[14]	Image Net	97	96	97
Zernike-CMFD [14]		70	46	48
DWT+SIFT [15]	MICC-F220	96	92	93.9
Proposed	FERET	98.5	97.0	96.8

DyWT does not incorporate down sampling so the image size is intact and low frequency component contains most of the information on which SIFT is applied to extract the features and then matching is obtained between the feature descriptors to conclude that a given image is forged or not. The acronyms are, FD: Feature Dimension DB: Data base Prec: Precision Rec: Recall F-M: F-Measure.

The PCT is approximate nearest neighbor searching based detection in CMF algorithm. The algorithm starts by dividing the image into overlapping patches. Robust and compact features are extracted from patches by taking advantage of the rotationally-invariant and orthogonal properties of the polar cosine transform. Hence, second set of samples are devoted to detecting the copy move forgeries with post-processing, and a number of image processing operations are imposed on the duplicated region with varying strength, including blur, noise addition, JPGE compression and rotation. The Zernike moment based CMFD is simulated for performance comparison. Similar to the other work, Zernike-CMFD is also developed to accomplish the challenging rotation-resistant CMFD. The simulation results indicate this proposed work with DWT+FICA algorithm, it achieving accurate forgery detection results.

The developed an algorithm of image-tamper detection based on the DyWT. It used for dimension reduction, which in turn increases the accuracy of results.

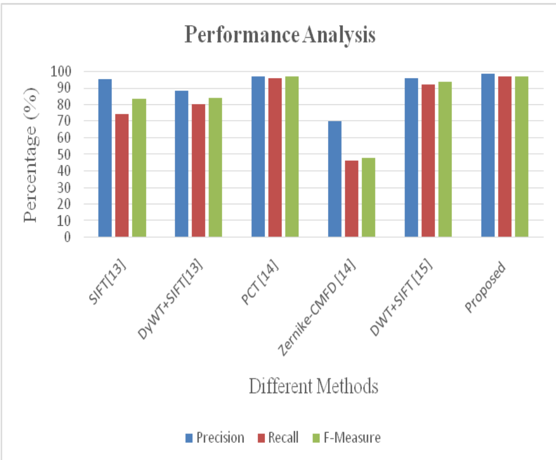


Figure 12: Performance Analysis of FERET images

The First DyWT is applied on a given image to decompose it into four parts LL, LH, HL, and HH. Since LL part contains most of the information, SIFT is applied on LL part only to extract the key features and find descriptor vector of these key features and then find similarities between various descriptor vectors to conclude that the given image is forged. The proposed DCT+FICA method is performed in FERET database and achieved better results than existing methods. The proposed achieves 98.5% of precision, 97.0% of recall and 96.89% of F-measure.

Table 4 represents the performance of FERET database with respect to different methods and efficient evaluation metrics such as TPR and FPR. The two efficient block-based systems for detection of copy-move forgeries present in images. The first system is based on the extraction of Local Binary Pattern Histogram Fourier features from each overlapping block and forgery decision based on the matching of these block features using Euclidean similarity measure.

The second proposed system is based on the extraction of Fast Walsh Hadamard Transform features from each overlapping block and forgery decision based on the matching of these block features using shift vectors analysis

Table 4: Performance Evaluation of FERET

Methods	TPR	FPR
LBP-HF and FWHT[16]	98.6	7.1
Improved DCT [17]	93.2	7.4
Improved DAISY descriptor [18]	92.7	3.3
SIFT[18]	88.52	9.48
SIFT+KD +BBF [19]	91.26	6.32
Proposed	99	2.5

Both systems are tested using tampered images of the CoMoFoD dataset. An improved DCT-based method is developed to detect this specific artifact. Firstly, the image is divided into fixed-size overlapping blocks and, DCT is applied to each block to represent its features. Truncating is employed to reduce the dimension of the features. Then the feature vectors are lexicographically sorted and, duplicated image blocks are neighboring in the sorted list.

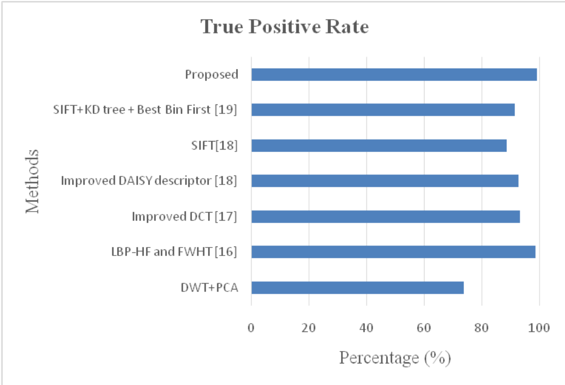


Figure 13: True Positive Rate (TPR)

Analyzes DWT+PCA is basic method of CMF detection and summarizes block matching technique, then uses a CMF detecting method based on local invariant feature matching. It locates copied and pasted regions by matching feature points. Another method detects feature points and extracts local feature using Scale Invariant Transform algorithm. Matching local features is based on KD tree and Best-Bin-First method.

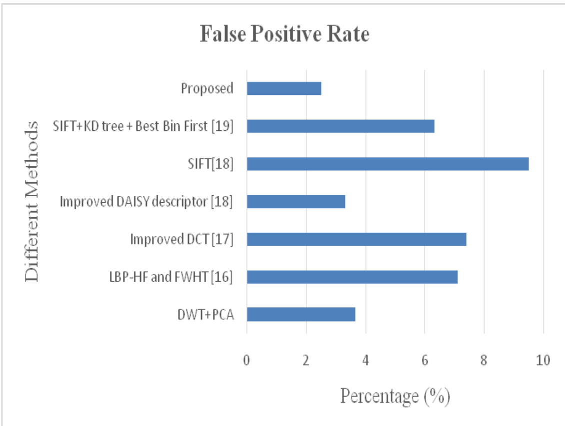


Figure 14: False Positive Rate (FPR)

Through analysis we learn computational complexity of the proposed method is similar to existing block-matching methods, but has better locating accuracy. Experiments show that this method can detect copied and pasted regions successively, even when these regions are operated by some process. Finally, compare to all existing methods the proposed method represents the better results.

III. SUMMARY

Copy-Move forgery image is a widely committed forgery in our society. In this work, the concept of block based forgery detection algorithms which are efficient in detecting CMF is developed. The proposed DCT and FIC Analysis method is proposed for identify the duplicate region in the digital images. This technique is decreases the irrelevant features and improves the performance of copy move detection. An experimental analysis of the work demonstrated that the proposed method performance is calculated using evaluation metrics such as precision, recall, F-measure, TPR and FPR. Moreover, input data is taken from the three reputed databases such as FERET, AR database images. The proposed method result is compared with the existing many methods shown in this work. Hence, overall experimental performance of proposed method is shows the better results than the existing methods.

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