Improved Approaches SURF, RANSAC And 5level DWT Using Image Forgery Detection

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Abstract- *Due to the availability of various image processing tools forgery over an image can be performed very easily but very difficult to identify. In copy-move forgery, a segment is copied from the original image and pasted at some other location on the same image to hide significant objects of image or to bring additional information which is originally not present in image. Nowadays, this forgery technique is drawing researcher's attention. Till now many solutions are presented by researchers to detect such type of forgery in images. In this paper, we use both block-based and the feature point-based algorithm. (DWT) is used for the image segmentation, where we use fifth level (DWT) to find the frequency energy coefficients. Considering the coefficients we calculate the initial size of the super pixel. This super pixel is used in SLIC algorithm to form the non-overlapping irregular blocks. These non-overlapping irregular blocks give more accurate results for the high-resolution images. To extract the features SURF algorithm is applied to the irregular blocks. The feature is extracted in every irregular block; they are matched by calculating the Dot products between unit vectors. This gives the exactly matched tentacles of SURF feature in every block. Further, (RANSAC) algorithm is applied to detect the forged regions. A proposed is implemented to evaluate the performance of the scheme the SURF algorithm is used in this paper for feature extraction. It is an efficient alternative to SIFT it is much faster and more robust as opposed to SIFT.*

The remaining points were used as pre matching points to be iterated by RANSAC method, which reduces the number of iterations and improves the matching efficiency.

Keywords- image Forgery detection; SURF;RANSAC;5-DWT.

I. INTRODUCTION

In this modern era, "we are seeing a figure is not conceivable because there are lots for changes has been done to hide or to add some information or some objects". Automation today makes it easy for anyone with a computer to modify official documents, including photos, changing material content. Receiver of this material might process these digital forgeries unless they have controls in place to verify key information. Nowadays digital image can be easily manipulated by some powerful tools, such as adobe Photoshop, etc. some tools are free whereas some are licensed. These tools make it very easy to create a forged image from one or more than one image. Image forgery detection has being emerged as a remarkable research in applications of computer vision, digital image processing, biomedical technology, criminal investigation, image forensics, etc. It becomes more attractive and challenging when powerful software tools for image processing are so popular and sophisticated that we cannot confirm whether image is manipulated by naked eyes.[1] As example of newspaper (e.g. refer figure-1), in which three photographs were used to create a one forged image. Image of white house, Bill Clinton, Saddam Hussain. Firstly Image of white house is blurred to create an illusion of an out-of-focus background. Then, image of Bill Clinton and Saddam Hussain were cut from two different images and pasted in white house image. [1].

Forged images can be used at various places like news report, magazines and websites to mislead persons. So, for avoiding such situations various methods are developed to examine authenticity of images. Copy-move forgery used at various places because of its difficult detection. Many researchers invented different methods for detecting copy-move forgery. Digital image forgery detection methods can be divided in two broad categories: active and passive approach. Active approach requires anterior information about the image. Active approaches demands watermark or generation of signatures at the time of image acquisition. Due to this requirement, active approaches limit their applications [2].

II. FORGERY DETECTION

Forgery detection methods become much more complicated to deal with the latest forgery techniques. This back to the availability of digital editing tools, alteration, and manipulation become very easy and as a result forgery detection becomes a complex and threatening problem [3]. Image forgery detection can be manipulated in various ways with many simple operations like affine transforms such as translation, scaling, etc., compensation operations such as brightness, colors, contrast adjustments, etc., suppression

operation such as noise extraction, filtering, compression, etc., .Furthermore, more complex operations are also possible such as compositing, blending, matting, cropping, photomontage leading to visually untraceable artifacts in an image. The automatic and scientific method of detecting the forged images has become a big challenging problem for researchers and the same problem is true for every multimedia contents.

III. using techniques

Digital Image Forgery Techniques

RANSAC:

Random Sample Consensus (RANSAC) algorithm is used to extract the matched regions. The experimental result of the algorithm which is proposed indicatesthat, it can extract more accurate results compared with existing forgery detection methods.[4]

Decomposing Using DWT

5level -DWT is applied in the initial stage of forgery detection process as it helps to extract more number of SURF features which will help in better detection performance. DWT is applied on the image for copy-move forgery detection; the image is decomposed into four different sub-bands LL, LH, HL, and HH. Most of the data is concentrated in LL sub-band and it is considered as the approximation of the image. It represents the coarse level coefficients of the original image. It is the LL sub-band which is decomposed into four sub-bands at the next level. Size of the image is reduced at every level by the DWT transform. The decomposing of Butterfly image after applying DWT on it, the image is divided in 4 parts in first level and in next level its LL subband is further decomposed.[5]

SURF feature descriptors matching:

Keypoints match is done between two images typically. Given a pair of images iI, jI with their respective interest points and feature descriptors, for every interest point in the first image Ii, we calculate the Euclidian distance to all feature descriptors in the second image iI . If the ratio of the nearest neighbor and the second-nearest neighbor is smaller than a predefined threshold, which is discussed in the experiment, a match is assumed to be correct and is therefore added to the list of putative matches. In our paper, the match process of key points is done by matching between two subsets of the keypoints set of the test image, as described in follows: (1) Given a keypoints set of test image as S , randomly divide the set into two subsets as 1S , 2 S , 12S *S =S . (2) Find the nearest neighbors in 1S , 2S , and save the matching records. (3) Applying step (1), (2) to 1S, 2S respectively and repeatedly until 1S , 2S only contains one element. By using the above matching method, the keypoints matches can be found, and the duplication can be further determined.[6]

IV. LITERATURE SURVEY

Ahmed Ghoneim, et al. (2018) with the invention of new communication technologies, new features and facilities are provided in a smart healthcare framework. The features and facilities aim to provide a seamless, easy-to-use, accurate, and real-time healthcare service to clients. As health is a sensitive issue, it should be taken care of with utmost security and caution. This article proposes a new medical image forgery detection system for the healthcare framework to verify that images related to healthcare are not changed or altered. The system works on a noise map of an image, applies a multi-resolution regression filter on the noise map, and feeds the output to support-vector-machine-based and extreme-learning-based classifiers. The noise map is created in an edge computing resource, while the filtering and classification are done in a core cloud computing resource. In this way, the system works seamlessly and in real time. The bandwidth requirement of the proposed system is also reasonable.[7]

Gonapalli Ramu, et al. (2017) Cloning (copy-move forgery) is a malicious tampering attack with digital images where a part of image is copied and pasted within the image to conceal the important details of image without any obvious traces of manipulation. This type of tampering attacks leaves a big question of authenticity of images to the forensics. Many techniques are proposed in the past few years after powerful software's are developed to manipulate the image. The proposed scheme is involved with both the block based and feature point extraction based techniques to extract the forged regions more accurately. The proposed algorithm mainly involves in matching the tentacles of same features extracted from each block by computing the dot product between the unit vectors. Random Sample Consensus (RANSAC) algorithm is used to extract the matched regions. The experimental result of the algorithm which is proposed indicates that, it can extract more accurate results compared with existing forgery detection methods.[8]

Kang Hyeon RHEE (2017) For a design of the Gaussian filtering (GF) detection (GFD) in the tampered digital images, this paper presents three kinds of the new feature vector which are extracted from the edge ratios and the parameters of Hough peaks. In the proposed algorithm, the

formed 10-dim. feature vector is trained in SVM (Support Vector Machine) for the GFD.[9]

Ying Zhang, et al. (2017) This work introduces an approach to localize the tampered region among the images from social media platforms. We propose a joint model to integrate the predictions from a set of features, each of which represents the inherent relation among the pixels within a certain distance to detect the forgery. Within a fixed distance, the feature is adapted from a few basic statistics through a stacked Autoencoder to a proper version in a noise-resistant manner, so that it will be more robust to detect the tampering when the forgery gone through some common social media platform operations. The classifier is trained using a standalone dataset from a benchmarking but is pre-processed properly to simulate its possible imperfections when spreading over the Internet. The approach was tested on images from Facebook, with results showing an encouraging improvement from the prior arts.[10]

Junjie Zhang, et al.(2017) Active detection technology was widely used in the traditional tampering detection. Firstly, those mainstream technologies of active detection were introduced. Then, some necessary improvements for the tampering detection algorithm were proposed in this paper, for example, the steganography information was cross-embedded to enhance the safety of the images, and the chaos function was simplified to enhance the execution efficiency and detection precision of the algorithm. Experimental results showed that the proposed algorithm can improve the efficiency of image tamper detection.[11]

Paulo Max G. I. Reis (2017) et al present that Audio authentication is an essential project in multimedia forensics stressful strong techniques to hit upon and identify tampered audio recordings. In this text, a brand new method to detect adulterations in audio recordings is proposed by exploiting odd versions inside the Electrical Network Frequency (ENF) signal in the end embedded in a questioned audio recording. These unusual versions are due to abrupt segment discontinuities because of insertions and suppressions of audio snippets during the tampering task. First, we recommend an ESPRIT-Hilbert ENF estimator alongside an outlier detector based at the sample kurtosis of the anticipated ENF. Next, we use the computed kurtosis as entering for a Support Vector Machine (SVM) classifier to suggest the presence of tampering. The proposed scheme, wherein unique as SPHINS, drastically outperforms associated previous tampering detection methods within the performed assessments. We validate our effects the use of the Carioca 1 corpus with a hundred unedited authorized audio recordings of phone calls.[12]

Chi-Man Pun (2016) et. Al. present that TD strategies based on picture hashing were widely studied with non-stop improvements. However, most existing fashions can't generate object-level tampering localization consequences because the forensic hashes connected to the image lack contour records. In this paper, we gift a singular TD version that may generate an accurate, item-level tampering localization quit end result. First, an adaptive image segmentation technique is proposed to phase the picture into closed regions based on strong edges. Then, the color and function features of the closed areas are extracted as a forensic hash. Furthermore, a geometrical invariant tampering localization version named Image Alignment based Multi-Region Matching (IAMRM) is proposed to establish the location correspondence among the obtained and forensic images by exploiting their intrinsic shape statistics. The model estimates the parameters of geometric ameliorations thru a robust image alignment approach primarily based on triangle similarity; additionally, it fits multiple regions concurrently through utilizing manifold rating based on one-of-a-kind graph systems and functions. Experimental consequences display that the proposed IAMRM is a promising method for object-stage TD compared with ultra-modern strategies.[13].

V. PROPOSE WORK

Problem Statement

In the base paper, for feature extraction we have used SIFT algorithm but it is less complex and expensive as e adopted both block based and feature point based algorithm. Also, the SIFT algorithm is slower in performance.

Propose work:

In this paper, we use both block-based and the feature point-based algorithm. (DWT) is used for the image segmentation, where we use fifth level (DWT) to find the frequency energy coefficients. Considering the coefficients we calculate the initial size of the super pixel. This super pixel is used in SLIC algorithm to form the non-overlapping irregular blocks. These non-overlapping irregular blocks give more accurate results for the high-resolution images. To extract the features SURF algorithm is applied to the irregular blocks. The feature is extracted in every irregular block; they are matched by calculating the Dot products between unit vectors. This gives the exactly matched tentacles of SURF feature in every block. Further, (RANSAC) algorithm is applied to detect the forged regions. A proposed is implemented to evaluate the performance of the scheme the SURF algorithm is used in this paper for feature extraction. It is an efficient

alternative to SIFT it is much faster and more robust as opposed to SIFT.

Proposed ALGORITHM:

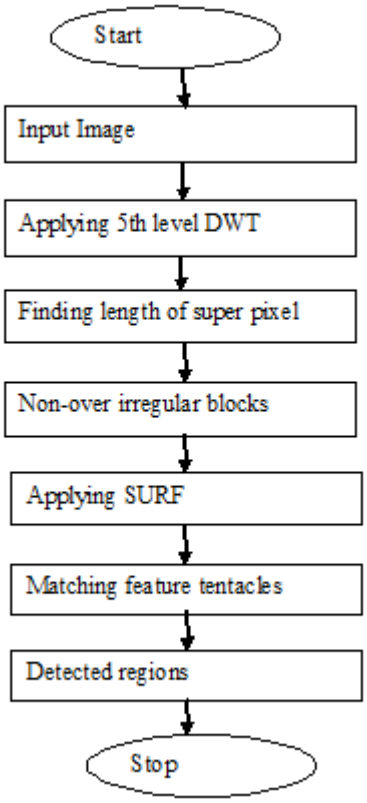

Fig. 1 Flow chart on Propose work

VI. RESULT ANALYSIS

MATLAB is used to test the images where we had tested 80 images with resolutions between 1000 x 900 and 1200 x 1000.

Fig. 2 First, We 'Run' our code and then obtain this type of menu bar.

In this menu bar there are 6 steps.

Fig. 3. Browse an Host image from dataset.

Fig. 4. Browse a Watermark image from dataset.

Fig. 5. Embedding

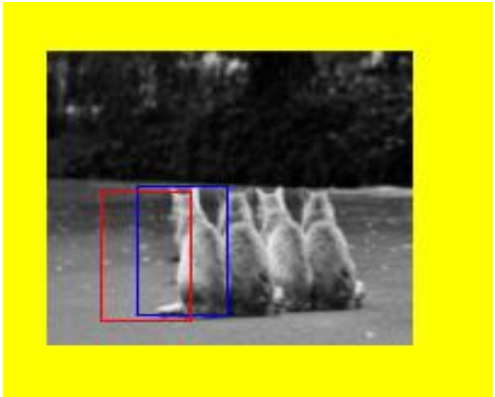

Fig.6. Tempering process.

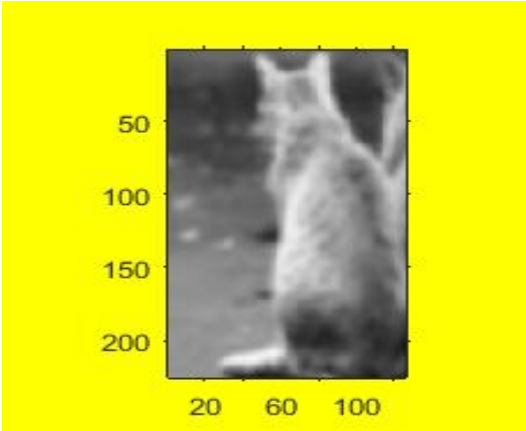

Fig. 7. Selected area of tempered

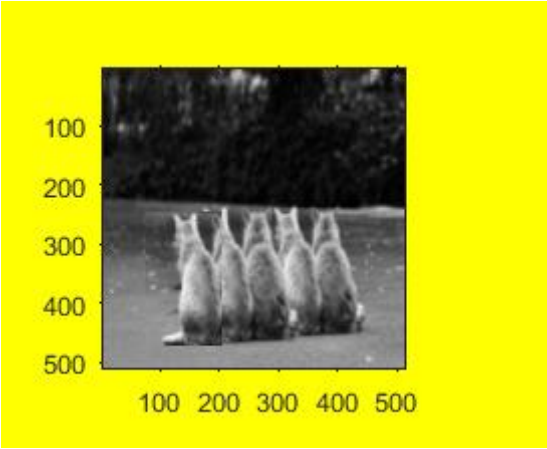

Fig. 8. Tempered image

Fig. 9. Extraction with temper

Table 1. Comparison on Base Accuracy and Propose Accuracy

Base Accuracy	Propose Accuracy
98.0200	99.1300

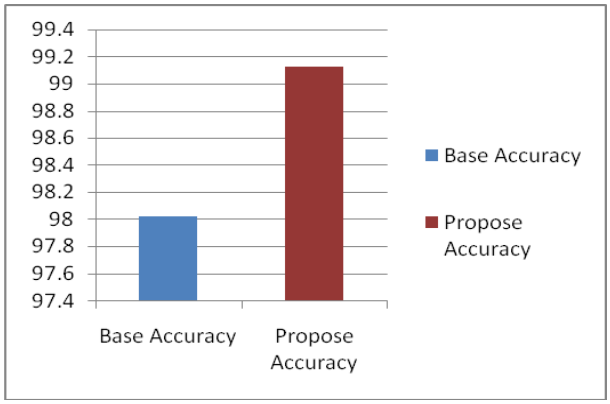

Fig. 10. Comparison Graph on Base Accuracy and Propose Accuracy

Table 2. Comparison on Base SPECIFICITY and Propose SPECIFICITY

Base SPECIFICITY	Propose SPECIFICITY
94.9808	95.2726

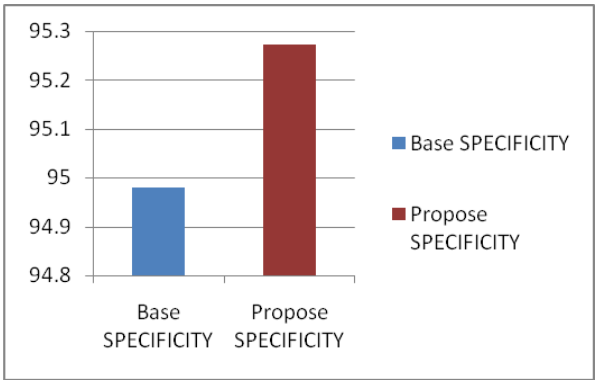

Fig. 11. Comparison Graph on Base SPECIFICITY and Propose SPECIFICITY

Table 3. Comparison on Base SENSITIVITY and Propose SENSITIVITY

Base SENSITIVITY	Propose SENSITIVITY S
93.8223	96.3244

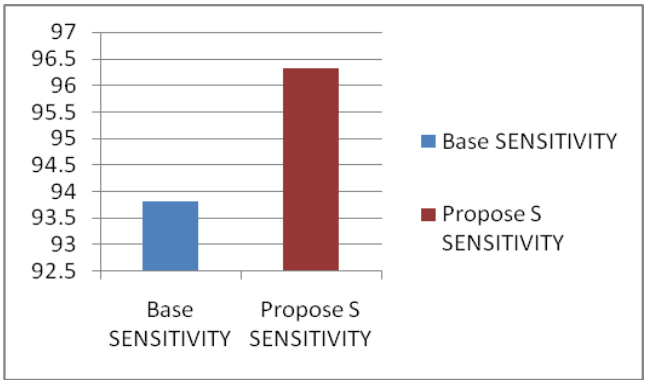

Fig. 12. Comparison Graph on Base SENSITIVITY and Propose SENSITIVITY

Table 4. Comparison on Base FPR and Propose FPR

Base FPR	Propose FPR
5.0192	4.7274

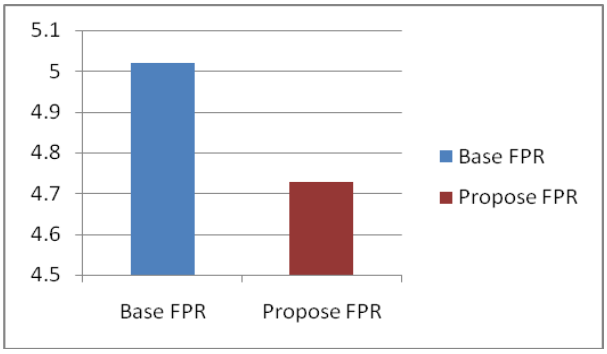

Fig. 13. Comparison Graph on Base FPR and Propose FPR

Table 5. Comparison on Base FNR and Propose FNR

Base FNR	Propose FNR
6.1777	3.6756

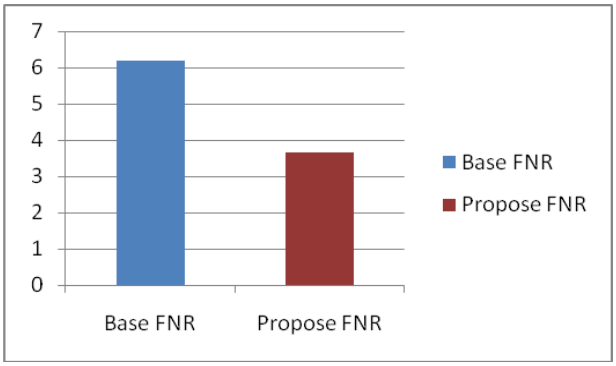

Fig. 14. Comparison Graph on Base FNR and Propose FNR

VII. CONCLUSION

In this paper, we studied that, due to the advancement in the digital software"s manipulation of digital images has become easy. As powerful computers, advanced photo-editing software packages and high resolution capturing devices are invented. Out of all the cases of digital image forgery, theycan be categorized into two major groups as active and passive approaches, based on the process involved in creating the fake image. These non-overlapping irregular blocks give more accurate results for the high-resolution images. To overcome the above drawbacks, we proposed a method where we use both block-based and the feature point-based algorithm. (DWT) is used for the image segmentation, where we use fivelevels (DWT) to find the frequency energy coefficients. Considering the coefficients we calculate the initial size of the super pixel. This super pixel is used in SLIC algorithm to form the non-overlapping irregular blocks. These non-overlapping irregular blocks give more accurate results for the high resolution images. This gives the exactly matched tentacles of SURF feature in every block. Further, (RANSAC) algorithm is applied to detect the forged regions. A proposed is implemented to evaluate the performance of the scheme the SURF algorithm is used in this paper for feature extraction. Our Future work is how we merge two algorithms for getting better results.

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