Analysis of Copy-Move Forgery Detection in Digital Image

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Abstract— **In today's time because of less-cost and more-resolution digital cameras, there is ample amount of digital images across globe. Digital images have a crucial presence in specific domains like in insurance process, forensic lab work, monitoring systems, services of intelligence, medical imaging and journalism. The most needed requirement is the images we see should be authentic. With the availability of effective image processing software's like Adobe Photoshop the possibility is very high to modify an artificial picture. Copy-move forgery is a very regular category of the digital fraud. There are basically two techniques for identifying copy-move fraud which are Block based method and Key point based methods. Here for the report, I have reviewed different copy-move forgery detection technique and its advantages over other methods of detection technique.**

IndexTerms— **Key point based, Block based, Copy move, forgery, fraud.**

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I. INTRODUCTION

In the current technical world Digital images play very important role in various enormous fields. Majorly they are present in the work of defense, news work, medical checkup and media work. With the progress in technology of digital image, for instance, camera devices, programs, and computer systems and the vastly spread through the internet medium, the digital image can be considered as an important point of information currently. Due to the growth of technology and accessibility of cheap price hardware and software alteration devices, it's not important to replace or fraud the digital pictures lacking any observable elements. The duping of of Digital image and calculation of digital images in many cases is to deliberately harm the knowledge of receiver. In such condition the Digital image alteration detection has a crucial involvement in image forensics to give the image authentication.

A. Classification of Image forgery:

There are many detection techniques are classified into two approaches as shown in figure.1) active and b) passive techniques. For authenticating the digital image, watermarking of digital images and digital signature are introduced and they are known as active techniques. In an active approach it needs little pre processing operations, like attaching watermark and signature when generating digital images, hence it limits their applications in practice. Unlike the technique of watermark and signature-based, the passive techniques does not require any digital signature to be created or to be put in any watermark. The passive authentication is the method of checking digital pictures lacking bringing in use any further data aside from the images themselves.
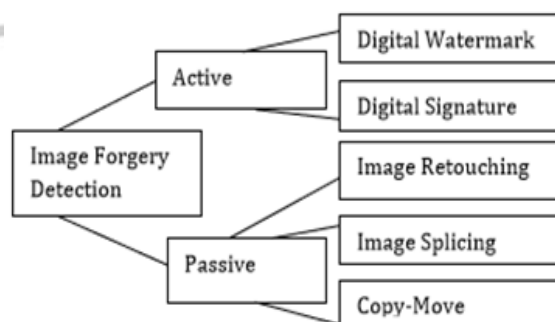

Figure 1: Image forgery classification

B. Types of Image forgery:

- **Image Retouching** :-

It can be treated to be the low dangerous moderately digital picture fake. Image retouching does not greatly transform or modify an picture, but a place of, improve the quality (or decreases) attribute e of an picture. Figure 2 Shows image retouching, and the difference between left image and right images (enhanced) clearly.

(a)Original Image   (b) Image Retouching

Figure.2: Image Retouching [11]

- **Image Splicing**:-

This is second one type of forgery. Image splicing is an approach that includes a composition of multiple images which are fixed together to create a forgery as shown in figure3.This type of forgery is executed with attention; the boundary between the spliced areas can be barely observed.
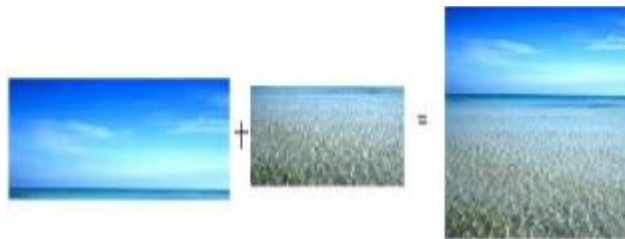

Figure.3: Image Splicing[11]

- **Copy Move Forgery**:-

Copy move forgery is almost alike to image splicing. Here this kind of image fake a part of a picture itself is copied, moved to a desired place and pasted within the same picture. (Figure 4) shows a red pen has been removed from the original image in part (a), by covering some of the region by background of the same image to produce forged image (b) [4]. There are many types of copy move forgery as follows: 1) just Copy-move;2) Copy move with reflection; 3) Copy-move with different scaling; and 4) Copy move with rotation.
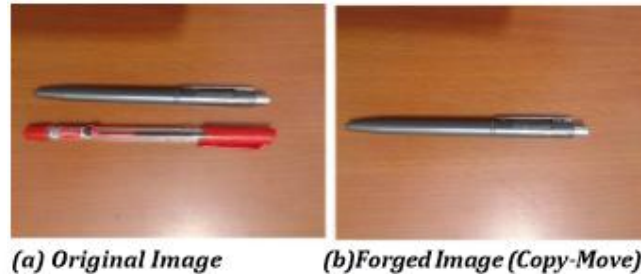

(a) Original Image   (b)Forged Image (Copy-Move)

Figure.4:Copy Move[11]

II. LITERATURE REVIEW

- **Digital Image Processing:**

Digital image processing is the significant of computer algorithms to do image processing on digital pictures. Digital image processing has many advantages over analog image processing. It entitles a commonly broad range of algorithms to be implemented to the input data and can avoid problems such as the spread of noise and signal falsification during processing. As pictures of digital types are fixed over two dimensions. Digital image processing may be designed in the scheme of multidimensional orders.

- **Digital Forensics**:

Digital forensics science is a sub category of forensic field comprises the rehabilitation and analysis of medium found in digital machines, generally in link to computer offence.Digital forensics was initially used as a replacement for computer Judaical but has enlarged to cover analysis of all devices able preserve digital information. With source in the individual computing innovation of the late 1970s and early 1980s, the authority developed in an unsystematic process during the past years, and it was not upto the last decade that national programs appeared.

- **RELATED WORK**

Parameswaran Nampoothiri V, Dr. N Sugitha[2] In this paper, an observe on the passive technique for fraud picture identify like Format build techniques, Pixel build proficiency, Camera build proficiency, Physical environment build proficiency, Geometry build proficiency. A require of digital picture tampering identify is becoming too required in the technical world.In

defence, military and in medical reports altered pictures can play a essential part in resolve making. The advance inexpensive devices validate the making and alter of digital pictures which fond no noticeable find so that the allowing of originality to the pictures can be examine generally as forensic proof. There are some modification techniques mentioned in this paper. Since passive technique need not require any previous data they are require appropriate.Many of these techniques are essential to identify digital picture altering. Nithiya. R, Veluchamy.S [1], In this paper ,author had concentrated on copy move fraud picture .Aims to verify particularly the fake area in a picture.she presented the adaptive over segmentation and key point matching algorithm. Computational complexity is decreased in this task by splitting picture into non overlapping blocks of picture area. Proposed system uses Discrete Wavelet Transform to analyse frequency diffusion of provide picture. All the structure of SIFT attributes are combined with its neighboring set attributes and detect the fake area. The exploratory exhibit that system reached high recall rate under dissimilar convert (FMT, SVD, DCT). Author demonstrated regarding an effective copy move picture fraud area nearby in a picture. Azra Parveen

III. COPY MOVE FORGERY DETECTION

Copy Move Forgery is a picture fake method in which a region of a picture is copied and moved on another region of the same picture. Copy move forgery is performed to conceal certain things or copy objects within an picture. Copy move forgery identify methods are Block based method and Key point based method. In Block based CMFD techniques, the picture will be divided in to flapping blocks of specified size and a feature vector will be calculated for these blocks. The main aim of copy move forgery detection is to identify forged regions even though if they are moderately varies from one another.The process of pipeline for copy move forgery identify contains some steps to be followed as shown in below diagram.Pre-processing is the initial from which block based and key point based are subcategory.Feature extraction is derived from both sub division and it is carried out by matching process.after matching it must further filtering process is applied and finally post processing is carried to fish whole processing pipeline.
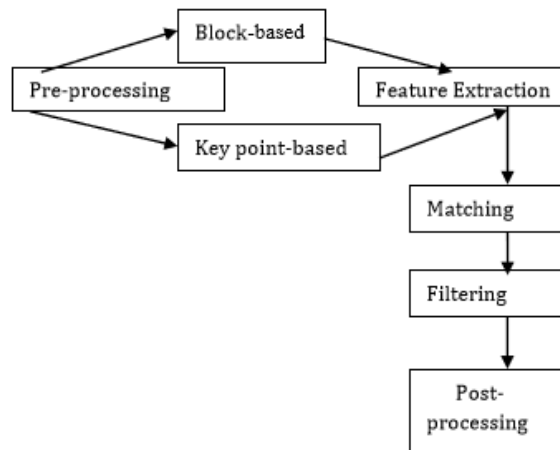

Figure 5:Processing pipeline for CMFD

- **Feature Extraction**

Techniques like in system expert, pattern recognition and in image processing, feature extraction process should begin from an build up of measured data and then derived values must be built calculated to be providing useful and un wanted, facilitating the subsequent learning and generalization steps, and in some cases generate to better human explanation. Feature extraction is associated to dimensionality reduction.

- **Matching**

Matching is done to detect the duplicated regions. High resemblance between two attribute descriptors is translated as a sign for a copied area. Methods used for matching can be lexicographic sorting, Best-Bin-First search.

- **Filtering**

By applying filtering we can able to reduce the false matching image probability . Removing the matches exist between spatially close regions includes the removal of a common noise suppression. Mostly adjacent pixels usually have indistinguishable intensities, which makes to appear false forgery detection

- **Postprocessing**

Post processing step is mainly to save matches which display a usual performance. Let us examine a set of matches which is a member of duplicated area. Such matches are anticipated to be involving nearby to one other in both the original and the destination blocks (or key points). Additionally, matches that developed from the same copy move exploit must display same amounts of translation, scaling and rotation.

A. Classification of Copy Move Forgery Detection Technique

- **Key point Based Method:**

Key point based technique operate on whole image. Instead block based methods, Key point based methods compute their attributes only on picture areas with excessive disorder. Key point based method can be further classified into two tecniques:

> **SIFT (scale invariant feature transform)**

In a SIFT, an objects key points are initially obtained from a set of source pictures[2] and deposited in a database. And then an entity is identified in a new picture by separately differentiate each characteristic from the new picture to this database and using Euclidean distance of their attribute vectors to find applicant combining attributes. with that full set of duplicates, subsets of keypoints which accepts on the object and its place, scale, and direction in the new picture are discovered to filter out good equivalent.An effective hash table exertion of the generalized Hough transform is continuously applied to determination of consistent clusters. All cluster of 3 or more attributes which accepts on an entity and its create is then subject to foresee full design validation and eventually anamoly are removed.

> **SURF (Speeded Up Robust Features)**

It is a invented district attribute locate and description. SURF technique is mostly applicable for steps such as entity identification, picture authorizing, grouping or 2D rebuild. It is partially magnificent with the scale-invariant feature transform (SIFT) caption. This techniques specification type is respective stage speedy than SIFT technique also stated along its initiator to be high strong opposite different picture variation apart form SIFT. It apply integer approximation of an origin of Hessian blob recognition to identify interest points, that maybe calculated with 3 integer exercise using a pre calculated integral picture. Its attribute descriptor is of the, Haar wavelet response based on the sum around the area of interest. These, it could be calculated with the aid of the fundamental picture.

- **Block Based Methods**

Block-based methods splits a the image in a rectangular regions for future with drawl.A feature vector is calculated for all every such area. Similar feature vectors are eventually matched. In the Block based features DWT, DWT, KPCA, PCA and ZERNIKE characteristic execute definitely effective.

> **DCT**

In this algorithm, exploits DCT(Discrete Cosine Transform) coefficients as characteristic that can be strong on JPEG compression and Gaussian addition noise. To reduce the cost of the calculation work and to reduce the difficulty of the similirity, the DCT coefficients were arranged lexicographically[7]

> **ZERNIKE**

Compared to all of different varieties of moments defined in the documentation, ZERNIKE moments have been shown to be high standard quality to the others an entitle of their inconsiderate to picture noise,data willing, and capability to allocate faithful picture depiction. Since the magnitude of ZERNIKE moments are algebraically invariable against rotation, the recommended technique can identify the fake area although it is rotated before fixing[13].

IV. ANALYSIS

Above discussed methods shows differences due to different texture of the copied regions. In Literature we can find the categories as smooth, rough and structure. The Key-point Based methods require sufficient entropy in the copied region to develop their full strength. In the category rough, SIFT and SURF are consistently either the best performing features or at least among the best performers. Conversely, for copied regions from the category smooth, the best block-based methods often outperform SURF and SIFT at image or pixel level.

V. SUGGESTION

If we able to minimize the false-positive detection which generates because of JPEG Compression of an image, then Block based methods can be superior on Key-point based methods.

VI. CONCLUSION

While going through the various papers on digital image forgery, which describes technique for identify of copy move picture fake in digital image, it has been seen that a set of work has been completed as copy move forgery identification. Thus further research effort is still needed to develop an appropriate algorithm that can detect the copy move. From the literature survey, we observed that the big issue with the copy move fraud in digital image is the identification of altered region processed by some usual post managing performance such as compression,extra noise, rotation scaling,overturn etc. The other concern is the time complexity of identification technique of copy move fraud in digital picture. Motive of this paper was to give a brief comprehensive review about various techniques for copy move forgery detection in digital pictures. A very common type of forgery i.e. copy move fraud identification is discussed. This paper presented a study on various detection techniques which is based on block method

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