Copy Move Image Forgery Detection Techniques: Survey

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Abstract- Image forgery is now more customary in our daily lives with improvements in computer and image improvements software. As forgers developing sophisticated software, to combat that we need more advanced ways of detecting these forgeries. There are two major types of forgery detection techniques, active methods and passive methods. Our focus is mainly on pixel based forgery which is one of the type of passive method. Pixel based forgery is the type of forgery which takes place on structural unit of image i.e on pixels. Copy move forgery is one of the type of pixel based forgery. In this paper, various methods of copy move forgery detection are surveyed.

Keywords- Image forgery detection, pixel based forgery, copy move forgery, Image authentication, Image forgery

I. INTRODUCTION

With the increasing demand of image processing software and amelioration in digital cameras lead to rise in many manipulated images with no obvious traces, initiating huge demand for automatic forgery detection algorithms to resolve of truthfulness of an image. The need to legitimate the photographs is crucial as these are supporting evidences and historical records in growing number and wide range of applications from forensic investigation, journalistic photography, criminal investigation, law enforcement, insurance claims and medical Imaging. There are two main types of Image forgery detection techniques: Active or Non Blind Method and Passive or Blind Method [5][6].

Active method are the method which are categorised as digital watermarks [2]. Watermarks are initially used for preservation of an image and if there is any kind of meddling done in image it is further retrieved by watermarks itself. That’s how this method got other name as Non blind method. Here original image is accessed before processing it, so the watermarks are inserted. This method is not beneficial on practical basis so we need passive methods.

Passive method or Blind methods require no prior information about the image [1][4]. It is assumed that although forgeries are difficult to detect as they leave no clue, but it mostly likely disturbs the statistical property of a natural image which brings antiquity leading to various forms of disparity. Passive methods can be classified into following categories.

- Pixel Based
- Format Based
- Camera Based
- Physics Based
- Geography Based

Perhaps one of the most common image manipulations is to clone (copy and paste) portions of the image to conceal a person or object in the scene [3]. When it is done precisely, it can be hard to recognize cloning outwardly. Since the cloned areas can be of any shape and area, it is computationally difficult to hunt all conceivable picture areas and sizes. Copy move forgery is pretty much like image splicing in perspective of the way that both methods change certain image locale, with another picture.
However, rather than having an outer image as the source, copy-move forgery utilizes part of the first base image as its source. In a copy-move forgery, parts of the original image is copied, moved to a desired location, and pasted. The usual purpose of such act is to conceal certain details or to enhance certain aspects of an image. The irregularities of the copied and pasted regions is reduced by some post processing such as blurring, median filtering. Further, in next section existing different methods are discussed which are mainly focusing on making algorithms for copy move forgery detection.

II. EXISTING METHODS FOR COPY MOVE FORGERY DETECTION

Manipulations of an image has become very easy now a days with sophisticated software. Existence of two same regions in normal images is not common and thus this property is used to detect copy move forgery. The methods introduced during the literature survey are only based on copy move forgery detection.

Shaktidev Mukherjee et.al [7] concentrated on DCT algorithm. One of the common method to detect copy move forgery is block matching method where the image is divided into overlapping blocks and further the blocks are matched to find duplicated regions but this type of method lead to exhaustive search and so further efficient block matching detection based on DCT was introduced. To represent an image in frequency domain, DCT is widely used as it represents most of the intensity distribution details with fewer coefficients. To keep the low frequency coefficients together and before the high frequency coefficients in the row vector, DCT coefficients are arranged in zigzag manner. After applying the algorithm the result is analysed. The high frequency coefficients are susceptible to noise, so the row vectors are curtailed. Experimental results have confirmed a marked improvement in the execution time compared with the existing methods.

Qunting Yang et.al [8] concentrated on approach that used improved DCT. Compared with other methods ,there are certain advantages like dimension of feature vector is lower, it is robust to various attacks, such as multiple copy-move forgery, Gaussian blurring, and noise contamination and lower computational complexity. In this approach image is divided into overlapping blocks and DCT transform is applied to that blocks feature is extracted by circle block and correct blocks are matched and thus we get output. As we know DCT only focuses in low frequency coefficients so the square block is divided into circle blocks which decreases the computational complexity. It also used very less features to represent block.

Gavin Lynch et.al [9] created a new algorithm where blocks are compared against each other in order to see which blocks are matching. Features are extracted ignoring the subtle noise. Further there are few limitations so to overcome that this algorithm is enhanced. Instead of using average gray value of the block as dominant feature, variance is used as the feature since it is not affected by constants. The advantage of the expanding block algorithm is that it can handle block comparison methods that require two blocks to be directly compared with each other and direct block comparison can be done without a large sacrifice in performance time.
Different feature extraction methods are used to improve the capability of the algorithm so in this paper 2D-FT is used to extract features from the blocks. Seniha Ketenci et.al [10] here introduced the method that uses 2D-FT to extract features from the overlapping blocks. Predefined number of FT coefficients are used to constitute feature vectors. In this approach firstly the image is made smooth by applying square kernel mean filter to make low frequency components more effective. Then the image is divided into overlapping blocks, search the similarity by comparison and thus lastly create the visual result of the output. This method detected multiple copy move forgeries and is also robust to JPEG compression attacks even at lower quality. Also reducing the dimension of feature vectors improves the computational efficiency of the approach.

The proposed method by Sondos M.Fadl et.al [11] accelerated block matching strategy, accelerated copy move forgery detection using automatic blocks clustering. This method is also accurate when the image is affected with Gaussian blur, JPEG compression and rotation angle less than 5 deg. Firstly the image is divided into overlapping blocks, then feature is extracted using DCT. For each class the feature vectors are lexicographically sorted and the correlation between each nearby pairs of blocks are computed. If the correlation is greater than some threshold, then two blocks are considered to be similar. The experiment results show that the proposed method has the ability to detect copy move forgery in an image faster. After analysing the detection method based on DCT, 2DFT, PCA, expanding block algorithm, Keskar, A.G et.al [12] introduced a method based on Discrete wavelet transform(DWT). Here DWT is used to reduce the dimensions and the primary advantage is that we are using SIFT for the robustness. The method can detect copy move forgery easily. DWT is applied on the image (up to level 1). The image gets divided in to 4 sub bands- LL, HH, LH and HL. SIFT is applied to LL bands only. Occurrence of same features at different locations in the image is searched. Image blocks that return similar SIFT features from all four images are marked as forged regions.

Nandini singhal et.al [13] generated an algorithm based on DWT. In the given algorithm DWT is applied in input image to obtain LL1 subband, further the subband is divided into subimages. After calculating the phase corelations ,copy move region is detected by pixel matching. Atlast mathematical morphological operations are applied to detect the result. From the results we came to know that the algorithm works efficiently even under noise.

Ghorbani et al. [14] proposed DWT-DCT (QCD)-based copy-move image forgery detection. Authors used DWT and resolved the image into sub-bands and then performed DCT-QCD (quantization coefficient decomposition) in row vectors to reduce vector length. After row vectors are lexicographically sorted, shift vector is computed. Finally, the shift vector is compared with threshold and the forged region is highlighted.

III. CONCLUSION

This paper deliberates various approaches to detect copy move forgery of different images successfully. All the methods and approaches examined in this paper successfully detects the copied and forged regions. But there are limitations in few methods. Few algorithms detect area besides actual forged regions and on other hand, some have very high time complexity. So there is need to develop forgery detection algorithm overcoming this limitations.

REFERENCES


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