Detecting Forgery in Duplicated Region Using Superpixel Segmentation and Feature Point Matching

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Abstract- The region duplication image forgery detection is the one of the major problems in the field of digital image forensics In this paper describes a roboust forgery detection scheme using adaptive oversegmentation and feature point matching It include both block based and keypoint based forgery detection methods. In proposed method, an adaptive oversegmentation method is to segment the host image into non overlapping and irregular blocks called Image Blocks(IB),Then apply Scale Invariant Feature Transform(SIFT) in each block to extract the SIFT feature as block feature(BF) .Then ,the block features are matched with one another to determine labeled feature points(LFP).The indicate the suspected forgery region .Using this approach ,for each image we can determine appropriate block initial size to enhance the accuracy of forgery detection ,and also reduce computational expenses .The proposed forgery region extraction algorithm replace the feature points with small superpixels as feature block and the neighboring feature blocks with local color features that are similar to feature blocks are merged to generate the merged region .The morphological operation are applied to the merged regions to generate the detected forgery region .The proposed copy-move forgery detection scheme can achieve better results compared to existing copy-move forgery detection methods.

Index Terms- Scale Invariant Feature Trasform(SIFT),Adaptive Oversegmentation,Block feature Extraction,Block feature matching

I. INTRODUCTION

Digital images are easy to manipulate and edit due to availability of powerful image processing editing software. Nowadays ,it is possible to add or remove important features from image without leaving any obvious traces of tampering . As digital camera and video camera replace their analog counter parts, the need for authenticating digital images, validating their content and detecting forgeries will only increase . Detection of malicious manipulation with digital images (digital forgeries)is the topic of this paper . We focus on detection of a special type of digital forgery, the copy move attack . In which a part of the image is copied and pasted somewhere, else in the image with the intent to convert an important image feature. A copy-move forgery introduces a correlation among the original image area and the pasted content. It is often necessary to perform post-processing of snippet of the images before pasting to create a convincing forgery. Good forgery detection method be roboust to post –processing operation, such as scaling , rotations, JPEG compression and Gaussian noise addition. There are considerable numbers of algorithms available focusing on different post-processing on snippet. Digital image detection techniques, are classified into two principle approaches. They are active approach the digital image requires. Some pre-processing such as water mask embedding or signature generation at the time of creating the image, Which would limit their application in practice. Moreover, there are millions of digital images in internet without digital signature or watermark .According to the existing methods, the copy move forgery detection methods are categorized into two main categories: block based algorithms and feature keypoint based algorithms.

Most of the existing block based forgery detection algorithms use a similar framework, and the only difference is they apply different feature extraction methods to extract the block features .Although these algorithms are effective in forgery detection, have three drawbacks:1) the host image is divide into overlapping rectangular blocks ,they could be computationally expensive as the size of image increases 2) These methods cannot address significant geometrical transformation of the forgery regions 3) their recall rate is low because their blocking method is regular shape. The existing keypoint based forgery the existing keypoint-based forgery detection methods can avoid the first two problems, they can reduce the computational complexity and can successfully detect the forgery, even when some attacks exit in the host images, the recall result of the exiting keypoint-based forgery methods were very poor

To address the above-mentioned problems, in this paper, we propose a noval copy-move forgery detection scheme using adaptive over-segmentation and feature point matching. The proposed scheme integrates both the traditional block-based forgery detection methods and keypoint-based forgery detection methods keypoint-based forgery methods. Similar to block –based forgery detection methods, we propose an image-blocking method called the adaptive over-segmentation algorithm to divide the host image into non-overlapping and irregular blocks adaptively. Then, similar to the keypoint-based forgery detection methods, the feature point are extracted from each image block as block features instead of being extracted from the whole host image as in the traditional keypoint-base methods. Subsequently, the block features are matched with one another to locate the labeled feature point, which can approximately indicate the suspected forgery regions. To detect more accurate forgery region, we proposed the forgery region extraction algorithm, which replace the feature points with small superpixels as feature block and, then, merges the neighboring blocks with similar local color features into feature blocks, to generate the merged regions . finally, it applies a morphological operation into the merged regions to generate the detected forgery regions.

The paper can be organized in 4 sections. First section describes related works, second section describes proposed system, and third section describes solution methodology, fourth section describes the discussion of the paper and the last section deals with conclusion about the paper.

II. RELATED WORK

Here we are discussing some Image Forgery detection and removal methods.

1.Detecting Forgery In Duplicated Region Using Key Point Matching.

This paper include a common form of manipulation in tampering with digital images that is called region duplication.Where a continuous portion of pixel is copied and pasted to different location in the same image .The duplication region are created with geometrical adjustments,several methods have been proposed for the detection of region of copy-move,where a region of pixels is pasted without any change to another location in the image.Our method is based on local image SIFT features,which makes it applicable to the detection of general region duplication with region scaling and rotation.Experimental results demonstrate that method is effective and robust in the presence of additive noise and different JPEG qualities.In our proposed method detect the distorted duplicated region including modulus are 1) finding image keypoints 2) keypoint matching 3)elimination mismatched keypoints 4) estimation of affine transform 5) identifying duplicated region,

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2. An Evolution Of Popular Copy-Move Forgery Detection Approaches.

Copy move forgery is the process of copying and pasting content with the same image .we propose the 15 most prominent feature set, Through over analysis ,we created a evaluation frame work consisting of a) 48 realistically sized base image containing b) 87 copied snippets and c) a software to replay realistically looking copy move forgeries in a controlled environment and we create a realistic database of forgeries included by a software that generates copy move forgeries of varying complexity.

3 Forgery Detection In digital Image Using Block Method.

This paper describing a existing forgery detection method is called block method .Using powerful image editing software we can easily modify the digital image .In this paper we are focusing on detection of special type copy move forgery ,the original image is copied moved to desired location in the same image and pasted .In proposed method compress image using DWT and divide into blocks and choose block then perform feature vector calculation and lexicographical sorting and identifying duplicated blocks after sorting .This method is good at some manipulation attack scaling ,rotation Guassian smoothing noise ,JPEG compression .In our proposed method first take the input image and check image is in RGB or gray scale and perform block creation, feature extraction, exact match, shift vector calculation and detection results.

4. SLIC Superpixels compared to state-of-Art Superpixels Methods

This paper include a deep depth performance analysis of modern superpixels technique. It also include performance comparison of five state of art algorithm and focus on boundary adherence ,segmentation speed and performance. It include a graph based segmentation technique it includes a graph cut. it is the one of the existing technique it include some drawbacks .It limited in increasing image size and more expensive for adding more node .This paper propose a new technique from the adaptation of K-means clustering called simple linear iterative clustering(SLIC).It reduce no of distance calculation to limited search space to region that proportional to super pixel size .It also reduce complexity to linear in the number of pixel N rather than no o pixel K .It also uses weighted distance measure that combines color and spectral proximity .It reduce computation overhead , superpixe l should be fast to compute, simple to use,and improve quality of the result.

5.Digital Image Foegeries and Passive Image Authentication Techniques: A Survey.

In this paper describing survey of active and passive authentication technique .digital image forensics is the latest research field which intends to authorize the genuineness of images. This paper include survey attempts to provide an overview of various digital image forgeries and include passive methods to authenticate digital image. In this paper the image authentication methods are classified into two. Active authentication and passive authentication the classification based on whether the original image is available or not .Active authentication are broadly classified two. Digital signatures and digital water masking. The passive authentication are broadly divided to forgery dependent and independent method. Dependent method include copy move and image splicing and forgery type independent include retouching detection and lighling condition.

III. PROPOSED SYSTEM

Here we are proposing a method which combines both Forgery detection and removal method.1) Forgery detection 2) Forgery removal.

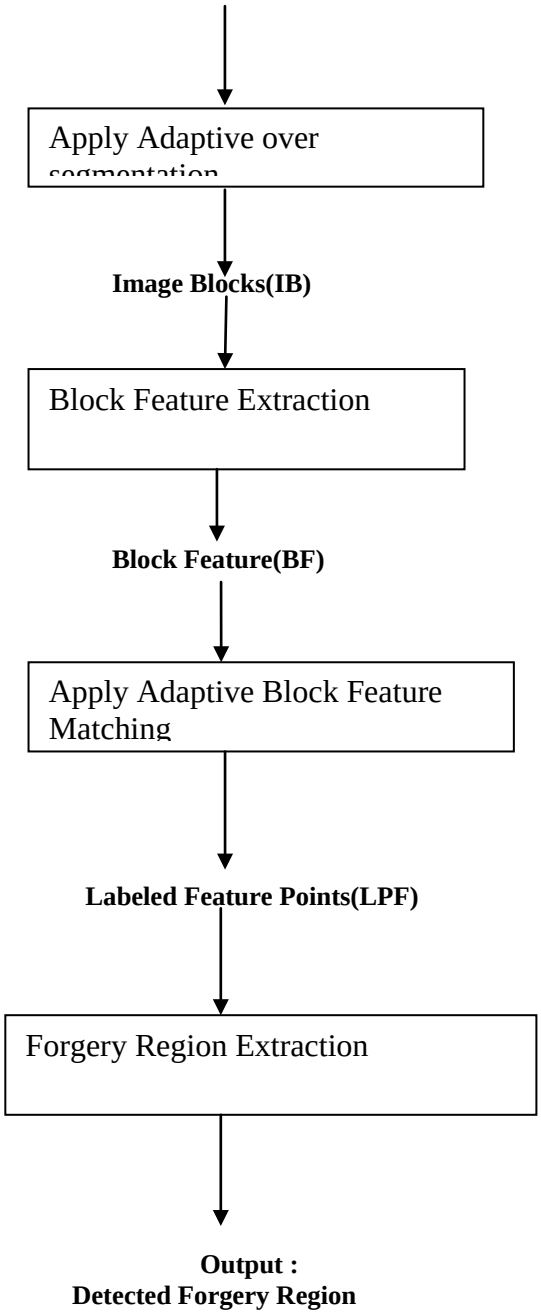
In Forgery Detection phase:- Adaptive oversegmentation method can divide the host image into blocks with adaptive initial size according to the given images.Based on block feature matching algorithm.First the number of matched feature points is calculated and correlation coefficient map is generated,then the corresponding block matching threshold is calculated adaptively ,according to their result the matched block pairs are located, the matched feature points in the matched block pairs are extracted and labeled to locate the position of the suspected forgery region.

In Forgery Removal phase:- In forgery region extraction algorithm that extract the labeled feature points which are only the locations of the forgery regions, we must still locate the forgery regions. Considering that the superpixels can segment the host image very well, we proposed a method by replacing the LFP with small superpixels to obtain the suspected regions (SR), which are combination of labeled small superpixels. Furthermore, to improve the precision and recall results, we

measure the local color feature of the superpixels that are neighbors to the suspected region (SR), if their color feature is similar to that of the suspected region, then we merge the neighbor superpixels into the corresponding suspected regions, which generate the merge region (MR) . Finally, a close morphological operation is applied to the merged regions to generate the detected copy-move forgery regions.

Input

Host image



IV. SOLUTION METHODOLOGY

Algorithm

1.Input Image.
2. Superpixels Segmentation.
3 .Feature Extraction.
4. Divide Into Small Blocks.
5.Load the block features BF = {BF1,BF2,…BFN}.
6. Calculate the Correlation Coefficient CC of image blocks.
7. Calculating the Block Matching Threshold TRB.
8. Locate the Matched Blocks MB according to TRB.
9. Label the Matched feature point in the matched blocks MB indicate the suspected forgery region.
10. Load the Labeled Feature points apply SLIC .
11. Measure the local color feature of the superpixels.
12.Apply the Morphological close operation into MR to finally generates the detected forgery result.
13. Plot the Output.
14. Stop.

First, ,an adaptive oversegmentation method is proposed to segment the host image into non overlapping and irregular blocks are called Image Blocks(IB) .Then apply Scale Invariant Feature Transform(SIFT) in each block to extract the SIFT feature points as Block Features(BF). Subsequently ,the block features are matched to one another are determined by labeled feature points(LFP),which approximately indicate the forgery regions .We propose the forgery region extraction algorithm to detect the forgery region from host image according to their extracted LPF.

V. DISCUSSION

The proposed system can achieve better detection results for copy –move forgery images under some challenging conditions such as JPEG compression ,geometric transforms and down sampling compared to existing forgery detection scheme. Although over proposed method can work well against any rotation angle because our block features are extracted by SIFT algorithm ,which is more robustness to scale and rotation invariance .We are also conducting the experiments for copy move forgery regions with large rotation angles .Further works are focus on applying the proposed forgery detection scheme based on adaptive over segmentation and feature point matching on other types of media for example, video and audio.

VI. CONCLUSION

In this paper, we have presented a novel method for copy move forgery detection scheme using adaptive over segmentation and feature point matching .In adaptive over segmentation algorithm is to segment the host image into non overlapping and irregular blocks according to their host image .The proposed scheme integrate both traditional block based forgery detection methods and keypoint based forgery detection methods .T he feature points are extracted from each image block as block features instead of being extracted from whole host image as in traditional keypoint-base methods .The block features are matched to one another to locate the labeled feature points which indicate the suspected forgery regions .To accurately detect forgery regions ,we propose a forgery region extraction

algorithm in which the labeled feature points are replaced with small superpixels as feature blocks and the neighboring feature blocks with local color features that are similar to the feature blocks are merged to generate the merged regions and morphological operations is applied is applied to merged regions to generate the detected forgery regions.

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