Image Forgery Detection Using Adaptive Over-Segmentation and Feature Point Matching

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Abstract- *A novel copy-move forgery detection scheme using adaptive over-segmentation and feature point matching is proposed in this paper. The proposed scheme integrates both block-based and key point-based forgery detection methods. First, the proposed Adaptive Over-Segmentation algorithm segments the host image into non-overlapping and irregular blocks adaptively. Then, the feature points are extracted from each block as block features, and the block features are matched with one another to locate the labeled feature points; this procedure can approximately indicate the suspected forgery regions. To detect the forgery regions more accurately, we propose the Forgery Region Extraction algorithm, which replaces the feature points with small superpixels as feature blocks and then merges the neighboring blocks that have similar local color features into the feature blocks to generate the merged regions; finally, it applies the morphological operation to the merged regions to generate the detected forgery regions.*

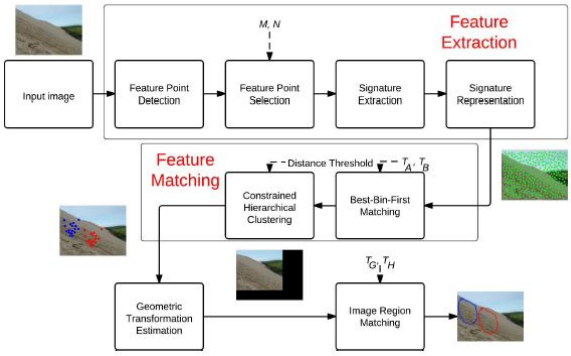
I. INTRODUCTION

With the development of computer technology and image processing software, digital image forgery has been increasingly easy to perform. However, digital images are a popular source of information, and the reliability of digital images is thus becoming an important issue. In recent years, more and more researchers have begun to focus on the problem of digital image tampering. Of the existing types of image tampering, a common manipulation of a digital image is copy-move forgery ridch is to paste one or several copied region(s) of an image into other part(s) of the same image. During the copy and move operations, some image processing methods such as rotation, scaling, blurring, compression, and noise addition are occasionally applied to make convincing forgeries. Because the copy and move parts are copied from the same image, the noise component, color character and other important properties are compatible with the remainder of the image; some of the forgery detection methods that are based on the related image properties are not applicable in this case. In previous years, many forgery detection methods have been proposed for copy-move forgery detection. According to the existing methods, the copy-move forgery detection methods can be categorized into two main categories: block-based algorithms and feature keypoint-based algorithms.

II. RELATED WORK

The existing block-based forgery detection methods divide the input images into overlapping and regular image blocks; then, the tampered region can be obtained by matching blocks of image pixels or transform coefficients. Fridrich et al. proposed a forgery detection method in which the input image was divided into over-lapping rectangular blocks, from which the quantized Discrete Cosine Transform (DCT) coefficients of the blocks were matched to find the tampered regions. Popescu and Farid applied Principal Component Analysis (PCA) to reduce the feature dimensions. Luo et al. used the RGB color components and direction information as block features. Li et al.used Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD) to extract the image features. Mahdian and Saic calculated the 24 Blur-invariant moments as features. Kang and Wei calculated the singular values of a reduced-rank approximation in each block. Bayram et al. used the Fourier-Mellin Transform (FMT) to obtain features. Wang et al. used the mean intensities of circles with different radii around the block center to represent the block features. Lin et al. used the gray average results of each block and its sub-blocks as the block features. Ryu et al. used Zernike moments as block features. Bravo-Solorio and Nandi used information entropy as block features. As an alternative to the block-based methods, keypoint-based forgery detection methods were proposed, where image keypoints are extracted and matched over the whole image to resist some image transformations while identifying duplicated regions. In, the Scale-Invariant Feature Transform (SIFT) was applied to the host images to extract feature points, which were then matched to one another. When the value of the shift vector

III. SYSTEM ARCHITECTURE



IV. MODULES

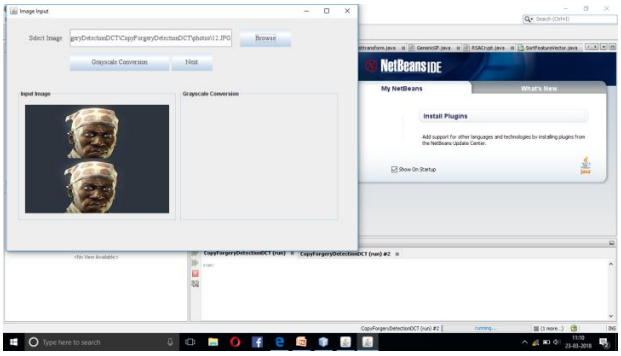
1. Feature Extraction

Feature Point Detection:

- image is represented in scale-space by repeatedly smoothing with a Gaussian filter of increasing size.
- The scale space is extracted by levels.
- It provides more accurate gradient angle estimates.

Feature Point Selection

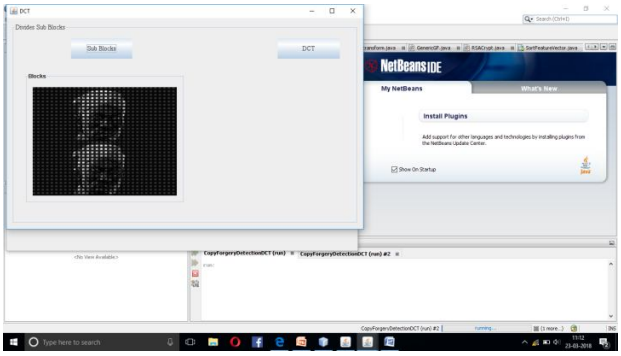
- The maximum response points are clustering and selected for signature extraction.



2. SIGNATURE EXTRACTION

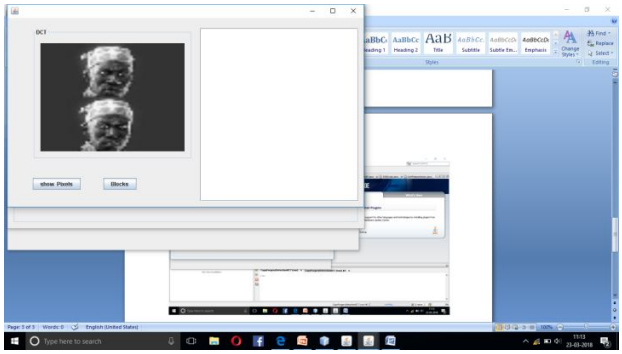
These obtained using the features from image signature tools.

- These features display good accuracy and extremely low false positives.
- -Various identifiers are used extracted from each transformed region.



3. FEATURE MATCHING

- This threshold is set sufficiently high to remove only the unlikeliest matching feature pairs, without eliminating any true matches.
- The feature matching module describes the Euclidean distance between the components of each pair of features is calculated,



4. Matching in the image

- To observe that matching features are likely to cluster in regions of the image if they originate from actually copied regions within the image.
- This indicates that clustering the features in the image space offers a natural way to reject false positives in matching features.

V. CONCLUSION

Digital forgery images created with copy-move operations are challenging to detect. In this paper, we have proposed a novel copy-move forgery detection scheme using adaptive over-segmentation and feature-point matching. The Adaptive Over-Segmentation algorithm is proposed to segment the host image into non-overlapping and irregular blocks adaptively according to the given host images; using this approach, for each image, we can determine an appropriate block initial size to enhance the accuracy of the forgery detection results and, at the same time, reduce the

computational expenses. Then, in each block, the feature points are extracted as block features, and the Block Feature Matching algorithm is proposed, with which the block features are matched with one another to locate the labeled feature points; this procedure can approximately indicate the suspected forgery regions. Subsequently, to detect the more accurate forgery regions, we propose the 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. Next, the morphological operation is applied to the merged regions to generate the detected forgery regions. We demonstrate the effectiveness of the proposed scheme with a large number of experiments. Experimental results show that the proposed scheme can achieve much better detection results for copy-move forgery images under various challenging conditions, such as geometric transforms, JPEG compression, and down-sampling, compared with the existing state-of-the-art copy-move forgery detection schemes. Future work could focus on applying the proposed forgery detection scheme based on adaptive over-segmentation and feature-point matching on other types of forgery, such as splicing or other types of media, for example, video and audio.

REFERENCES

[1] P.Kakar and N. Sudha, "Exposing Postprocessed Copy–Paste Forgeries Through Transform-Invariant Features," Information Forensics and Security, IEEE Transactions on, vol. 7, pp. 1018-1028, 2012

[2] S. J. Ryu, M. Kirchner, M. J. Lee, and H. K. Lee, "Rotation Invariant Localization of Duplicated Image Regions Based on Zernike Moments," Ieee Transactions on Information Forensics and Security, vol. 8, pp. 1355-1370, Aug 2013. Feature Matching," Ieee Transactions on Information Forensics and Security, vol. 5, pp. 857-867, Dec 2010.

[3] I. Amerini, L. Ballan, R. Caldelli, A. Del Bimbo, and G. Serra, "A sift-based forensic method for copy–move attack detection and transformation recovery," Information Forensics and Security, IEEE Transactions on, vol. 6, pp. 1099-1110, 2011.

[4] X. Bo, W. Junwen, L. Guangjie, and D. Yuewei, "Image copy-move forgery detection based on SURF," in Multimedia Information Networking and Security (MINES), 2010 International Conference on, 2010, pp. 889-892.

[5] P. Kakar and N. Sudha, "Exposing Postprocessed Copy–Paste Forgeries Through Transform-Invariant Features," Information Forensics and Security, IEEE Transactions on, vol. 7, pp. 1018-1028, 2012.

[6] B. Shivakumar and L. D. S. S. Baboo, "Detection of region duplication forgery in digital images using SURF," IJCSI International Journal of Computer Science Issues, vol. 8, 2011.

[7] D. G. Lowe, "Object recognition from local scale-invariant features," in Computer vision, 1999. The proceedings of the seventh IEEE international conference on, 1999, pp. 1150-1157.

[8] H. Bay, T. Tuytelaars, and L. Van Gool, "Surf: Speeded up robust features," in Computer Vision–ECCV 2006, ed: Springer, 2006, pp. 404-417.

[9] V. Christlein, C. Riess, J. Jordan, C. Riess, and E. Angelopoulou, "An Evaluation of Popular Copy-Move Forgery Detection Approaches," Ieee Transactions on Information Forensics and Security, vol. 7, pp. 1841-1854, Dec 2012