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Image Tampering and Morphing Detection with Exact Block Extraction

[1] S. Prasanth, [2] J. Jeyachidra

[1] II MCA Student, Department of Computer Science and Applications, prasanthsomu2000@gmail.com

[2] Dean Faculty of Computer Science and Engineering, Dept of Computer Science and Applications, Periyar Maniammai Institute of Science and Technology, Vallam, Thanjavur, Tamil Nadu, India. deanscse@pmu.edu

ABSTRACT –

The initial step in the duplicated area identification technique for assessing copy-paste picture fraud is image block matching. The setting where the shot was taken is closely examined. One of the main issues with this phase is the extensive calculation needed. We also use the temporal complexity function to assess how well the suggested technique performs. The results of the investigations and mathematical study show that two-layer matching can be faster than previous conventional tactics like lexicographic sorting. The suggested approach finds details in blurred photos, eliminates contaminated noise, and detects compression. The use of editing software or morphing is the simplest approach to identifying image fraud. The technique has been proven to be more effective in several tests.

Keywords: Blurred Photos, Copy-Paste Forgery, Morphing, Detects Compression, Block Matching

INTRODUCTION

Digital images are easy to tweak and edit because good picture processing and editing software is accessible. Modification of images can be done without leaving visible traces. As digital cameras and video cameras replace analogue ones, the need for authenticating digital photographs, verifying their metadata, and identifying forgeries will only increase. The detection of harmful alterations to digital photos (digital forgeries) is covered in this article. This essay examines the problem of spotting copy-move fraud and proposes a reliable and efficient method of detection, even if the copied piece is enhanced or modified.

LITERATURE SURVEY

1. The paper published in 2019 - A survey on image tampering and its detection in real-world photos - Zheng, Lilei and Zhang, Ying and Thing, Vrizlynn LL.

This review provides an overview of picture tampering, publicly available image tampering datasets, and cutting-edge tampering detection techniques to explore tampering hypotheses that underlie various detection methods.

2. The paper published in 2019 - Image Forgery Identification using Convolution Neural Network, International Journal of Recent Technology and Engineering, N. Hema Rajini

FMZM Transform to detect copy-move regions with high accuracy. Performance metrics are measured and the method achieved 97.56%, 99.98%, and 97.12% accuracy.

3. This paper published in 2019 - Yuan Wang , Lihua Tian , Chen Li, LBP-SVD Based Copy Move Forgery Detection Algorithm, IEEE International Symposium on Multimedia.Hybrid local features extraction enhances block-based copy-move forgery detection.

4. This paper published in 2020 - Single image face morphing attack detection using ensemble of features - Venkatesh, Sushma and Ramachandra, Raghavendra and Raja, Kiran and Busch, Christoph.

Scale-space representation used to identify face-morphing assaults. Experiments are conducted on two different datasets and compared with existing MAD mechanisms.

5. This paper published in 2022 - Copy-move Forgery Detection using SIFT and DWT detection Techniques - Singh, Richa and Verma, Sandeep and Yadav, Suman Avdhesh and Singh, S Vikram.

Copy-Move forgery practices are becoming more common due to the availability of effective image processing tools. This paper proposes techniques to detect cloning or copy-move forgery using block based extraction and feature point extraction. The proposed algorithm achieves an efficiency of 98.12%, precision factor of 97%, and recall factor of 100%.

EXISTING SYSTEM

Hierarchical feature point matching is a fast and effective copy-move forgery detection algorithm with superior performance.

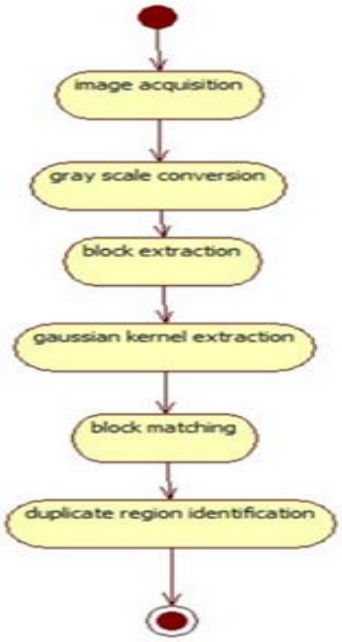
PROPOSED SYSTEM

Finding evidence of forgeries in digital photos is an intriguing topic in digital image forensics. The system's primary goal is to create an image forgery identification system employing multiple key point extraction and copy and move forgery detection. The region where the forged picture was created will be examined using the suggested Gaussian RBF kernel PCA.

A. SYSTEM DEVELOPMENT ENVIRONMENT

Java is an object-oriented programming language with strong typed exception-handling for writing distributed and dynamically extensible programs.

- It is simple and object oriented.
- Programmers can create user-friendly interfaces by using XML.
- It is very dynamic.
- Platform independent language.
- Provides support for internet programming.



B. SYSTEM IMPLEMENTATION

- Image Acquisition.
- Gray scale Conversion.
- Block extraction SVD.
- Gaussian Kernel PCA.
- Block Matching.
- Duplicate Region Detection.

Image Acquisition

Modern colorization techniques can deceive human observers in subjective testing, and digital imaging is the process of creating a digitally encoded representation of an object's visual qualities. 15 000 real and false photos' hue and saturation histograms, normalized.

Gray Scale Conversion

Greyscale conversion reduces complexity by turning colour photos and films into black and white with 0-255 pixels. Recent research used the H-K (Helmoltz-Kohlrausch) phenomenon, linear RGB by inverse gamma mapping, CIELUV colour space, reference white chromatic values, gamma mapping, and local contrast enhancement to transform the picture and video into something perceptually accurate.

- ***Block Extraction SVD***

SVD is a powerful numerical analysis tool for matrices computation, transforming a set of correlated variables into a set of uncorrelated variables, providing an interpretation of relationships among the original data items. F=UVT is used to execute SVD on the original picture, adding a single watermark to the SVs of each block. A technique to segment the original picture is suggested to eliminate this drawback.

- ***Gaussian Kernel***

Gaussian kernel converts dot product into Gaussian function, coefficients matrix C(p, q) holds SVD coefficients, feature extraction decreases dimensionality with minimal information loss, Euclidean distances represented by similarity vector D = d1, d2, and dn1 determined for 2NN test**.**

- ***Block Matching***

The size of each block Bi is fixed and the coefficients matrix C is changed using Gaussian RBF kernel PCA. Diagonal representation extraction identifies feature vector with block representation, principal components are compared with 10 key points, and correlation coefficient is less than 50%.

- ***Duplicate Region Detection***

The system detects duplicated regions when the similarity index between regions is lower than the overlapping value, using gaussian feature extraction and SVD block overlapping.

CONCLUSION

The proposed Block-by-Block SVD-Based method provides fidelity and robustness against Gaussian noise, cropping and JPEG compression. It uses two layers of block matching with low and high accurate features to improve the time complexity.

FUTURE ENHANCEMENT

Expand research into multilayer block matching and watermarking.

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