General Article

Survey on Detection of Non Aligned Double JPEG Compression and Localization of Image Forgeries

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Abstract

This paper performs review on the image forensic method to detect the presence of non-aligned double JPEG compression (NA-JPEG) in the compressed images and discriminate between original and forged regions in jpeg images; the tampered image presents the non-aligned double jpeg compression.

Keywords: *Digital Image forensics, JPEG artifacts, nonaligned double JPEG compression, threshold detector, tampered image.*

1. Introduction

Digital images play very important role in today's technical world. Images act as photographic evidence. Due the speedy advancement in image editing software's make extremely simple to alter the content of digital images. Authenticating a given digital image content has become more difficult because of the possible diverse origins and the alterations that could have been operated on images. When the digital content of an images is used to support legal evidences its important details could be maliciously hidden or erased or duplicated or tampered from the recorded scene, and the true original source can be concealed. A common and easy manipulation is to remove objects from an image or simply remove undesired event from an image. When done carefully, such a digital tampering is difficult to detect. The image forensic is a new research area developed assessing the credibility of an images using different forensic techniques. There are many forensic techniques are available for revealing the presence of forgeries in digital images through geometrical and statistical features ,jpeg quantization artifacts and camera based artifacts.

This paper gives a survey on the Digital image forensic techniques which are based on the jpeg compression artifacts and to localize the forgery in an image. The rest of this paper organized as follows. Section 2 gives overview of previous work in the image forensic. Section 3 gives a forensic scenario. Section 4 gives conclusion.

2. Related work

H. Farid categorized image forensic tools as pixel based, format based, camera based, physically based and geometric based techniques.

H.Farid roposes to detect forgery in areas which have undergone a double jpeg compression by recompressing the image at different quality levels.

Z.Lin proposes to detect Double JPEG compression by analyzing the statistics of DCT coefficients. This approach work in case of aligned jpeg compression.

B. Li, Y. Shi, and J. Huang propose to detect the double jpeg compression using the statistical distribution of first digit in quantized DCT coefficients.

W. Luo, Z. Qu, J. Huang, and G. Qui targets on the non aligned double jpeg compression. It uses the blocking artifacts introduced by the jpeg compression.

Y.-L. Chen and C.-T. Hsu works on the blocking artifacts in pixel domain but in this periodic property is measured. It also work on the NA double jpeg compression.

Z. Qu, W. Luo, and J. Huang, the statistics of DCT coefficients is represented as noisy convolutive mixing model and it uses independency between the DCT coefficients. It works on the NA-JPEG compressed images

The previous work (H. Farid *et al* etc.) is based on the aligned gird shift of jpeg compressed images. It does not detect the forgery in the non-aligned jpeg compression.

W. Luo et etc. work is based on the non-aligned double jpeg compression. Bianchi et a worked on the NA double jpeg compression based on the integer periodicity maps and also computed the grid shift and quantization steps ,gives more detail analysis of forged images which is not focuses on the previous approaches.

3. Forensic scenario

The NA-JPEG double compression occurs is image splicing. In this forgery, region from a JPEG image is

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pasted onto a host image and that the resulting image is JPEG recompressed, does not have jpeg statistics. There is an random placement of the forged region, the forged region will exhibit NA-JPEG compression artifacts and non modified area does not have compression artifacts. Such case called as double compression forgery hypothesis. An another scenario for NA-JPEG compression in which an original JPEG image is locally modified using an image processing tools which disrupts JPEG compression statistics, then randomly cropped and recompressed in JPEG format. For Example tampering in which destroys JPEG statistics could be a cut and paste from either a non compressed image or a resized image, or the insertion of content. The DCT coefficients of unmodified area have double quantization artifacts and it is double jpeg compressed. The modified that is forged area have no double quantization artifacts. Such case called as single compression forgery hypothesis.

Conclusion

There are various techniques are available to detect the forgery in an images. This paper gives an overview on the techniques which are focuses on NA Double JPEG compression with localization of forgery.

References

H. Farid, 2009, *A survey of image forgery detection*, IEEE Signal Processing Mag., vol. 2, no. 26, pp. 16–25.

H. Farid, Mar 2009, *Exposing digital forgeries from JPEG ghosts*, IEEE Trans. Inf. Forensics Security, vol. 4, no. 1, pp. 154–160.

Z. Lin, J. He, X. Tang, and C.-K. Tang, Nov. 2009 *Fast, automatic and fine-grained tampered JPEG image detection via DCT coefficient analysis*, Pattern Recognition, vol. 42, no. 11, pp. 2492–2501.

B. Li, Y. Shi, and J. Huang, oct. 2008 *Detecting doubly compressed JPEG images by using mode based first digit features*, in Proc. of IEEE 10th Workshop on Multimedia Signal Processing, , pp. 730–735.

W. Luo, Z. Qu, J. Huang, and G. Qui, 2007 *A novel method for detecting cropped and recompressed image block*, in Proc. of ICASSP 2007, vol. 2, pp. II–217–II–220.

Y.-L. Chen and C.-T. Hsu, Oct. 2008, *Image tampering detection by blocking periodicity analysis in JPEG compressed images*, in Proc. of IEEE 10th Workshop on Multimedia Signal Processing, pp. 803–808.

Z. Qu, W. Luo, and J. Huang, 2008, *A convolutive mixing model for shifted double JPEG compression with application to passive image authentication*, in Proc. of ICASSP 2008, pp. 1661–1664.

T. Bianchi, A. Piva, Nov-Dec 2011, *Analysis of Non Aligned Double Jpeg artifacts for the localization of image forgeries* in *Proc. of WIFS 2011*, pp. 978-1-4577-1019-3/11

T. Bianchi, A. Piva, April 2012 *Detection of Non Aligned Double Jpeg Compression Based on Integer Periodicity Maps* IEEE Transaction on Information Forensics and Security.