DETECTION METHOD OF COMPRESSED JPEG BLOCK EDGE TO IMPROVE SPLICING MANIPULATION ACCURACY ANALYSIS IN THE IMAGE OF JPEG EXTENSION

Muhammad Masjun Efendi
Department of Informatics Engineering
STMIK-ASM Mataram
NTB,Indonesia
creativepio@gmail.com

Bambang Sugiantoro
Department of Informatics Engineering
Universitas Islam Negeri Sunan Kaljaga Yogyakarta
Yogyakarta,Indonesia
bambang.sugiantoro@uin-suka.ac.id

Hanif Amarudin
Department of informatics engineering
Universitas Islam Negeri Sunan Kalijaga
Yogyakarta,Indonesia
hanifamar17@gmail.com

Darmawan Alisaputra
Department of chemistry
Universitas Islam Negeri Sunan Kalijaga
Yogyakarta, Indonesia
alidarmawan982@gmail.com

Abstract*—Digital images are easier to manipulate. Before the image is published, the manipulation process is often done. One form of image manipulation is splicing. This manipulation is done by duplicating a particular part of one image or more and placing it in a particular part of the target image. The purpose of this splicing manipulation is to add objects in the image, for example putting an object on the target image as if the object was there. In this study image manipulation of this type was detected using compressed JPEG edge block detection method. This method is able to detect object images that are manipulated properly and accurately.

Keywords; digital image, edge detection, image manipulation, splicing

I. INTRODUCTION

Digital image are used as a communication medium for information delivery. The authenticity of an image has an important role in many fields, including forensic investigations, criminal investigations, surveillance systems, intelligence services, medical imaging and journalism (Charpe, 2015).

Image Forgery is an illegal counterfeiting action. Image falsification can also be defined as the process of manipulation of a digital image to hide or eliminate some important information in an image (Tiwari, Dubey, & Goyal, 2015). There are several types of image forgery, including cloning, rotating, scaling, retouching, copy-move, splicing and others, but the most common thing is splicing. splicing that is duplicating a certain part of one image or more and placing it in a certain part of the target image (Reshma, 2015).

In this study one method is used to detect splicing types image manipulation. In this type of image manipulation, an object in an image, copied to another place in a different image or duplicates a particular part of one image or more and places it in a particular part of the target image target (copy-move in a different image). In general, the purpose of this type of manipulation is to add objects in the image (Tembe & Thombre, 2017).

Several other studies have discussed the solving method of splicing type manipulation. In research conducted by (Das, Medhi, Karsh, & Laskar, 2016) to detect splicing type image manipulation Gaussian blur method is used. The inconsistency of Gaussian blur is used to test the authenticity of the image. Gaussian blur from the first image is evaluated and the standard deviation obtained is used to blur the image. The results can be used to detect forged areas that are very opaque, but the image with splicing in it is less accurately detected and this algorithm works well only with counterfeit Gaussian blur types.

There are many methods used to solve splicing type manipulation problems, but the detection accuracy of the method is still lacking. Therefore, in this study applied one method to solve the above problem by using compressed JPEG edge block detection method. The process of detecting compressed JPEG blocks edge is done by looking for inconsistent neighboring pixels from compressed JPEG based on the difference in pixel energy in the image block boundary. After that the image is divided in non-overlapping 8x8 block assuming that the image is stored in JPEG format so that the 8x8 block is a compressed JPEG block and then calculates the pixel energy difference in the block boundary for each block. By using this method, the expected results will be able to improve the accuracy of splicing manipulation detection.

II. PURPOSE

The purpose of this research are as follows:

1. Implement compressed JPEG block edge detection method for detection of splicing manipulation in JPEG extension images.

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2. Knowing the accuracy of this method in terms of image manipulation detection by splicing manipulation in JPEG extension images.

III. METHODOLOGHY

The application of edge detection method is done to find inconsistent neighboring pixels from compressed JPEG based on differences in pixel energy in the block. The following is the flow of splicing manipulation detection .

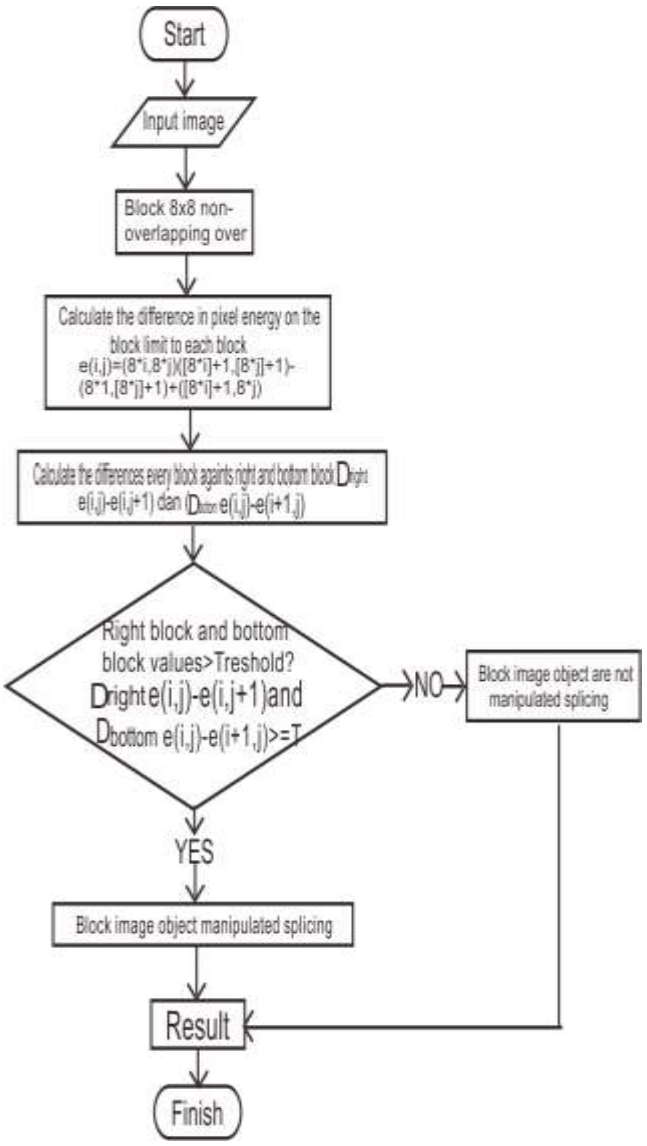

Figure 1. Flowchart flow of splicing manipulation detection

IV. RESULT AND DISCUSSION

In this test there are 14 images that are divided into non-overlapping blocks with a standard compress size JPEG which is a size of 8x8. Furthermore, for each block calculated the difference in block boundary pixel value e (i, j), from the value of e (i, j) for each block compared to the value of e (i, j) block on the right side (Dright) and with the block below (Dbottom) To determine the splicing area of Dright and Dbottom values compared to a threshold value determined by the threshold, if Dright and Dbottom are both greater than the threshold all blocks pixels (i, j) are converted to white and are thought to be splicing edges, block (i, j) the other is changed to black..

Experiments were conducted on 14 (fourteen) image files with the results of manipulation of 10 (ten) where 6 (six) image files resulting from personal manipulation, 4 (four) image manipulation files shared from the internet and 5 (five) shared manipulation image files from social media. The result of the experiment shows that the image that is not manipulated shows that there are no objects identified with marked white spots that do not form any object, it shows that the image was not manipulated. Where the white spots are pixels of the image. When the image or image is manipulated, the manipulated image objects will be identified with pixel spots on manipulated objects. These pixel spots follow the shape of a splicing object. The compressed JPEG edge block detection method applied shows accurate and good results. But for cases of manipulation taken from the internet and reported on social media this method cannot detect manipulated image objects. In general, it can be concluded that compressed JPEG block edge detection method is able to detect spliced image objects accurately and well. This method can only be used to detect images that have not been uploaded on the internet and have not been shared on social media.

Meanwhile testing using JPEGSnoop provides an assessment or information on an image file whether it has been manipulated or still original and also provides information on what device is used to take the image. Also seen is the retrieval date and modification date of the image. But when the image file is uploaded on the internet and shared on social media, JPEGsnoop cannot identify the EXIF from the image either when the image was made, with what device the image was taken and other information.

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TABLE I. ANALYSIS RESULTS OF ALL SAMPLE DATA USING JPEGSNOOP

No	Name	Source	Edited	Time	Original	Processor
1	ah_asli1	None	None	None	None	None
2	ah_asli2	None	None	None	None	None
3	ah_manipulasi_in	Google	None	None	None	Google
4	ah_manipulasi_pr	Adobe Photoshop	Edited	2018:01:16 19:23:12	-	Adobe Photoshop CC 2015
5	everest_asli1	Canon EOS 650D	-	2017:11:12 07:41:14	Originil	-
6	everest_asli2	None	None	None	None	None
7	everest_manipulasi_in	Google	None	None	None	Google
8	everest_manipulasi_pr	Adobe Photoshop	Edited	2018:01:13 09:50:47	None	Adobe Photoshop CC 2015
9	gita_asli1	Xiaomi	-	2017:05:23 12:01:16	Originil	-
10	gita_asli2	None	None	None	None	None
11	gita_manipulasi_pr	Adobe Photoshop	Edited	2018:01:13 11:56:50	-	Adobe Photoshop CC 2015
12	ha_asli1	None	None	None	None	None
13	ha_asli2	None	None	None	None	None
14	ha_manipulasi_pr	Adobe Photoshop	Edited	2018:01:13 15:52:01	-	Adobe Photoshop CC 2015
15	joget_asli1	None	None	None	None	None
16	joget_asli2	None	None	None	None	None
17	joget_manipulasi_pr	Adobe Photoshop	Edited	2018:01:13 21:10:40	-	Adobe Photoshop CC 2015
18	js_asli1	None	None	None	None	None
19	js_asli2	None	None	None	None	None
20	js_manipulasi_in	Google	None	None	None	Google
21	js_manipulasi_pr	Adobe Photoshop	Edited	2018:01:16 18:27:09	-	Adobe Photoshop CC 2015
22	sh_asli1	None	None	None	None	None
23	sh_asli2	None	None	None	None	None
24	sh_manipulasi_in	Google	None	None	None	Google
25	sh_manipulasi_pr	Adobe Photoshop	Edited	2018:01:16 20:41:53	-	Adobe Photoshop CC 2015
26	sh_manipulasi_bbm	None	None	None	None	None
27	sh_manipulasi_fb	None	None	None	None	None
28	sh_manipulasi_ig	None	None	None	None	None
29	sh_manipulasi_wa	None	None	None	None	None

CONCLUSION

After doing several things related to testing and analysis, the following conclusions are obtained:

1. Compressed JPEG block edge detection method, successfully implemented to detect splicing manipulation in JPEG extension images.
2. The test results in the form of splicing manipulation of the 6 (six) image files tested successfully detect objects that are manipulated accurately and well.
3. Compressed JPEG block edge detection method is able to detect spliced image objects accurately and well, but this method can only be used to detect images that have not been uploaded on the internet and have not been shared on social media.
4. The JPEGsnoop application can provide whether a JPEG image has been manipulated or original but cannot determine the area being manipulated. While the detection method for compressed JPEG block edge successfully detects object images that are manipulated accurately and well.

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REFERENCES

[1] Abhishek Kashyap, Rajesh Singh Parmar, B. Suresh, M. A. & H. G. (2016). Detection of Digital Image Forgery using Wavelet Decomposition and Outline Analysis, 187–190.

[2] Abhishek Kashyap, Rajesh Singh Parmar, B. Suresh, M. A. & H. G. (2016). Detection of Digital Image Forgery using Wavelet Decomposition and Outline Analysis, 187–190.

[3] Al-Azhar, M. N. (2012). DIGITAL FORENSIC Practical Guidelines for Computer Investigation.

[4] Asy'ari, A. F. (2015). DETEKSI TEPI CITRA KHAT ARAB MENGGUNAKAN.

[5] Binnar, M. P. (2015). Robust Technique of Localizing Blurred Image Splicing Based on Exposing Blur Type Inconsistency, 398–402.

[6] Calvinhass. (2017). JPEGsnoop. Retrieved from https://sourceforge.net/projects/jpegsnoop/

[7] Charpe, M. J. (2015). Revealing Image Forgery through Image Manipulation Detection, (Gcct), 723–727.

[8] Chyan, P., & Sumarta, S. C. (2013). Sistem temu balik citra berbasis isi citra menggunakan fitur warna dan jarak histogram, 31–38.

[9] Das, A., Medhi, A., Karsh, R. K., & Laskar, R. H. (2016). Image Splicing Detection using Gaussian or Defocus Blur, 1237–1241.

[10] Dong, J., Chen, L., Tian, J., & Xu, X. (2016). A novel image splicing detection method based on the inconsistency of image noise, 560–563.

[11] Fan, Y., Carré, P., Fernandez-maloigne, C., & Cnrs, U. M. R. (2015). IMAGE SPLICING DETECTION WITH LOCAL ILLUMINATION ESTIMATION, 2940–2944.

[12] Fauzi, M. H., Ir, P., Tjandrasa, H., Sc, M., Ph, D., Informatika, J. T., … Nopember, S. (2014). IMPLEMENTASI THRESHOLDING CITRA MENGGUNAKAN ALGORITMA HYBRID OPTIMAL ESTIMATION.

[13] Gusa, R. F. (2013). Pengolahan Citra Digital untuk Menghitung Luas Daerah Bekas Penambangan Timah Rika Favoria Gusa, (2), 27–34.

[14] Herdiyeni, Y. (2013). KOMPRESI CITRA, 1–13.

[15] Hoerr, K. (2015). Celebrity' fraudster Dimitri de Angelis appeals against sentence.

[16] Jang, J., Lee, S., Hwang, H., & Baek, K. (2013). } (1) = 3. *Global Thresholding Algorithm Based on Boundary Selection*, (Iccas), 704–706.

[17] Julliand, T., Nozick, V., & Talbot, H. (2015). Automated Image Splicing Detection from Noise Estimation in Raw Images.

[18] Khairani, M. (2014). IMPROVISASI BACKPROPAGATION MENGGUNAKAN PENERAPAN ADAPTIVE LEARNING RATE DAN.

[19] Kresnha, P. E., Susilowati, E., & Adharani, Y. (2016). Pendeteksian manipulasi citra berbasis copy-move forgery menggunakan euclidian distance dengan single value decomposition, 6–7.

[20] Kumaseh, M. R., Latumakulita, L., Nainggolan, N., & Citra, S. (2013). SEGMENTASI CITRA DIGITAL IKAN MENGGUNAKAN DIGITAL FISH IMAGE SEGMENTATION BY THRESHOLDING METHOD.

[21] Li, B., Ng, T., Li, X., & Tan, S. (2015). Revealing the Trace of High-Quality JPEG Compression Through Quantization Noise Analysis, *10*(3), 558–573.

[22] Liu, B., & Pun, C. (2017). Multi-object Splicing Forgery Detection Using Noise Level Difference, 533–534.

[23] Lusiana, V. (2014). Teknik Kompresi Citra Digital untuk Penyimpanan File menggunakan Format Data XML, *19*(2), 112–119.

[24] Mahardika, F., & , Kabul Agus Purwanto, D. I. S. S. (2017). IMPLEMENTASI METODE WATERFALL PADA PROSES DIGITALISASI.

[25] Nurullah, M. (2014). STUDI PEMBANDING DETEKSI TEPI (EDGE DETECTION) CITRA JPEG DENGAN OPERATOR SOBEL DAN OPERATOR CANNY MENGGUNAKAN SOFTWARE MATLAB.

[26] Patil, D. P. (2016). Detection of Digital Image Forgery using Transformation Domain, *5*(6), 599–602.

[27] Reshma, P. D. (2015). IMAGE FORGERY DETECTION USING SVM CLASSIFIER.

[28] Septia, P., & Matlab, D. (2015). MODUL MATLAB, (April).

[29] Singh, M. (2016). Various Image Compression Techniques : Lossy and Lossless, *142*(6), 23–26.

[30] Suryo Hartanto, Aris Sugiharto, dan S. N. E. (2013). OPTICAL CHARACTER RECOGNITION MENGGUNAKAN ALGORITMA TEMPLATE MATCHING CORRELATION, *5*, 1–12.

[31] Teguh, P., Putra, K., Kadek, N., & Wirdiani, A. (2014). Pengolahan Citra Digital Deteksi Tepi Untuk Membandingkan Metode Sobel, Robert dan Canny, *2*(2), 253–261.

[32] Tembe, A. U., & Thombre, S. S. (2017). Survey of Copy-Paste Forgery Detection in Digital Image Forensic, (Icimia), 248–252.

[33] Tiwari, N., Dubey, D., & Goyal, A. (2015). Reducing Forged Features Using Tampered and Inconsistent Image Detection Techniques In Digital Image Processing, 564–567. https://doi.org/10.1109/CSNT.2015.286

[34] XiaWu. (2015). Based on the characteristics of the JPEG image retrieval system research, 1–4. https://doi.org/10.1109/ICMTMA.2015.66

[35] Yogesh Kumar, Ashwani Kumar Dubey, A. J. (2017). No Title. *Thresholding, Pest Detection Using Adaptive*, 42–46.

[36] Zhan, L. (2015). Passive Forensics for Image Splicing Based on PCA Noise Estimation, 78–83.

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