e-ISSN : 2349-9745
p-ISSN : 2393-8161
Scientific Journal Impact Factor (SJIF): 1.711
International Journal of Modern Trends in Engineering and Research
www.ijmter.com

Demosaicing for Image Authentication and Detecting the Forged Region

Image Authentication

Deepak J. Dange[1], Prof. Ashvini Shete[2]
[1]*Department of Electronics and Telecommunication, ME(DS), GSMCOE Balewadi Pune, Savitribai Phule Pune University*
[2]*Department of Electronics and Telecommunication, GSMCOE Balewadi Pune, Savitribai Phule Pune University,*

Abstract— Computer graphics field is rapidly growing to the point where human subjects is facing difficulty distinguishing photorealistic computer generated images (PRCG) and photographic images (PIM). In 21th century the computer animation has reached to peak point where images can be manipulated. In other situations, it is highly necessary to distinguish between PRCG and PIM. In legal situation, most of the time as evidence many photographs are used. It must to distinguish the image authentic or forge. If it is forged then identify the region.

In this dissertation, new technique is using for image authentication and detecting forged region. It is also become important to develop method for distinguishing between actual photographs from digital camera and computer generated images. For such technique color filter array is using with demosaicing algorithm. In which the image from digital camera contains traces of resampling. Presence of demosaicing is the important key because in estimation of the actual demosaicing parameter is not required. It shows the application for distinguishing between PRCG and PIM and for accurately localizing forged region within digital camera images.

Keywords- Image Authentications, Detection of forged region, Demosaicing algorithm, CFA(Color Filter Array), Segmentation

I. INTRODUCTION

With increasing technical advances, computer graphics are becoming more photorealistic. Therefore, it is important to develop methods for distinguishing between actual photographs from digital cameras and computer generated images. The approach to this problem rather than focusing on the statistical differences between the image textures, The images from digital cameras contain traces of resampling as a result of using a colour filter array with demosaicing algorithms. The estimation of the actual demosaicing parameters is not necessary; rather, detection of the presence of demosaicing is the key.

A. Background

The in-camera processing (rather than the image content) distinguishes the digital camera photographs from computer graphics. The results show high reliability on a standard test set of JPEG compressed images from consumer digital cameras. Further, the application of these ideas for accurately localizing forged regions within digital camera images.The field of computer graphics is rapidly maturing to the point where human subjects have difficulty distinguishing photorealistic computer generated images (PRCG) from photographic images (PIM). As evidence of the proliferation` of computer generated imagery one need look no further than Hollywood. According to Wikipedia, the first feature-length computer animated film was Toy Story, in 1995. In 2007, a total of 14 computer animated films were released, several with stunningly realistic imagery. In addition to computer animated films, computer graphics are routinely used to create imagery in live action motion pictures that would otherwise be nearly impossible to film. Partly because of the success of computer animation in popular culture, it is well known by the general public that images can be manipulated and are not necessarily a historical record of an actual event. When viewing

movies for entertainment, the audience is usually a willing participant when fooled into believing computer generated images represent a fictional version of reality. However, in other situations, it is extremely important to distinguish between PRCG and PIM. In the mass media, there have been embarrassing instances of manipulated images being presented as if they represent photographically captured events. In legal situations, where photographs are used as evidence, it is crucial to understand whether the image is authentic or forged (either computer generated or altered). Furthermore, in the intelligence community, it is of vital importance to establish the origin of an image.

B. Motivation

Image authentication is become very important now days. Different types of images has been releasing on social media out of them so many are computer generated images. So it become important task to distinguish between those photographic images and computer generated images.

C. Objective

This papers main objective of the project is to image authentication and detection of forged region in images. First objective is image authentication in which some images edited by so many software. In those images only some part of the images has removed and replace by another images. These replace part has different or imported part of the other images. So here main task become to distinguish between images by applying demosaicing algorithm. Now second objective is one more application added is detection of forged region. In which image has some part which is not of the original image so it is become important to detect the only that part which is edited or changed by alter other images. These both applications design or implement through images processing technique. Demosaicing algorithm is further used for detection of forged region. These are the main objectives.

II. LITERATURE SURVEY

There are several methods and devices used for images authentication and detection of forged region. Several research works are being performed by many institutions throughout the world to offer the best approach to process the image authentication with different techniques with different methods for better result. This section gives a better result than earlier techniques as well as addition application of detection of forged region

A. Literature Survey

It is relationship between image noise variance and demosaicing. It has developed an algorithm for estimating CFA patterns and demosaicing algorithms. Extensive quantitative evaluation was performed to verify the effectiveness of the proposed method. Nevertheless, Method has some limitations, and there are several avenues for future work.

It showed the relationship between image noise variance and demosaicing. It has developed an algorithm for estimating CFA patterns and demosaicing algorithms. Extensive quantitative evaluation was performed to verify the effectiveness of the proposed method. Nevertheless, our method has some limitations, and there are several avenues for future work. One limitation of our method is that the accuracy goes down when the image is processed after demosaicing, e.g., image compression and other image filtering. These image processing operations significantly alter the noise distribution in unpredictable manner. It is very likely that explicitly accounting for these factors can increase the applicability of the proposed method. It is investigating the possibility of deciphering such post-processing operations using the observation of image noise. Another direction for future work is to apply the proposed method as a pre-processing stage for various vision tasks. Because interpolated pixels are essentially synthetically produced pixels, identifying the pixels that really receive irradiance (not by interpolation) is important for physics-based vision methods.

A cryptography based technology that has been publicly applied in information security to assist the examination and analysis of digital image data. The technology provides a unique cipher for every single processed image. It can use the unique cipher (check any change of the cipher) to confirm if the image is modified easily. With the proposed technology, it can strengthen image authentication effectively.

Some author is approach for image splicing localization and forgery detection. Different-quality re-demosaicing methods are used to obtain natural counterpart estimations of a test image with different image qualities. The estimated image shows similar statistical characteristics with the natural image, and distinct differences with the spliced image, because of the differences between the consistency of natural image and abrupt transition of spliced edge. Via comparing the smoothness between the test image and its estimated counterpart, the algorithm can provide a credible localization of the spliced region. For distinguishing the forgeries from the authentic photograph, two features are extracted from the splicing localization result, which is a binary image that indicates the region of the forgery. Finally, the features are fed into a classifier. The experimental results are evaluated using the publicly available database DVMM, and show that the method can localize the spliced region as well as detect forgeries with a high accuracy.

III. SYSTEM DESCRIPTION

System consists of the two main parts images authentication and detection of forged region. But for both of them the initial process is the same only segmentation step is added at the start.

3.1 RGB channel split

In this paper the process begins with the splitting of the color images into RGB channel. It goes through the pixel wise operation and differentiates the each color from the each pixel and makes it different images of individual color (i.e. R, G, B). Then R G B channel further processes individual. Here it select the green channel for processing because images has more number of green pixel so less number of calculations.

3.2 Histogram

A Histogram is a vertical bar chart that depicts the distribution of a set of data. Unlike Run Charts or Control Charts, which are discussed in other modules, a Histogram does not reflect process performance over time. It's helpful to think of a Histogram as being like a snapshot, while a Run Chart or Control Chart is more like a movie

3.3 DFT

The Fourier Transform is an important image processing tool which is used to decompose an image into its sine and cosine components. The output of the transformation represents the image in the Fourier or frequency domain, while the input image is the spatial domain equivalent. In the Fourier domain image, each point represents a particular frequency contained in the spatial domain image. In image processing, The Fourier Transform is used in a wide range of applications, such as image analysis, image filtering, image reconstruction and image compression. From the variants of the Fourier Transform Discrete Fourier Transform (DFT) is the variant used in digital image processing.

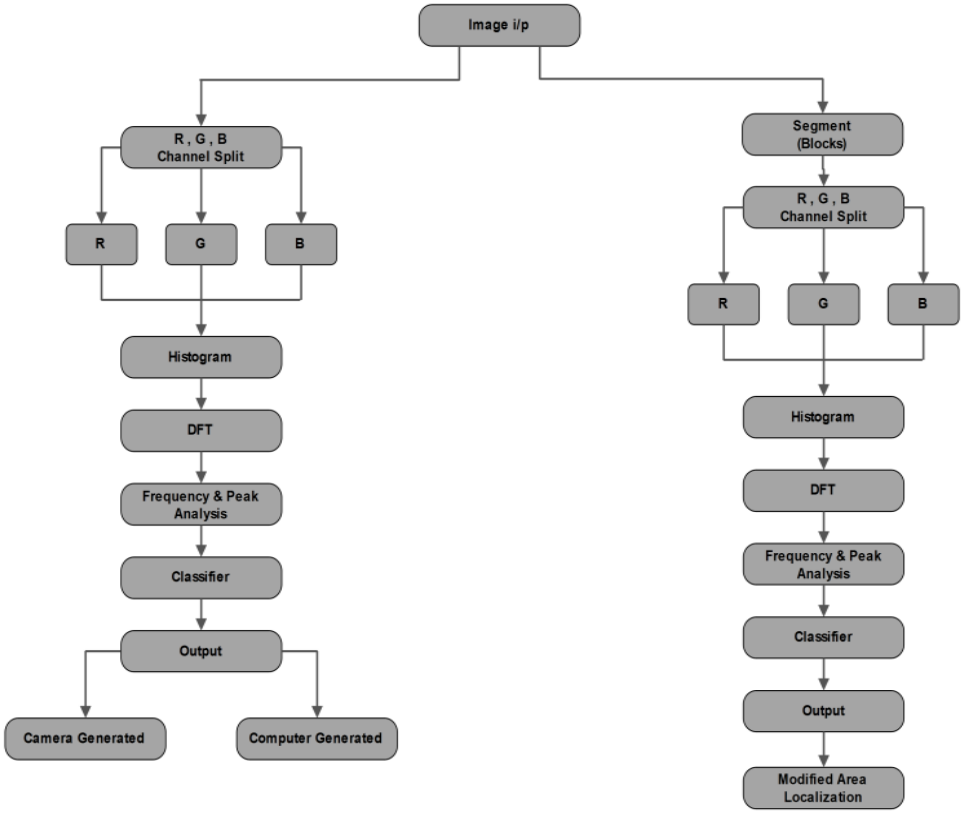

Figure 1. Block diagram

3.4 Frequency and peak analysis

The input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a compact representation set of features. The input data Transform into the set of features is called features extraction. If the features extraction is carefully chosen to so expect that the features set will extract the relevant information from the input data in order to perform the desired task . The color co-occurrence texture analysis method is developed by the Spatial Gray-level Dependence Matrices (SGDM).

3.5 Classifier

Neural network is chosen as a classification tool due to its known technique as a successful classifier for many real applications. The training and validation processes are among the important steps in developing an accurate process model using NNs. The dataset for training and validation processes consists of two parts; the training features set which are used to train the NN model; whilst a testing features sets are used to verify the accuracy of the trained using the feed-forward back propagation network. In the training part, connection weights were always updated until they reached the defined iteration number or suitable error. Hence, the capability of ANN model to respond accurately was assured using the Mean Square Error (MSE) criterion to emphasis the model validity between the target and the network output.

3.6 Images segmentation

The image will be segmented into different parts according to the region of interest. Image segmentation is to divide the image into same meaningful regions. Simply to say, image segmentation means to separate the object from background for following processing in an image. In this step the images are segmented using k-medoids clustering methods. K-medoids clustering is partitioning based clustering method. K-medoids or PAM (Partition around medoids): Every cluster is represented by one of the objects in the cluster. K-medoids more robust than k- means in the

presence of noise and outlines; because a medoids is less influenced by outlines or other extreme values than a mean. It used in detection of forged region because image has divided in smaller part and variance has calculated of each pixel of the color.

IV. DEMOSAICING ALGORITHM

1. Nearest-Neighbour Interpolation Simply copies an adjacent pixel of the same color channel (2x2 neighbourhoods). It is unsuitable for any application where quality matters, but can be useful for generating previews given limited computational resources.
2. Bilinear Interpolation The red value of a non-red pixel is computed as the average of the two or four adjacent red pixels, and similarly for blue and green. Bilinear interpolation generates significant artefacts, especially across edges and other high-frequency content, since it doesn`t take into account the correlation among the RGB value.
3. Cubic Interpolation Taking into account more neighbours than in algorithm no. 2 (e.g., 7x7 neighbourhood). Lower weight is given to pixels which are far from the current pixel.
4. Gradient-corrected bilinear interpolation an improvement to algorithm no. 2 is suggested. The assumption is that in a luminance/chrominance decomposition, the chrominance components don`t vary much across pixels. It exploits the inter channel correlations between the different color channels and uses the gradients among one color channel, in order to correct the bilinear interpolated value.

V. CONCLUSION

It describes a novel approach to distinguish between PI and PCGI. Rather than focusing on characteristics of the scene itself, it exploits the image processing necessitated by the camera hardware. Calculation of the positional variance of each green pixel values by splitting the RGB color channels. Further, it shows the application of the algorithm for accurately localizing forged image regions.It demonstrates that it is not necessary to recover the demosaicing parameters to authenticate images using evidence of demosaicing. It gives the better result then so many earlier methods of images authenticaton

REFERENCES

[1] Andrew C. Gallagher and Tsuhan Chen,Image Authentication by Detecting Traces of Demosaicing, IEEE 2014.
[2]Jun Takamatsu, Yasuyuki Matsushita Estimating demosaicing algorithms using image noise variance, CRV, 2011
[3]Bo Wang, 2Xiangwei Kong, Lanying Wu, Different-quality Re-demosaicing in Digital Image Forensics, 2012
[4]Che-Yen Wen,1,*Ph.D.;Kun-Ta Yang,1 M.S., Image authentication for digital image evidence, Forensic Science Journal,2006
[5] A. Gallagher. Detection of linear and cubic interpolation in JPEG compressed images. In Proc. CRV, 2005.
[6] T.-T. Ng, S.-F. Chang, J. Hsu, L. Xie, and M.-P. Tsui. Physics-motivated features for distinguishing photographic images and computer graphics. In Proc. ACM MM, 2005.
[7] V. Potdar, S. Han, and E. Chang. A survey of digital image watermarking techniques. Proc. Industrial Informatics,2005.
[8] S. Lyu and H. Farid. How realistic is photorealistic? IEEE Transactions on Signal Processing, 2005.
[9] K. Hirakawa and T. W. Parks. Adaptive homogeneity directed demosaicing algorithm. IEEE Trans. Image Processing,14:360–369, 2005
[10] Wikipedia. list of computer-animated films. http://en.wikipedia.org/wiki/List of computer animated films.

