Dust detection and removal from identified source camera using masking with Itti Koch method

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ABSTRACT- The image processing is the technique to process various type of information regarding images. This work is mainly focused on various information regarding camera. Also the source camera identification techniques are explained which will analyze various features of the image and on the basis of these features camera type and other information is related. The features of the image are analyzed and on the basis of image feature the whole work of identifying the camera type and dust detection from the image using masking is done. Also bilateral filtering is done to increase the quality of the image.

Keywords- Source camera identification; image forensics; PSNR; MSE.

1 INTRODUCTION

Image is a matrix in the square shape which is organized in lines and segments. Image processing is a procedure to change over an image into digital shape and play out a few operations to get an enhanced image and extract helpful information from it. It is an investigation of any algorithm that takes an image as input and returns the digital image as output. Image processing is alluded to processing of a 2D picture by a computer. It is a type of signal benefit in which image is input like video frame or photo and is image or characteristics connected with that image might be output [2]. Image processing system regard images as two dimensional signals and set of signals processing strategies are connected to them. It is most recent technologies and its applications in different parts of a business. Image Processing shapes center exploration region inside engineering and computer science teaches as well.

The source camera identification is the technique in which we identify the problems that affect the images which are taken with digital cameras or mobile phones. The images which are taken with the professional cameras like DSLR are of high quality, but when the dust particles or other noise parameters introduced in the capturing device then it leads to create the dust patterns on the image which is captured. When the dust particles stuck on the captured image it reduces the image quality. In this paper, various techniques are discussed in which various features are detected from the captured image.

1.1 Image formation in digital cameras

As shown in the figure (see Fig 1.), firsltly light enters to camera by the lens. Further filters are there. Then the block next to this is called the color filter array (CFA). Next to this section CCD array is arranged by using different filters, typically red, green and blue (RGB). CCD array is the most expensive component of a digital camera. Capturing the colour image process requires separate CCD arrays for each colour component. So this is the reason that CCD is expensive component of the digital camera.

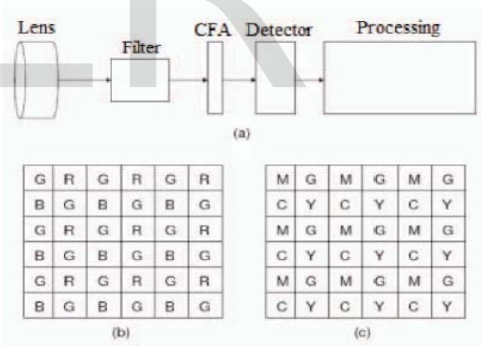

Fig 1: Image formation in cameras

Now one of the main problem which affect the quality of the image is dust patterns or we can say that a small noise. So following are some reasons which explains that how the dust or noise enters to the camera while capturing the image.

1.2 Image with dust patterns

When the lens of the camera is changed, dust enters to the camera body and settles on the image sensor. DSLRs are affected by this issue. Sometimes there are imperfections can be seen in the captured images like blurring, dead pixels or some important information is hidden due to the distorted image. So it is very important to analyse that problem so as to get the perfect image.

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1.2.1 Disadvantages of dust particles on image:

Dust particles once land on the image sensor's surface they can affect the quality of all the images.

There is also one main thing to know the difference between the dust pattern on the image and noise in the image. When pixel value difference is less from the original image then we can say that there are small dust patterns on the image and if the pixel difference is more, that leads to the noise present in the image.

2.REVIEW PROCESS

In [1], a patch-based (PB) SPN is extracted from the image and then algorithm is implemented.

Authors proposed a method based upon the detection of the dust particles [2]. Dust spots in the image are detected based on shape properties.

In [3], method proposed by averaging the noise obtained from multiple noisy images. Then a reference pattern noise is taken out as a watermark, which is considered by using a correlation detector.

In this study many techniques are divided for the identification: Metadata, CFA and Demosaicing Artifacts, Image Features. The main idea is to describe each category in detail.[4]

In this paper the approach to find the source camera depends upon the image features and the classification using SVM.[5]. The images used for the detection are clicked mainly by the different mobile devices.

In [6], the survey focused to interpolate the image to figure out the image characteristic values with SVM classifier and to obtain high detection rate.

Authors proposed a new camera identification method based upon the sensor dust characteristics. Dust particles on the image are detected using shape features to form the dust pattern on the DSLR camera.[7].

In [8], authors identified the source camera of an image based on the proprietary interpolation algorithm. A set of image characteristics are defined and then used with support vector machine.

3. COMPARISON TABLE

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Table1. Comparison of papers

Papa name (see reference)	Year of publication	Method & experiment	Image size used	Features considered	Accuracy	Future scope
[8]	2005	Proprietary interpolation algorithm EM algorithm (expectation/ maximization)	1600x1200	Auto-focus	89.3%	To solve the images that are heavily compressed
[3]	2006	Extracting reference pattern noise	1200x1792	-----	-----	Identification of video cameras and scanners
[2]	2008	Scheme based on sensor dust traces.	800x533	High focal number	92%	Detection of dust spots in very complex regions and low f-numbers.

[7]	2009	Support vector machine classifier	1024x1024 512x512	Sharpness and ISO(image sensor optimization)sensitivity	-----	-----
[6]	2012	Figure out the image characteristic value	-----	-----	90%	-----
[4]	2013	Demosaicing Artifacts, Lens Distortions and Wavelet Transforms	-----	-----	-----	To bridge the remaining gaps.
[5]	2015	Image features and classification using support vector machines	1024x768	Mobile devices	80.69%	To optimize the success rate for different cases presented with mobile device images
[1]	2015	a novel patch-based (PB) sensor pattern noise algorithm for camera source identification is proposed	256x256 512x512	Smooth image regions	70-80%	-----

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4. EXISTING METHOD RESULT

4.1 Camera identification

A picture (a photo) has for the most part been acknowledged as a "proof of event" of the portrayed occasion. In today's advanced age, the creation and control of advanced pictures is made straightforward by computerized handling apparatuses that are effortlessly and broadly accessible. As a result, we can no more take the realness of pictures, simple or advanced, for allowed. This is particularly genuine with regards to lawful photographic confirmation. Picture crime scene investigation is worried with deciding some fundamental certainty around a picture

The interface is to match the features known as the unique fingerprint for camera type identification and to detect noise from the camera. The noise in the image is of dust particles which are on the camera when the image is clicked. In the existing method an approach is based on different types of image features. We have also tried to detect the dust patterns by taking out the RGB patterns. We have also calculated the PSNR and MSE values of the dusty image. Accuracy can also be seen after this experiment. After this user defined images are matched. If the features get matched then the output shows the type of camera by which the test image is clicked.

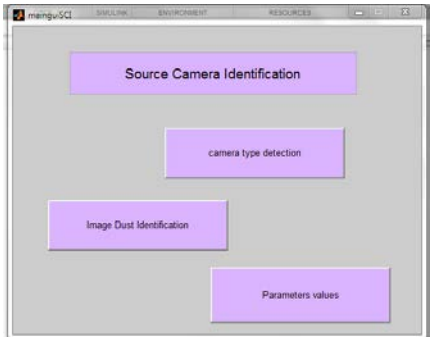

Fig 2: user interface setup

Fig 3: camera type shown

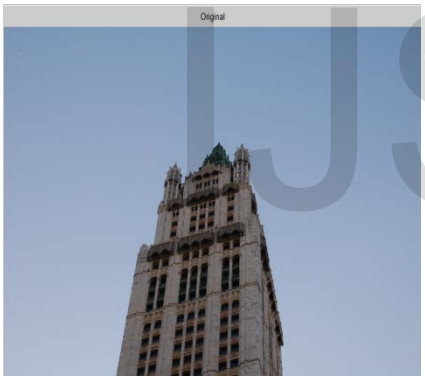

Fig 3: original image

Fig 4: saliency created

Fig 5: Object mask

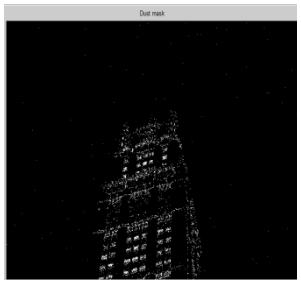

Fig 6: Dust mask

Table 1. Parameter values comparison

Parameters	Previous	Proposed
MSE	76.48	60.74
PSNR	18.53	18.56
Failure rate	0.20	0.03
Accuracy	83.51	89.30

5.FUTURE WORK

To propose the technique by which we can draw pattern in the image from one dust pixel to another dust pixel.

6.CONCLUSION

In this work, it is been concluded that fingerprint matching is applied which is used to find the camera type and further finds the dust patterns and remove them. The pixels which do not have similar properties to other part of image are marked in the image.

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