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Exposing the Digital Image Forgeries by using the Illumination Color Classification

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***Abstract* - For number of decades , photographs have been utilized document space-time events and they often serve as evidence in judiciary . The photographers are use to createcomposites of analog pictures, this process is very much time gathering and it requires a very highly expert knowledge. Today, where the number of powerful digital images can be change with the editing tools software makes image modifications in a straightway .This undergoes our real believe in photographs and , in particular ,faulty images as proof for real-world events. In this paper, we are making a study of one of the most common forms of photographic manipulation , known as image composition or splicing. When propose a forgery detection technic that exploits the irregularities in the colour of the illumination of the images. This approach is based on machines type of learning and requires minimum user interaction. The technique is applied to pictures containing two or more than two people and requires no expert interaction for the tampering decision. To achieved this , we incorporate many different statistics information from physics- and statistical – based illuminant estimators on image regions of similar material. From these illuminantion of estimates, we got a picture texture - and edge- based features which are then provided to a learning the machine approach for automatic decision-making. This can improve performance of classification using an SVM meta-fusion , classifier is really promising. While yields detection rates of the 86% on a new benchmark dataset consisting of 200 images , and 83% on 50 images that were collected from the website & netcafe.**

I. INTRODUCTION

EVERY day, billions of digital documents are produced by a many variety of different devices distributed by newspapers, websites , books, radio television. In all these information channels, images are powerful tool for the means of communication. But unfortunately, it is not difficult to use computer graphics and image processing techniques are used to manipulate images. A popular professor Quonto Russell Frank , a Professor of Journalism in Ethics at Pen State University, in 2004 after a Los Angeles Times incident involving the doctored photograph
from the Iraqi front: “Whoever said the camera never lies is a lier. Camera plays a very important role in our life .It is difficult to think without camera in todays day to day activity.

Fig. 1. How can one assure the authenticity of a photograph? Example of a spliced image involving people.

How we deal with the problem of photographic manipulation raises it a host of legal and ethical questions that must be addressed [1]. However, before thinking of taking appropriate any action upon questionable image, how one must be able to detect that an image has been altered.

Image composition (or splicing) is one of the common images manipulation operations the example can be shown in Fig. 1, in which on the girl on the right is inserted. Although this image can't show harm manipulation case, the several more controversial cases have been so reported, e.g., the 2011 Benetton the Un-Hate advertising campaign 1 or the diplomatically delicate case in which an German state -run a known newspaper published a manipulated photograph of Egypt 's former president , Hosni Mubarak, is at the front, rather than the back ,of a group of known leaders meeting for peace talks2.

When assessing the legal authenticity of an image , forensic investigators think to test the legality of an image. It is very important to deal with the authenticity and the legality of an image Among other tell tale signs ,we are dealing with the illumination inconsistencies and we, are use them which are actually potentially effective for splicing detection: from the viewpoint or the re-spect of a manipulator, we have to make proper adjustment of the illumination and the condition is really difficult to achieved while creating any composite image [1]. In those spirit , Riess and Angelo [2] proposed to analyze illuminant color estimation from the local image regions.

The interpretation of their resulting so-called *illuminant maps* is believe left to human experts. As it turns out, this is the vital decision is, which is in practice it seems to be often vital challenging. But as we think moreover of relying on visual assessment can be misleading, as at an-y condition the human visual system is critical and quite inept at judging illumination creating a crucial & useful environments in pictures & [3], [4]. Thus , it is very much preferable to transfer the tampering decision to an objective algorithm.

Thus it is important to understand any define algorithm in a proper manner so as to know the actual working of image slicing.

In this type of working, we make an important step towards how to minimizing user interaction for an illuminant- based tampering decision- making. We propose a new semi - automatic method that is also significantly is more reliable than any other earlier approaches. Quantitative & very reliable evaluation shows that the method which we proposed achieves a detection rate of 86%, while existing illumination-based work is slightly better than guessing.

We explain the reality that local illuminant estimates are most discriminative when comparing objects of the same (or synonym) material. Thus we focus on the automatic comparison of human skin, and are more specifically faces, & are used to and classify the illumination on a pair of faces as either consistent or inconsistent.User interaction is limited to marking any bounding boxes around the faces in an image under investigation. In the simplest case, this can reduce to specifying two corners (upper left and lower right) of a bounding box.

In summary, the very useful & contributions about this work are:

- Interpretation of an illumination interpretation are object texture for feature computation.
- A novel edge-based characterization method for illuminant maps which also explores edge attributes related to the illumination process.
- The creation of a benchmark dataset comprised of 100 skillfully created forgeries and 100 % original photographs

3 In the Section II, we briefly review related work in colour constancy and illumination-based detection of image splicing. In Section III we present examples of illuminant maps and highlight
the challenges in their exploitation. An overview of the proposed methodology, followed by a detailed explanation of all the algorithmic steps is given in Section IV. In Section V, we aregoing to introduce the proposed a typical benchmark database and it present experimental results. Conclusions potential future work are going to be full of different & diffi-cult challenges are there to be faced in the future.So to verify the reality of the pictures is going to be a very promising & difficult task to achieved. In court and many other legal activities this is going to be a very crucial task.

II. RELATED WORK

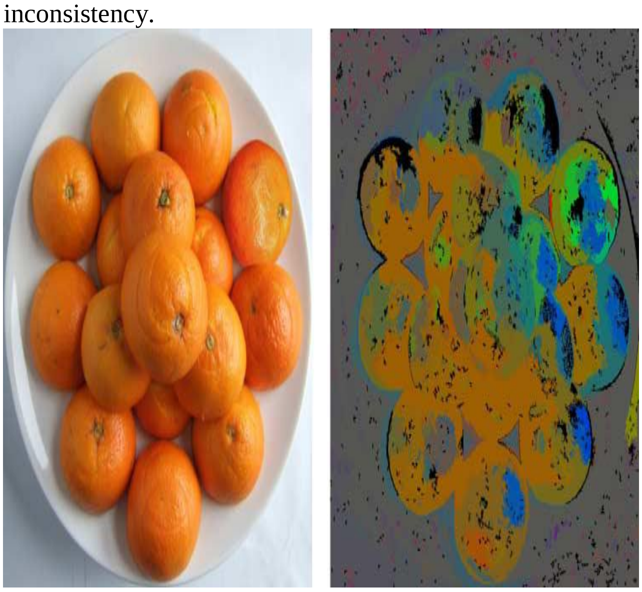
For forgery detection Illumination- based methods are either color-based or it can be geometry- based. Geometry -based methods mainly focus at detecting in-consistencies or ir-regularities in the position of the light source between any specific objects in the scene [6]–[10]. Color-based methods mainly search for any of the inconsistencies between object color and light color [2],[11],[12],[13], having any of the mutual interactions , the two methods that we have been proposed that use the direction of the incident light for exposing a digital forgeries. Mr. Farid and Mr.Johnson [7] proposed a method which computes a matrix of low- dimensional descriptor during the environment of the lighting in the image plane (i.e., in 2-D). It estimates the illumination direction from the intensity distribution of an object & boundaries having omogeneous color manually. Farid and Kee [9] extended this approach to exploiting known 3-D surface geometry. In the case of faces, a dense grid of 3 -- D normals improves the quality & estimates of the illumination direction. To achieve this, a 3-D face model is registered with the 2-D image using
3-D face model using a 2-D bi-dimensional image.
By using any 3- D image in place of 2 -- D image is always very challenging. It becomes a very difficult task for any of the image viewer to know the actual difference between 2-D and 3-D image.

The authors who make deep study of this topic were came into a critical phase where they realize that image slicing is a very vital issue. Image slicing or composition , makes it really very difficult to differentiate between a real image and a fake or inconsistent image. Authors make a huge study to overcome the problem of image iregulariti--es .They proposed different different of algorithms and theorems to overcome the serious problem of image slicing and image inconsistencies.

A very different approach using a typical physics-based color constancy algorithm was proposed by Riess and Angelo poulou [2] that can be operated on partially specular pixels. In this any of approach , the automatic detection of highly specular regions is avoided. The authors are proposed to segment the image where to estimate the illuminant color locally *per segment*. Recoloring of each of an image region according to its individual local illuminant estimate yields a so-called *illuminant map* .

Implausible illuminant color estimates point towards a well manipulated region. Unfortunately, the authors unable to provide a numerical decision criterion for any different tampering that were used occurs during the detection. Thus, an opinions of an expert is left with how , the difficult task of having the visualization examining an illuminant map for evidence of tampering. The involved challenges are further discussed in Section III. In the field of color constancy, descriptors for the illuminant color have been extensively studied. Most of the research in all color constancy is achieved.

Fig. 2. Example illuminant map that directly shows an inconsistency.



III. CHALLENGES IN EXPLOITING ILLUMINANT MAPS

There are many challenges while working with the illuminant maps. For this purpose we considere the Angelopoulou Riess and [2]. In this approach , an image is subdivided into number of sub -images or regions of similar color (superpixels). An illuminant color is locally estimated using many pixels within each super pixel (for details, see [2] and Section IV- A) Re coloring each super pixel consisting with its local an illuminant color estimate yields a so-called *illuminant map* to detect number of inconsistencies of a human expert and they can , then really try to investigate the illuminant map and the input image. Fig. 2 shows an example of an image of having its illuminant map , in which we are seeing any of an inconsistency can be directly shown: In the Fig the insert orange in the top right exhibits multiple green spots in the illuminant map. All the number of other fruits which in the scene show a transition gradually from red to blue. The mandarin orange which is the only one that deviates or different from this pattern. In practice , however , such analysis is seems to be often very challenging, as shown in Fig. 3. The top left image is original,while the image which is in at the bottom , composite with not any other than the rightmost girl is been inserted. Several key illumina -nt estimates are clear to outliers, such as the hair of the girl on the left in the bottom image, which is we estimated as strongly red illuminated. Thus, from an expert's viewpoint, it is reasonable to easily discard such regions and to focus on more reliable regions, e.g., the faces. In Fig. 3, however, it is very difficult to justify a tampering decision by comparing any of the color distributions in the facial regions. It is also challenging to argue, it was based on these key and vital illuminant maps, that the right-most girl in the bottom image has been inserted, while,e.g.if we use the right- most boy in the top image is original. The image is going to be an original image. We are mai-
nly deal with how the image has been processed &
this is a crucial phase.

In the following figure the illuminant maps are used for an original image (top) and a sliced sha
-ped is used at the bottom. In the following figure the illuminant maps are created with the IIC-based
Illuminant estimator are easily calculated by any of
the image estimator .The bad image which is being
processed can be eliminated are used for the slicing purpose.

Fig. 3. Example illuminant maps for an original image (top) and a spliced image (bottom). The illuminant maps are created with the IIC-based illuminant estimator (see Section IV-A).

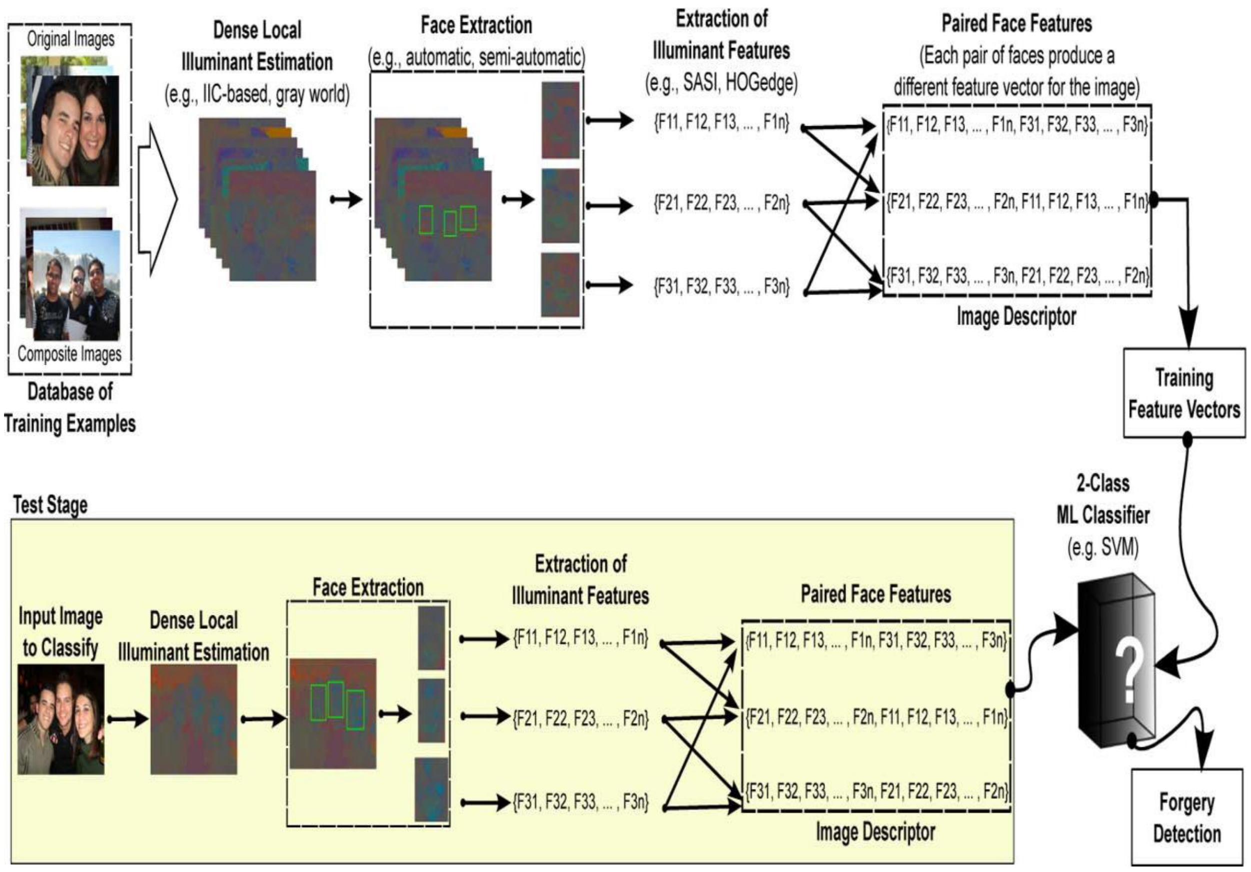


Fig. 4 . Overview of the proposed method.

IV. OVERVIEW AND ALGORITHMIC DETAILS

We classify the illumination for each pair of faces in the image as either inconsistent or consistent. Throughout the paper , here we abbreviate illuminant estimation as IE, and illuminant maps as termed as IM. But the proposed method consists where the five main components:

1) *Dense Local Illuminant Estimation (IE):* The input image is going to be segmented into homogeneous regions. A Per illuminant estimator, a new image is created where each of the region is colored with how the extracted illuminant color. This can result in an intermediate representation is called illuminant map (IM).

2) *Face Extraction:*
This is the only step that may require human interaction. An operator sets a bounding box around each face (e.g., by clicking on two corners of the bounding box) in the image that should be investigated. Alternatively,

An automated face detector can be employed. We are then crop every bounding box out of each illuminant map, so that only the illuminant estimation can be used.