

# Level Segmentation of Colour Images to Detect the Specular Regions

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**Abstract—** Specular reflections frequently appear in photographic images and interfere with numerous computer vision tasks, such as segmentation, object recognition, shape from shading and binocular stereo. In this paper we propose a new algorithm to detect the specular regions in digital images

**Keywords-** Contrast Stretching, Filtering, specular

## Introduction

Specular reflections frequently appear in photographic images and interfere with numerous computer vision tasks, such as segmentation, object recognition, shape from shading and binocular stereo[1]. The term specular means that light is perfectly reflected in a mirror-like way from the light source to the viewer. It often reflects the colour of the light source, not the colour of the reflecting object. This is because many materials have a thin layer of clear material above the surface of the pigmented material[2]



Figure 1. A Sample Image with Specular Regions

In a natural Images illumination plays main role some time bad illumination produces a presence of brightness and specular reflection of the object captured by vision system, some time because of these specular highlights in images make edge detection methods failed

In this paper we propose a new method of identifying the specular regions of natural Images using level segmentation

## II .PROPOSED ALGORITHM

Proposed algorithm contains two main algorithms to detect the specular regions like Pre-processing, Level Segmentation

## A .Pre-processing

Input image is converted in to gray or luminance for fast processing and to analyze the relationship between white and black area. The binomial low pass filter and contrast stretching used to detect the specular regions accurately [4].the flow diagram of preprocessing operations are described in Figure.2



Figure 2. The Flow Diagram of Pre-processing Operations

**Gray (or) luminance:** Before giving input to the level segmentation the user have to select the specular regions correctly. Selecting the specular regions in the colour image will be little complex. The first step is to convert an input image of a digital to a gray scale for detecting the specular region. The gray scale image can be analysed by a relationship between a white are and a black for the input image, easily and made to faster processing than a colour image.

**Binomial Low Pass Filtering:** The binomial low pass filters (BLPF) are used in order to accurately find the specular region from the digital image and remove a noise of the image. The BLPF is applying a size of mask (e.g., 3×3, 5×5) according to the size of specular regions in the images [3].Smoothing may be used in two important ways that can aid in data analysis [3]by being able to extract more information from the data as long as the assumption of smoothing is reasonable by being able to provide analyses that are both flexible and robust

**Contrast Stretching:** The image could be eliminated to a steep intensity transition of the object except the lighting gradation formed naturally the objects from the image. Adapt a high contrast from the image. The contrast should be clearly the highlights and shadows formed by the light from the image[4].

Contrast stretching (also called Normalization) attempts to improve an image by stretching the range of intensity values it contains to make full use of possible values. Unlike

histogram equalization, contrast stretching is restricted to a linear mapping of input to output values. The result is less dramatic, but tends to avoid the sometimes artificial appearance of equalized images.

**B. Level Segmentation**

Trim down the number of levels to show up the specular regions in the image. The 8-bits for gray image levels are Convert 256 into 10 [5]. The luminance image levels diminish into 10 .from the paper they have reduced up to 50 levels, the sample reduction of 256 to 10 levels for a gray image are described in Figure 3

GRAY	LUMINANCE	GRAY	LUMINANCE
0-25	16-38	0	16
25-50	38-60	25	38
50-75	60-82	50	60
75-100	82-104	75	82
100-125	104-126	100	104
125-150	126-148	125	126
150-175	148-170	150	148
175-200	170-192	175	170
200-225	192-214	200	192
225-255	214-236	225	214

**Figure 3: Level Segmentation**

**C. Algorithm**

Step1: Read the color image.  
 Step 2: Convert the image in to gray image or luminance for faster processing.  
 Step 3: Apply binomial low pass filter using (BPLF) 3x3 mask to reduce the noise in the image  
 Step 4: Adapt the high contrast in the image by contrast stretching.  
 Step 5: Reduce the number of levels in the image . for gray (255 to 10) to highlight the specular regions similarly for luminance.  
 For each region  
 For each pixel  
 If( $R(x, y) > 0 \ \&\& \ R(x, y) < 25$ )  
 Segmented( $x, y$ ) =0;  
 Else if( $R(x, y) > 25 \ \&\& \ R(x, y) < 50$ )  
 Segmented( $x, y$ ) =25;  
 Else if( $R(x, y) > 50 \ \&\& \ R(x, y) < 75$ )  
 Segmented( $x, y$ ) =50;  
 Else if( $R(x, y) > 75 \ \&\& \ R(x, y) < 100$ )  
 Segmented( $x, y$ ) =75;  
 Else if( $R(x, y) > 100 \ \&\& \ R(x, y) < 125$ )  
 Segmented( $x, y$ ) =100;

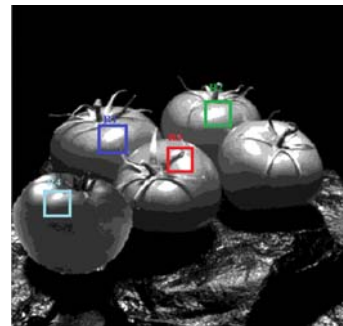
Else if( $R(x, y) > 125 \ \&\& \ R(x, y) < 150$ )  
 Segmented( $x, y$ ) =125;  
 Else if( $R(x, y) > 150 \ \&\& \ R(x, y) < 175$ )  
 Segmented( $x, y$ ) =150;  
 Else if( $R(x, y) > 175 \ \&\& \ R(x, y) < 200$ )  
 Segmented( $x, y$ ) =175;  
 Else if( $R(x, y) > 200 \ \&\& \ R(x, y) < 225$ )  
 Segmented( $x, y$ ) =200;  
 Else if( $R(x, y) > 225 \ \&\& \ R(x, y) < 255$ )  
 Segmented( $x, y$ ) =225;  
 End if

**III. RESULT ANALYSIS**

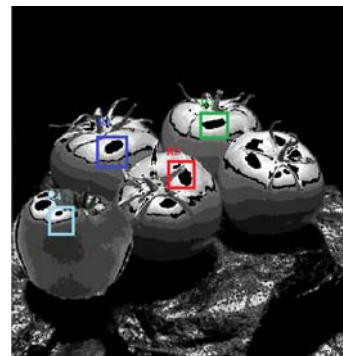
**Dataset 1:** A Image from Internet with specular regions



(a)



(b)



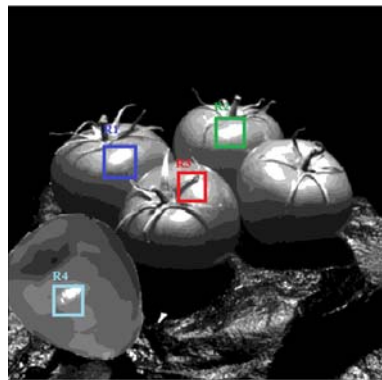
(c)

**Figure 4 (a) Input image (tampered image from Photoshop) (b) User interactive cropped regions after level segmentation using gray. (c) User interactive cropped regions after level segmentation using luminance**

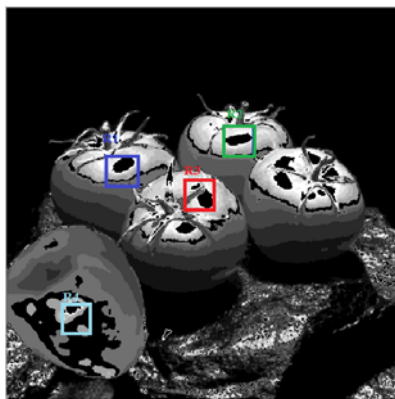
**Dataset 2:** A Image with Specular regions



(a)



(b)



(c)

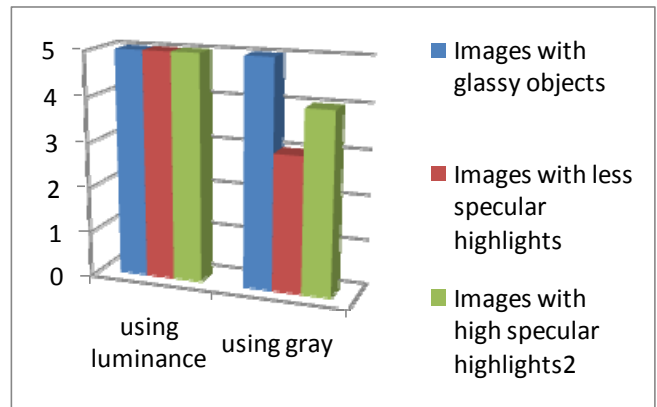
**Figure 5** a) Input image (tampered image from Photoshop) (b) User interactive cropped regions after level segmentation using gray. (c) User interactive cropped regions after level segmentation using luminance

IV. DISCUSSION

Types of images	no of image	Using gray	Using luminance
Images with glassy objects	5	5	5
Images with less specular highlights	5	3	5
Images with high specular highlights	5	4	5

**Figure 6 :** Accuracy of specular region detection

**Chart 1.** The specular region detection gray and luminance



V. CONCLUSION

We have presented a new method for specular reflection deduction in digital images. Rather than relying on a single image, we capture multiple images of the scene under different lighting conditions. Based on the information that highlights often shift according to the position of the light source in Future this technique may be extended to static objects in videos

VI. REFERENCES

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