

Research Article

Sensitivity of Light for Multiple Exposure Fusion Image using High Dynamic Range

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Abstract

This proposed method a various exposure fusion image to acquisition the high dynamic range. The five input image are combining in single image with different exposure time, while change the shutter speed when aperture is fixed and estimate the irradiance value of each pixel. This paper presents accurate multiple exposure fusion technique for the HDRI acquisition and also estimate the underexposure and overexposure region by using Maximum a posteriori estimation (MAP) and reduce the noise. We can take the different image from various image using the contrast stretching using histogram, in contrast stretching indicated the intensity of pixel.

Keywords: High Dynamic Range Image (HDRI), Histogram Contrast Stretching, Maximum A Posteriori (MAP) Estimation, Multiple Exposure Fusion.

1. Introduction

The human visual system can capture a wide dynamic range of irradiance. This wide dynamic range exhibited by human vision system is not achieved by the digital devices used. Many applications to capture a wide range of irradiance of natural scene and store it in each pixel. HDR sensors are used for in-vehicle cameras, high-contrast photo. surveillance in night vision. some problem in this application like black, white image region for using underexposure and overexposure and also problem in noise that makes estimation difficult. In this paper implement the multiple exposure fusion technique proposed. The structured of paper as follows Section II presents Fusion technique of various fusion exposure and proposed system implementation details. Section III present Performance Parameters Section IV presents results and discussion while section V conclusion.

2. Various Fusion Exposure

Multiple images are combining the HDRI acquisition method. First the images are capture various exposures time with changing shutter speed, while aperture is fixed and we obtain a set low dynamic range 8 bits/channel. The one images is selected as main image from the various image such as medium exposure. Multiple exposure image Fusion considering occlusions, underexposed, overexposed, and motion blur free a high dynamic range image is acquired (Takao Jinno *et al*, 2012)

A. Proposed Method

In this work the multiple input image are combine using high dynamic range technique. The work flow of proposed system is shown in figure 1. This type contains five main steps, such as input image, image acquisition, Main Image, Map based method estimation, high dynamic range, by fuse image by combine the different exposure time multiple image in a single image

1. Input image

The five image are capture different exposure setting with changing shutter speed, while aperture is fix.

2. Image Acquisition

First we need to produce a digital image from a paper envelope. This is done using either a CCD camera, or a scanner. The resulting image data is an ordinary image pixel value typically in one or several gray or color image

3. Main Image

The one images is selected as main image from the input image such as medium exposure.

4. Maximum A Posteriori

The MAP estimation method is detect the occlusion saturation region and obtain without blur HDRIs also detect the under exposure and overexposure region by MAP estimation.

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5. Image Fusion by HDRI

High dynamic range imaging (HDRI or HDR) methods is used in photography and image to allow a greater dynamic range between the darkest lightest and areas of an image than current standard digital imaging methods. Image fusion method is the process of combining multiple images into a single image. The fused image will be better than the input images.

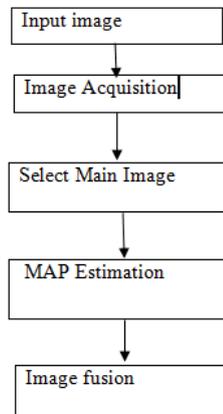


Fig.1 Work Flow of Proposed System

B. Algorithm steps for proposed method

- 1) Read the input image.
- 2) Image acquisition for the image with different exposure setting.
- 3) Apply the MAP Estimation to main image with medium exposure.
- 4) Detect the underexposure and overexposure Map.
- 5) Fusion of image into HDR image.
- 6) Calculate the mean value, standard deviation, PSNR

3. Performance Parameter

The performance parameters used in this paper comparison of fusion image, mainly measuring the definition of an image

3.1 Peak Signal to Noise Ratio (PSNR)

PSNR is the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity. The PSNR measure is given by:

$$PSNR \text{ dB} = 20 \log \frac{255\sqrt{3MN}}{\sqrt{\sum_{i=1}^M \sum_{j=1}^M (B(ij) - B'(ij))^2}} \quad (1)$$

Where, B - the perfect image, B' - the fused image to be assessed, i - pixel row index, j - Pixel column index, M , N - No. of row and column.

3.2 Standard Deviation

The standard deviation is calculated using the following formula,

$$S = \frac{\sqrt{\sum(X-M)^2}}{n-1} \quad (2)$$

Where, Σ = Sum of, X = Individual data point, M =Mean of all data point = Sample size (number of data point).

3.3 Mean (M)

The mean is the sum of the observations divided by the number of observations. The mean is calculated using the following formula,

$$M = \frac{\Sigma(X)}{N} \quad (3)$$

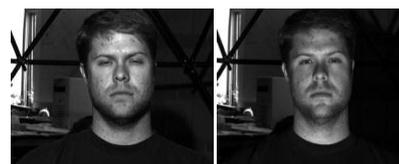
Where, Σ = Sum of, X = Individual data points N = Sample size (number of data points) (<http://www.anywhere.com/>)

4. Result and Discussion

In this section the main objectives of this work is five image by changing the shutter speed setting, while the aperture is fixed, and use them as an input for this algorithm. The shutter speed settings that used are 0.008, 0.0125, 0.02, 0.0333, and 0.05 (in seconds). Figure (a1-a5) shows the multiple input image ,figure (b1-b5) shows corresponding histograms with pixel values to number of pixel value using the control contrast Stretching In Histogram shows high bright image, the gray levels would be clustered at the lower end and is dark bright image ,the gray levels would be clustered at the upper end. ,figure (c1-c5)shows map of high exposure image is over exposed(in white region)and under exposed (in black region) ,figure (d1,d2)shows result of comparative method of photomatrix and our HDR result method.

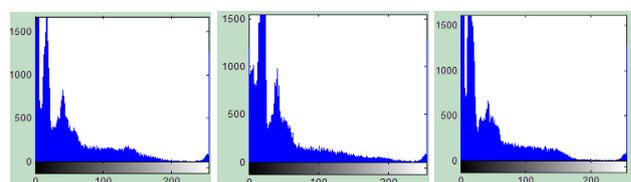


a (1) a (2) a (3)



a (4) a (5)

Figure 4.2(a) Multiple exposure input image of Boy



b (1) b (2) b (3)

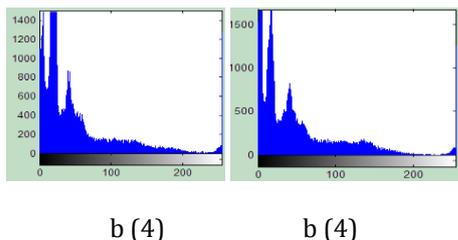


Figure 4.2(b) Histograms of input image of Boy

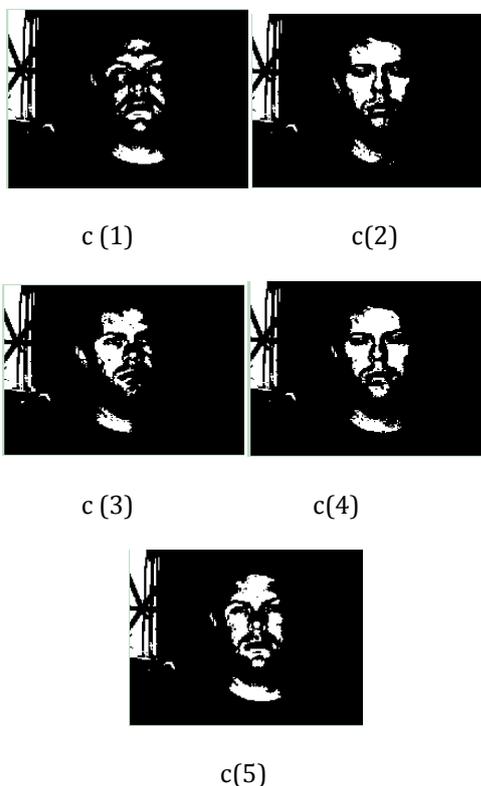


Figure 4.2(c) The high exposure image of Boy



D (1) Result of photomatrix d (2) Result of HDR

Table 1 Calculate value of performance fuse image proposed method and compare method of mean value , standard deviation, PSNR

SR NO	HDR	Photomatrix
Mean Value	46.2747	48.341
standard deviation	53.9883	56.236
PSNR	42.11	40.18

Photomatrix method is much poorer than HDR method. PSNR Value of HDR is 2dB greater than the photomatrix Method. Noise is reduce the fuse image of proposed Method and reconstruct the blur free image. So the clarity is better the fused image HDR than the compare method.

Conclusion

This paper is implemented on the basis of multiple images with different exposure time and produce high dynamic range images. Here it is a technique for combining the multiple exposure images. This paper presents accurate multiple exposure fusion technique for the HDR acquisition and also estimate the underexposure and overexposure region by using Maximum a posterior estimation (MAP) and reduce the noise. We can take the different image from various image using the contrast stretching using histogram , in contrast stretching indicated the intensity of pixel.

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