ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015

Detail Enhanced Fusion of Various Exposed Images by Using Exposure Fusion

Shruti M Benni[1], Sandhya Bevoor[2]

PG Student [DECS], Dept. of ECE, Maratha Mandal Engineering College, Belgaum, Karnataka, India[1]

Assistant Professor, Dept. of ECE, Maratha Mandal Engineering College, Belgaum, Karnataka, India[2]

ABSTRACT: In today's era customer demand for high quality output images since camera have limited dynamic range of sensors so faithfully it cannot show the information by using single exposure whatever our eye can view , one of the low cost solution is presented in this paper that is exposure fusion scheme for various exposed images here varying exposures images are taken and fused to produce high dynamic range on low dynamic range display the proposed method is suitable for mobile phones with limited computation power. Since camera is embedded into phones there is lot of conflict among manufacture to produce not only convenience but good high dynamic range output image .The information which is not properly exposed in over exposed or under exposed can be properly exposed in medium exposed so multiple exposure images are taken to merge relevant information from all the images and final image preserves all the exposures from set of low dynamic range images.

KEYWORDS: exposure fusion, exposed image, high dynamic range, low dynamic range ,enhanced output
.

I INTRODUCTION

We frequently have faced the real world scene having high dynamic range and most of the digital camera cannot capture the full dynamic range due to limited capacity of sensor by the camera have 10^3:1 dynamic range and our eyes can perceive dynamic range of 10^10:1. So properly representing the information what our eyes can view is not possible so therefore various exposed images are taken .since there is a lot of fierce conflict between mobile phone manufacturers they are trying to improve the quality of output image .one of the low cost method is to capture images of varying exposure and produce high dynamic range image [1] [2] [4] on low dynamic range display. now a day's customers demand for hdr images this method proposed is static images of varying exposure and suitable for mobile devices with limited computation .since camera are penetrating into mobile phones and they can be carried anywhere the proposed method can be implemented to the mobile phones where images that method for low end camera .the main objective is to enhance the quality of output images by preserving all the exposures and method is carried by using matlab 2010a .

II.LITERATURE SURVEY

Some of the related work is discussed here :

Exposure fusion [5]uses wavelet based approach ,various exposed images are taken ad coefficients are merged based on the factors such as weight map weight map uses contrast measure ,over exposure, well exposed pixels .to smoothen the luminance variation in the final image method allows for multiple resolution fusion.

Exposure fusion scheme[6]is proposed in this paper. The proposed method produces detail enhanced sharper ldr image from the set of various exposed ldr images without producing intermediate hdr image this approach uses quadratic optimization based where fine details are extracted from set of images and added to reference image which is merged by exposure fusion scheme.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015

Exposure fusion scheme [7]uses blp boosting laplacian pyramid the method uses exposure weight computation which uses global and local weight. the proposed approach uses laplacian to boost base and detail layer form set of exposures and it merges which is used for static scenes output final preserves colour texture output produced is better then existing tone operators .

III PROPOSED METHODOLOGY

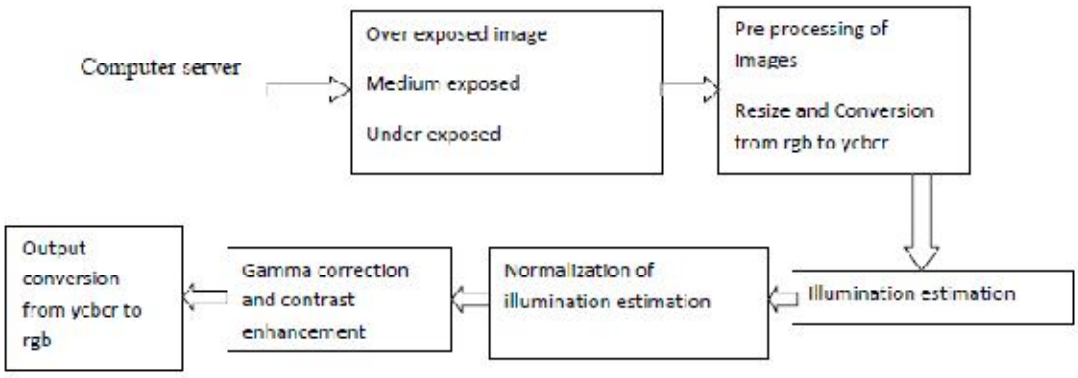
Exposure refers to amount of sunlight captured on the sensor per unit area[1][2]. exposure fusion is blending of relevant information from all the images into single image.

There are three factors that is affecting the amount of light(brightness) falling on the sensor .ie

Exposure time, aperture and iso.

- If exposure time is long shutter is open for longer time more light pass to the sensor .if it is less amount of light pass to the sensor.
- Aperture is wide more light pass through the shutter to the sensor aperture is small less amount of light falls on the sensor.
- Higher the value of iso more it is sensitive to light and lesser is the value less sensitive to light.

Block diagram for exposure fusion is given below.



Block diagram for the fusion system

The proposed method consists of following steps:

A.(INPUT IMAGES)DATASET

Three input images are captured by camera by varying the aperture of the camera we get three exposed images over exposed, medium exposed images and under exposed images.

Photo is said to be over exposed when there is loss of bright areas of the scene (highlight areas) appears to be washed out .photo is said to be medium exposed if all pixels are properly exposed and photo is said to be under exposed if there is loss of shadows details (darker areas) appears to be indistinguishable from black .three images are stored as our dataset. The reason for capturing the various images is because some of the pixels which are not properly exposed are properly exposed at least in any one of the image.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015

B.PREPROCESSING

In pre-processing of input images if images are not of same size we resize it and conversion from rgb to ycbcr. Where Y stands for luminance components which represent brightness of the pixel and cbcr are the chrominance components which represent the colour of the pixel [8].The reason for doing the conversion is because in rgb the correlation between the colour is important to décor related and to extract the y cb cr plane to have good compression and to reduce the bandwidth requirement while transmission of images and videos. After the conversion to ycbcr y cb cr component is temporarily stored and images are arranged according to the order if it is not arranged .cbcr can be down sampled without affecting the quality of image .y plane represents the brightness i.e. how much amount of light falling on the pixel[6].

Some predefined lut(look up table) is defined to increase the contrast of the image.

C.ILLUMINATION ESTIMATION

Here the y plane of three images are stored in scale 1(coarse scale) and scale 2(fine scale) and perform the illumination estimation.

D.NORMALIZATIONOF ILLUMINATION OF IMAGES:

Scale 1 and for scale 2 minimum and maximum values are obtained .to reduce the illumination differences it is performed .normalization refers to histogram stretching or contrast stretching .y we need to do normalization there are various reasons [3].

1) Image itself is very dark or illumination from images is less giving darker image

2) Dynamic range of the sensor is limited even if object illumination is good it is not able to capture

3)due to setting of aperture, exposure time is less amount of light falls giving dark image .here we are trying to modify the range of pixel intensity. It is one of the enhancement processes the contrast of the image is enhanced by expanding the range of pixel to specified pixel values.

E.GAMMA CORRECTION

It adjusts the brightness or darkness of the image it enhances the brightness of the image

F.CONTRAST ENHANCEMENT.

Output of gamma correction and normalization of images are taken and difference that is computed is contrast enhancement .the output is enhanced increase in contrast which is able to distinguish the lighter and darker regions of the image [9].

Contrast enhancement =Gamma corrected-normalization of image s for both scale 1and 2

All the three images coarse scale combine into one single scale 1

All the three images fine scale combine into one single fine scale2

Scale 1 and scale 2 both scale combine together and ycbcr is displayed at the output and ycbcr is converted to rgb for display final fused exposure image is obtained which has all details from the entire image in single image.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015

IV RESULT

Images are captured with varying exposure time and stored in directory as our dataset. input images are as shown above

First image is over exposed

Second image is medium exposed

Third image is under exposed

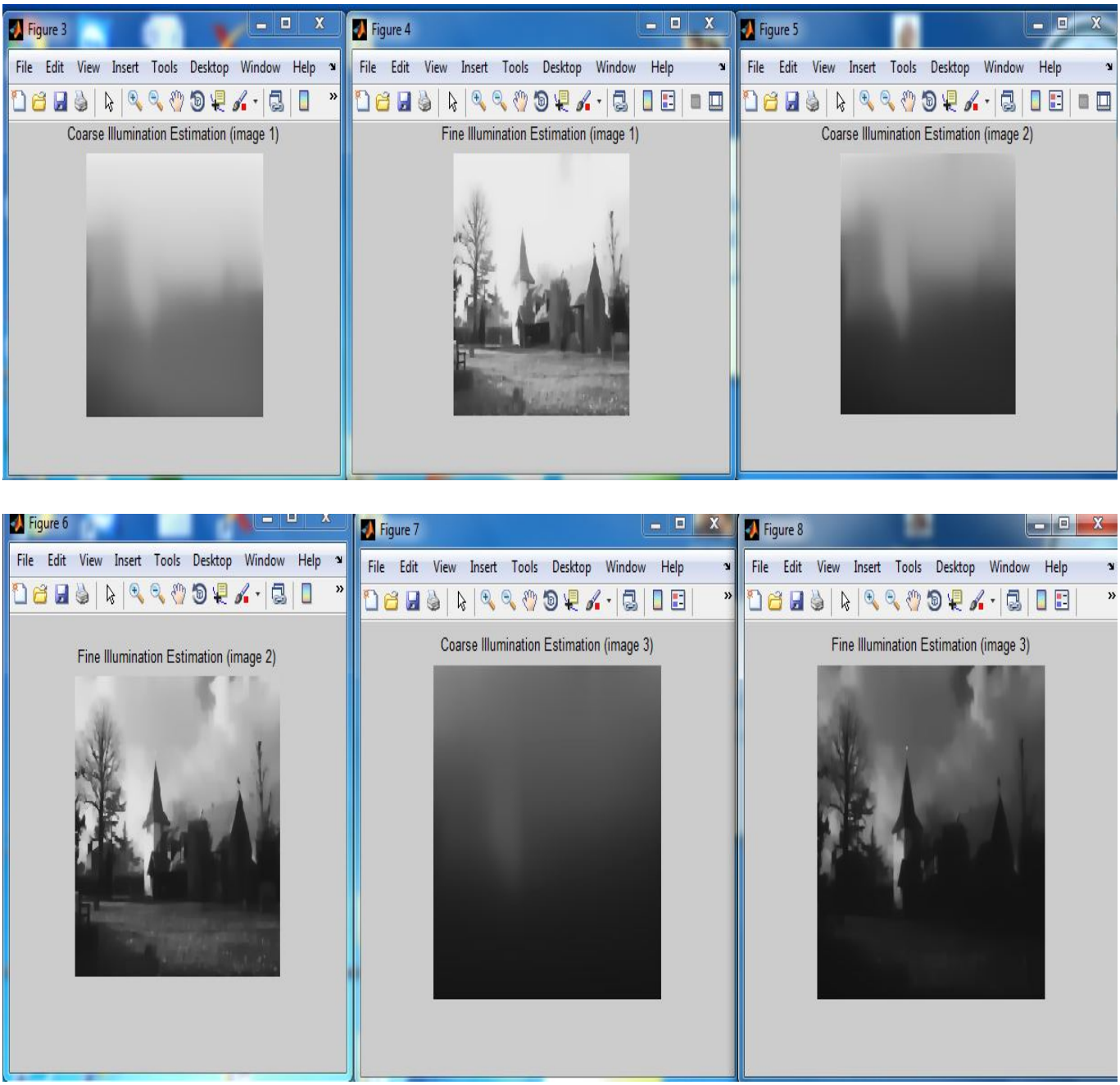
Images are converted from rgb colour space to ycbcr colour space .

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015



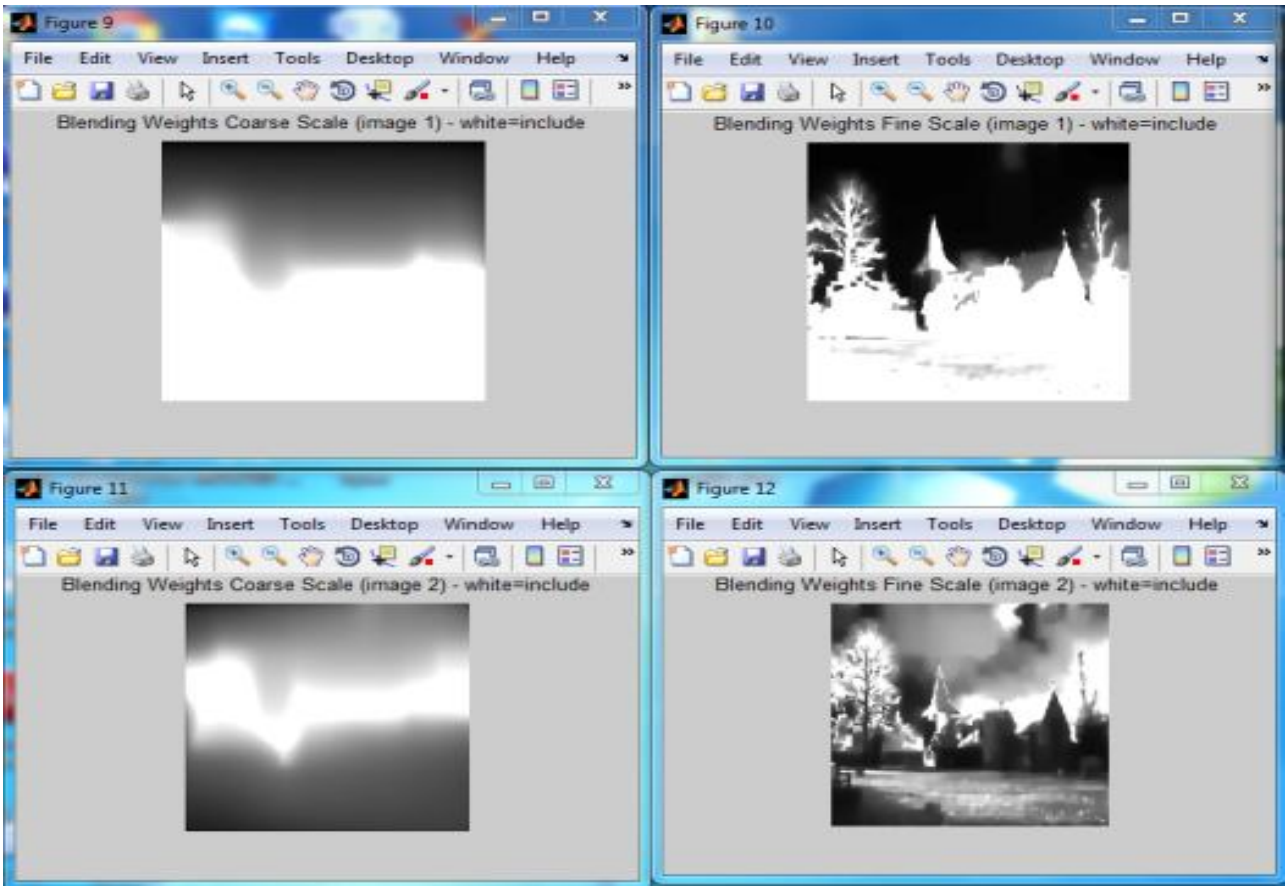
Coarse and fine estimation of illumination images (luminanace ie y plane of three images).

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

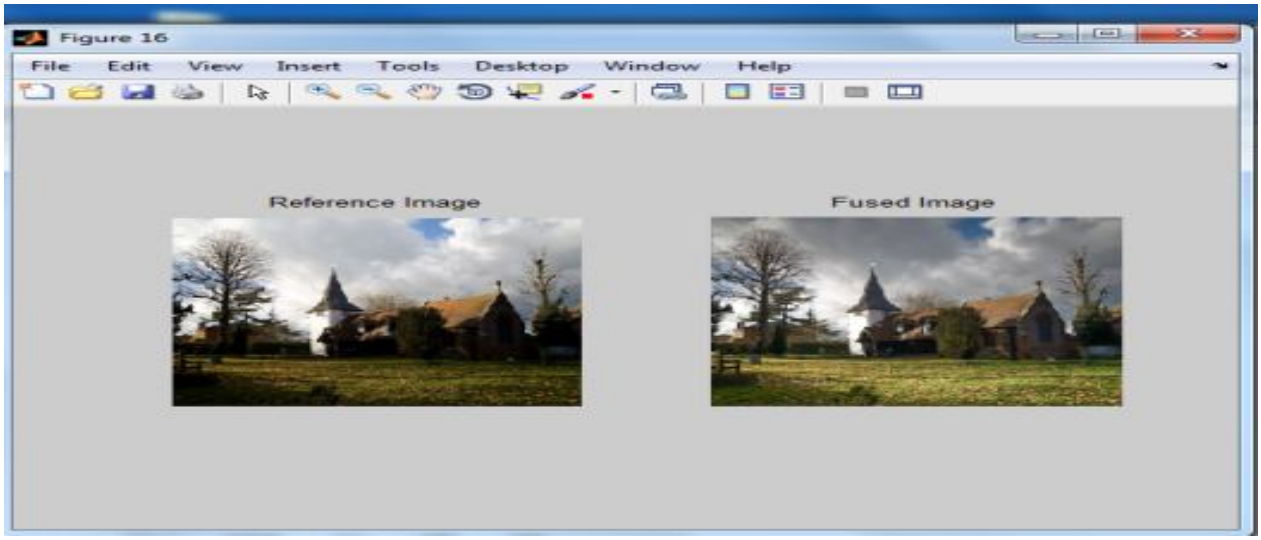
International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015



Blending of weights of coarse scale and fine scale images of three images giving final coarse scale(scale1)and fine scale(scale 2) scale 1 +scale 2 =fused image .



ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 5, May 2015

Here reference image is compared with fused image fused image preserves all the exposures from all the images and is enhanced .

V.CONCLUSIONS

In this paper, exposure fusion scheme is proposed to fuse multiple various exposed LDR images into a more detailed LDR image. The proposed scheme is applicable to static images .It is also applicable to various exposed images of the same scene irrespective of their lighting conditions. Therefore, it could be an ideal solution for real time exposure fusion over mobile devices.

REFERENCES

[1] S. Mann, "Comparametric equations with practical applications in quantigraphic image processing," *IEEE Trans. Image Process.*, vol. 9,no. 8, pp. 1389–1406, Aug. 2000.
[2] E. Reinhard, G. Ward, S. Pattanaik, and P. E. Debevec,*High Dynamic Range Imaging: Acquisition, Display and Image-Based Lighting*. San Mateo, CA, USA: Morgan Kaufmann,2005
[3] Rafael C Gonzalez and Richard E Woods, "Digital Image Processing", third edition, Pearson Education,2007.
[4] Neha Goyal, Gagan Jindal ,Multiple Exposure Fusion for High Dynamic Range Image Acquisition International Journal of Computer Science and Information Technology Research Vol. 3, Issue 2, pp: (109-113), Month: April - June 2015.
[5]Madiha Hussain Malik, S. Asif M. Gilani, Anwaar-ul-Haq ,"Wavelet Based Exposure Fusion ",in Proceedings of the World Congress on Engineering 2008 Vol IWCE 2008, July 2 - 4, 2008, London, U.K.
[6]Z. G. Li, J. H. Zheng, and S. Rahardja, "Detail-enhanced exposure fusion," *IEEE Trans. Image Process.*, vol. 21, no. 11, pp. 4672–4676,Nov. 2012.
[7]Jianbing Shen,Ying Zhao, Shuicheng Yan, and Xuelong Li, Exposure Fusion Using BoostingLaplacian Pyramid Ieee Transactions On Cybernetics
[8] Noor A. Ibraheem, Mokhtar M. Hasan, Rafiqul Z. Khan, Pramod K. Mishra Understanding Color Models: A Review ARPN Journal of Science and Technology VOL. 2, NO. 3, April 2012
[9] S.Gayathri1 , N.Mohanapriya2 , Dr.B.Kalaavathi3, Survey on Contrast Enhancement Techniques International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 11, November 2013