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REVIEW ARTICLE

A Review on a High Dynamic Range Image (HDRI) Acquisition

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Abstract— ***Exposure Fusion (EF) is a new concept which process and creates a low dynamic range (LDR) image from a series of exposures images. A common process for constructing of high dynamic range images (HDRI) acquisition is combining multiple images taken with different or multiple exposures and estimating the irradiance value for each pixel. Due to the object movement or camera movement the series of images contains the motion blur and ghosting artifacts. This paper provides an overview on a High Dynamic Range Image (HDRI) acquisition.***

Keywords— ***Exposure Fusion (EF), high dynamic range images (HDRI), multiple exposures***

I. INTRODUCTION

Digital cameras can only capture a limited luminance dynamic range and most monitors of images. Displaying media also have limited dynamic range due to the limited capacity of digital sensors. The dynamic range of real world scenes varies over several orders of magnitude, when taking a photograph of scene bright areas tend to be overexposed while dark regions tend to be underexposed, as a consequence. These bright and dark regions appear saturated in the image. An auto-exposure mechanism can be used to minimize the number of saturated pixels or to correctly expose a region of interest. Saturated pixels such as a face, suppose fails to correctly expose the entire image and recover the whole dynamic range of the captured scene. To enlarge the dynamic range spanned by conventional cameras a very interesting and powerful technique has been developed in the last few years known as high dynamic range imaging (HDR) [10].

Exposure Fusion (EF) takes the best bits from each image in the sequence of images and combines them to create a final image that is fused image. Technically fusing process of an image simply assigns weights to the each pixels of each image from the sequence according to luminosity, saturation and contrast, then by using these weights and finally includes or excludes them from the final image i.e. fused image. Nowadays, HDR imaging technologies have been developed and some HDR sensors are commercially available. They are used for in-vehicle cameras, surveillance in night vision, camera-guided aircraft docking [1], high-contrast photo development [2], robot vision [3], etc. There is tremendous progress in the development and accessibility of high dynamic range (HDR) imaging technology. Modern image processing and graphics software becomes HDR enabled. Also HDR digital photography replaces low dynamic range (LDR) technologies. HDR photographs are of much better quality and easier to be processed in a digital darkroom [6].

II. LITERATURE REVIEW

Takao Jinno and Masahiro Okuda [4], presents an accurate multiple exposure fusion technique for the HDRI acquisition. Proposed method simultaneously estimates displacements and occlusion and saturation regions by using maximum a posteriori estimation and constructs motion-blur-free HDRIs and also proposes a new weighting scheme for the multiple image fusion. Demonstration of the system proves that HDRI acquisition algorithm is accurate, even for images with large motion. In this paper, an algorithm of the HDRI estimation based on the Markov random field (MRF) model and constructs the HDRI. HDRI is constructed by considering displacements, underexposure and overexposure (saturation), and also occlusions. The displacement vectors, occlusion and the saturation are detected by the MAP estimation and do not required to estimate accurate motion vectors but displacement to the pixel with the closest irradiance, whereas the conventional methods such as try to accurately estimate the motion. This relaxation improves the final quality of the HDRI. Ghosting artifacts are accurately removed by using of the occlusion and the saturation, which clearly classified them and then separately treated.

Paper propose a method for the multiple-exposure fusion in which, the MAP-based method estimates occlusion, saturation, and displacements between input images and then construct the HDRIs by removing the artifacts. While in the conventional work it is hard to eliminate the ghosting artifacts, particularly when large motion occurs, the proposed method can compensate for the effects of motion, the occlusion, and the saturation and can obtain motion-blur-free HDRIs.

Ramratan Ahirwal, Yogesh Singh Rajput et *al. [5]*, introduce a ghost-free High Dynamic Range imaging algorithm for obtaining ghost-free high dynamic range (HDR) images. There is no movement of camera and objects when capturing multiple images and differently exposed low dynamic range (LDR) images only in this condition the multiple image fusion based HDR method works. This paper proposed single image-based ghost-free HDR imaging algorithm using histogram separation method and edge preserving de-noising technique. Because the existing multiple image-based HDR image generation method work only on condition that there is no camera and object movement during the acquisition of several differently exposed LDR image. Ghost artifact is unavoidable in the dynamic environment when acquiring multiple, differently exposed LDR images. To solve Ghost artifact problem, the proposed algorithm self generates three LDR images from a single input image. For proposed algorithm system uses techniques of histogram equalization and for removing noise amplification during the process of histogram equalization, uses the technology that is edge preserving noise suppression. Finally generates HDR image by fusing three LDR images. The proposed method that is HDR generates ghost artifact-free HDR images by using a single input image. For this reason the proposed method provides easy acquisition using a camera without using a tripod for acquiring LDR images. In the future it can be used as function in mobile phone camera in the form of integrated algorithm or post- treatment to provide the ghost artifacts-free HDR image.

Tomaszewska A. and Mantiuk R. [6], proposed a fully automatic method for eliminating misalignments between a sequences of hand-held photographs taken at different exposures. This paper proposed a method that is SIFT method, which is useful to search for key-points (or feature-points) in consecutive images, hence the key component of this paper is the SIFT method that is employed. The key-points are used to find matrices that transform a set of images to a single coordinate system and eliminate any global misalignments including general planar homograph. System use this technique to capture high dynamic range images from a set of photographs taken at different exposures which causes the misalignments that is blurring and artifacts and it is responsible to achieve the high quality HDR images. Alignment technique works for over- and under-exposed images. The proposed technique is not sensitive to image content. This paper presents implementation of the technique and the results which is taken from the variety of photographs under the testing of proposed technique.

E. Reinhard, M. Stark *et al. [7]*, this paper presents the time-tested techniques of photographic practice to develop a new tone reproduction operator. In this paper, an extended techniques developed by Ansel Adams which deals with digital images. New technique algorithm is simple and produces good results and applied for a wide variety of images. A proposed algorithm works on tone reproduction for digital images, which borrows photographic experience from last 150 years. Goal of this paper is to achieve the subjectively satisfactory and essentially artifact-free images. They used different methods, Stockham's homomorphism filtering, Tumblin-Rushmeier's brightness matching operator, Chiu's local scaling, Ward's contrast scale factor, Ferwerda's adaptation model, Ward's histogram adjustment method, Schlick's rational sigmoid and Pattanaik's local adaptation model. Above methods do produce subjectively pleasing images for many inputs.

S. Kausar Banu, D.K. Jawad and D.Venkatesh[8], implemented a prototype application which takes multiple images with different irradiance and produce high dynamic range images. Our application is the practical implementation of the technique proposed by Jinno and Okuda [4]. In this paper, their technique arrives at motion blur-free high dynamic range image by estimating occlusion, displacements and saturation regions concurrently. The MAP based method used in the application has capabilities to estimate artifacts, occlusions and motion blur so as to eliminate such problems in the process. The prototype application is able to prove the concept and the empirical results revealed the usefulness of the technique.

See Zi Siang, Khairul Hazrin Hashim *et al. [9]*, paper explores the development of an optimization of method and apparatus for retrieving extended high dynamic range from digital negative image. High dynamic range imaging (HDRI) technique provides benefit to Architectural photo imaging for preserving and presenting sufficient luminance in the shadow and highlight clipping image areas. The HDRI technique required multiple exposure images as the source of HDRI rendering system may not be effective in terms of time efficiency during the acquisition process and post-processing stage. System has numerous potential imaging variables and technical limitations during the multiple exposure process.

This paper explores an experimental method and apparatus that aims to expand the dynamic range from digital negative image in HDRI environment. In this paper, a method and apparatus explored is based on a single source of RAW image acquisition for the use of HDRI for the post-processing. System will cater the optimization in order to avoid and minimize the conventional HDRI photographic errors, which are caused by different physical conditions during the photographing process and the misalignment of multiple exposed image sequences. From the result it is observed that characteristics and capabilities of RAW image format as digital negative used for the retrieval of extended high dynamic range process in HDRI environment.

Abhilash Srikantha *et al. [10]*, provide an up-to-date review of the recently proposed methods for ghost-free HDR image generation. This paper provides a classification and comparison of the different methods is reported to serve as a useful guide for future research on this topic and also provide the ghost problem in high dynamic range (HDR) imaging is presented and recently proposed methods to solve this problem. All methods comparison in this paper is based on a quantitative evaluation of the accuracy of the different methods in detecting ghost regions in a given sequence of exposures and finally the results show that high contrast movement that is a moving object different from the background and can be correctly detected while small and low contrast movements. Small and low contrast movements are nothing but the similarity in colors between the object and the background and are more difficult to detect. This paper classify these methods based on the fusion of the domain, ghost map computation, the setting of parameters, , the number of exposures required and the final generated HDR image.

III. CONCLUSIONS

In high dynamic range (HDR) imaging the ghost problem, motion blur, misalignments between sequences of hand-held photographs, occlusion and saturation regions are present. This paper provides a overview on different existing methods to solve these different problems.

REFERENCES

[1] E. Reinhard, S. Pattanaik, G. Ward, and P. Debevec, “High Dynamic Range Imaging: Acquisition, Display, and Image-Based Lighting, ser. Morgan Kaufmann Series in Computer Graphics and Geometric Modeling.” San Mateo, CA: Morgan Kaufmann, 2005.

[2] F. Mccollough, “Complete Guide to High Dynamic Range Digital Photography”, China: Lark Books, 2008.

[3] M. Bualat, L. Edwards, T. Fong, M. Broxton, L. Flueckiger, S. Y. Lee, E. Park, V. To,H. Utz, and V. V. Clayton, “Autonomous robotic inspection for lunar surface operations,” in Proc. 6th Int. Conf. Field Service Robot., Jul. 2007, pp. 169–178.

[4] Takao Jinno and Masahiro Okuda, Member, IEEE “Multiple Exposure Fusion for High Dynamic Range Image Acquisition”, IEEE Transactions on Image Processing, Vol. 21, No. 1, January 2012.

[5] Ramratan Ahirwal, Yogesh Singh Rajput, Dr. Yogendra Kumar Jain, “Ghost-Free High Dynamic Range Imaging Using Histogram Separation and Edge Preserving Denoising”, International Journal of Computers & Technology, Vol 12, No.3,pp. 3329-3337, January 2014.

[6] Tomaszewska A. and Mantiuk R., “ Image registration for multi-exposure high dynamic range image acquisition”, International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG), pp. 49–56, Jan. 2007.

[7] E. Reinhard, M. Stark, P. Shirley, and J. Ferwerda, “Photographic tone reproduction for digital images,” *ACM Trans. Graph.*, vol. 21, no. 3, pp. 267–276, Jul. 2002.

[8] S. Kausar Banu, D.K. Jawad and D.Venkatesh, “HDRI (High Dynamic Range Image) Acquisition by Multiple ExposureFusion”, International Journal of Research Communication Technology, Vol. 2, Issue 8, august 2013.

[9] See Zi Siang, Khairul Hazrin Hashim, Harold Thwaites, Lee Xia Sheng, Ooi Wooi Har, “Retrieving Extended High Dynamic Range from Digital Negative Image - An Experiment on Architectural Photo Imaging” World Academy of Science, Engineering and Technology Vol:6, pp. 1833-1941, 2012.

[10] Abhilash Srikantha, D´esir´e Sidib´e, “Ghost Detection and Removal for High Dynamic Range Images: Recent Advances”, hal-00671579, version 1 - 9 Mar 2012.

