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Glare Removal: A Review

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Abstract— ***In this paper, we emphasis the study concerning of removal of glare from images and also remove flash exposure photography artifacts while image so here we enhancing visual quality is able to improved Without specialized sensor technology or custom, multichip cameras, high dynamic range imaging basically include time-sequential capture of multiple no. of photographs. In this proposed system we are going to highlight different schemes or approaches for remove the glare artifact. We are presenting a novel gradient projection scheme with removal of reflections and highlights from flash images. We present several experimental results that demonstrate the proficiency of algorithms to produce improved flash images having glare.***

Keywords — Glare, flash, reflection removal, gradient projection, photography, filters, high dynamic range

I. INTRODUCTION

Over the years, a number of approaches have been proposed for removing glare which defined as a “harsh uncomfortably of bright light. Glare is a sensation in response to bright light that can take a number of forms. Although light is necessary for vision, light usually bright light can also reduce vision visibility of an objects just because of high sensation light in basic HDR image As this report will describe, bright light can create scatter inside the eye not unlike that experienced when looking through the fogged glass, smoke, which makes objects harder to see the near by object as well as the object placed in long distance. Light that is much brighter than the rest of field of view can also cause an unwanted discomfort, annoyance, or even pain, and this sensation is another form of glare. In HDR image, glare is a sensation caused by bright or flash of light. Glare can reduce one’s ability to see, create feelings of discomfort or both in eye retina. Since we rely on higher range of glare for obtaining information about clipped HDR image regions, the methods that optically suppress glare Sometime visibility discomfort caused by viewing oncoming vehicle headlamps or headlamps in rear view mirrors [1]-[7].

The human visual system has developed a clever mechanism to report with highly saturated scene regions, light sources. The saturated regions from glare, which is produced by the high intensity of light reflects on visual system which able to infer higher brightness. Recently the high dynamic range (HDR) display devices provide significantly greater brightness in image if

any exposed of light has contain in HDR image it produced glare with high intensity and dynamic range compared to conventional display technology. Furthermore, image with no flash illumination has a some effect on the perception of the imagery displayed, and its impact on user preferences for brightness and contrast must be understood [8].In the Encoding Details of bright image regions in a high dynamic range image, such as highlights and directly visible light sources, are encoded into specially shaped glare patterns optically added to the image. For reducing glare area we now proposed method for decoding both the low dynamic range image and the highlight details from a glare photograph taken with a flash light. Considering the light transport ,here we can see that it is impossible to solve for the direct glare-free latent image, due to sensor saturation. Instead of we broke up the problem by separately considering the saturated and the unsaturated pixels in the observed image. Flashes are often used to capture a good photograph of a scene under very low-light conditions. Therefore, flashes produce a variety of undesirable effects as well as artifacts [9]. They tend to saturate nearby objects while failing to light up distant. Since the flash intensity falls with distance from the camera, flashes produce a penetrate effect, where brightness reduced quickly with depth. Moreover, flashes are flagrant for producing undesirable reflections. Often any one can sees the reflection of an object that shows outside the field of view of the any camera but is strongly lit by the flash, or by a pertaining object within the field of view. One also can sees strongly exposed due to reflection of the flash itself by glazed objects in the scene. Previous work has shown that a flash and ambient image pair can be used to artifact free and enhance the basic ambient image as well as to achieve to improve image fusion calibration [10]-[14].

II. LITERATURE SURVEY

Mann and Picard proposed a extending dynamic range by collecting differently exposed pictures in the year 1995 , the main features of the scheme is that they combining multiple amount of digital images which has been taken at different exposures time just to reached at an extended response of floating point image array having “self-calibration” method also compute certinity function and weight it. [1].Until the year 1997 Debevec and Malik developed a scheme that present a method which has been recovering HDR radiance maps taken with conventional imaging equipment. In our method, various photographs of the scene are taken with different amounts of exposure. The algorithm state that different exposed photographs which recover the response function of the imaging process, up to the factor of scale, using the assumption of reciprocity and also the algorithm can fuse the various photographs into a single, HDR radiance map contain pixel values are relate to the true radiance values in the photograph scene. In which they constructed method on images acquired with both photochemical as well as digital imaging processes and also discuss how this work is applicable in different areas of computer graphics involving digitized photographs. A few applications of HDR radiance maps used for realistic motion blur and also for simulating the response of the human visual system [2].

In the year 1997, Nayar, Fang, and Boult, anticipated techniques for Separating the reflection components using color as well as polarization in this paper pertaining interreflection and reflection produced strong highlights in the brightness image which contain minute quantity of glare reflection of light. So for separating specular as well as diffused component of reflection from image which can allow specific pattern of object. [3]. A very simple method developed by Nayar, and Mitsunaga in the year 2000 for significantly improved the dynamic range of virtually any type imaging system. The basic principle take continuous sample with spatial and exposure dimensions of image irradiance. There are several different ways to get image detector array with optical convention which has pattern with spatially varying transmittance, by giving adjacent pixels on different exposures scene. The captured image is mapped into a HDR image using an efficient image reconstruction

algorithm. The end result can measure a very wide range of scene radiances which produce a substantial greater number of brightness levels, with a slight reduction in resolution [4]. In the year 2002, R. Fattal et al. anticipated a new method for rendering HDR images on conventional displays. This method is little bit simple, robust, and easy to use. Where one can manipulate the gradient field of the luminance high dynamic range image by depletion the magnitudes of large gradients. on the modified gradient field we solve it by poison equation which gives low dynamic range image. Our results is capable of drastic dynamic range compression, while saving fine details and avoiding common artifacts, such as halos, gradient reversals, or loss of local contrast it also able to significantly improve common typical images by taking out detail in dark regions [5].

In 2003 P. Perez et al. has project generic interpolation machinery based on particular solving Poisson equations, a which has been contain variety of getting novel tools are introduced for seamless editing of image regions. The set of tools permits the seamless importation of opaque as well as transparent source image regions into a targeted region. Where as the second set is totally depend on common mathematical ideas that allow the user to modify the appearance of the image seamlessly, within an appropriate selected region. These changes can be arranged to affect the texture, the illumination, to make a rectangular selection and the color of objects deceptive in the region [6]. E. Eisemann and F. Durand has planned in year 2004 to enhanced Flash photography by via intrinsic relighting Where they take photographs shot in dark environments region area by combining that picture taken with the available light and also with the flash. They also preserve original lighting. By using bilateral filter the images is decomposed into detail and large scale. Then they again construct the image using the large scale of the available lighting also detect and correct flash shadows [7]. R. Raskar, K.Tan, R. Feris, J.Yu, and M.Turk, also present work on multi-flash imaging in year 2004 Where they take approach in non-photorealistic rendering to capture and create shape features of real-world scenes using a camera with multiple _ashes along depth discontinuities in the scene. The projective-geometric relationship of the camera-_ash setup exploited detection of depth discontinuities and. The resulting images get is more clear to the 3D structure of the imaged scenes [8].

G. Petschnigg et al. proposed method for both flash and no flash images in year 2004 in which they featured the Digital photography which has been made it possible to quickly take a pair of images of low-light environments with flash and without flash to take ambient illumination. A variety of applications can combine the strengths of such flash and no flash image pairs which include denoising and detail transfer white-balancing , continuous flash and red-eye removal [9].

In the year 2004 , A. Agarwala et al. has projected knowledge on Interactive digital photomontage. It is a computer-assisted framework for collecting parts of a set of photographs in single picture ,a process which call as "digital photomontage." framework use two techniques one as graph-cut optimization and other as gradient-domain fusion, a process based on Poisson equations which visible artifacts in the image. Image objectives are applied sepratly to each and every pixel location which generally involve a function of the pixel values drawn from that same location is typically user applies a list of image objectives to create a finished composite [10].

R. Raskar, A. Ilie, and J. Yu present a class of image fusion techniques which automatically combine images of a scene in 2004.Where they take an example of the non-realistic appearance used to improve the context in night time traffic videos so that they are easy to understand. This approach is based on a gradient domain technique ,while avoiding traditional that face problems like aliasing, ghosting and haloing. Where they presents several amount of results on increasing the information density of low quality night time videos as well as images [11].

In year 2006 ,F. Banterle, P. Ledda, K. Debattista, and A. Chalmers are provided in many Tone Mapping Operators techniques have been presented in order to display HDR image on typical display devices. To control the contrast TMOs

compress the luminance range and expands a Low Dynamic Range Image into a High Dynamic Range image. Inverse Tone Mapping Operators could have potential to revive all of this content for use in HDR display and image-based lighting. This paper propose an approximate solution that uses median cut to search out areas considered in high luminance and subsequently Expand-map to extend the range in the high luminance areas [12]. Amit Agrawal et al. propose to use a flash and ambient image to produce better flash images also present a novel gradient projection scheme based on a gradient coherence model take contained Gx, Gy variable gradient field for each pixel which removal of reflections and highlights from flash images having minor glare . Let F be the flash radiance map, or the image strictly due to a unit flash intensity. The flash-only image F is F scaled by the flash intensity P. Let a be the ambient radiance map for an ambient image A is a scaled by the exposure time E. The scale factors E and P are both constant for all pixels. The irradiance map of a linear response given by :- $I = F + A = \Phi P + \alpha E$. The flash duration, usually 1 millisecond, is smaller than the exposure time E .A brightness-ratio based on algorithm that allows to fall off in the flash image brightness due to depth. To analyze the flash intensity-exposure space and propose a method for adaptively sampling to minimize the number images for any given scene. The several experimental results that demonstrate the capability of algorithms to improved flash images [13].

In year 2007, E. Talvala, A. Adams, M. Horowitz, and M. Levoy anticipated record of a high dynamic range image, by taking one snapshot or a sequence snapshots, is limited by the presence of veiling glare the contrast has been reduced everywhere within the some field of the view and such glare arises from multiple scattering of light inside the camera's body .By calculating each separately the direct and indirect components of the camera light transfer, In a particular camera one can maximized dynamic range is capable of recording. In this paper, two methods used for removing glare are deconvolution by a measured glare spread function and selectively block the light that contributes to veiling glare with deconvolution. [14].

In year 2008 , R. Raskar et al. introduced the Glare aware photography in camera lenses the 4D ray sampling to minimized glare effects. While previous one approaches have analyzed glare in 2D image space that glare is inherently a 4D ray-space phenomenon.. This scheme explore masks for uniform and non-uniform ray sampling technique to show how a practical solution is used to analyze the 4D statistics without significantly compromising image resolution [15]. P. Didyk, R. Mantiuk, M. Hein, and H. Seidel utilize the full potential of new high dynamic range displays, the video sequences in a system of bright luminous objects improved the quality is proposed in year 2008 .Which may classifies saturated regions as lights, reflections and diffuse surfaces by using a semi-automatic classifier .[16]

In year 2008 , A. Yoshida et al. introduced scheme for glare illusion is used in CG rendering, To evoke the illusion, an image is convolved at basic point spread function (PSF)evokes by of the eye or a Gaussian kernel. That functions allows : 1) An illusion of the same evoke the Gaussian kernel or higher strength than that produced by the Point spread function with less expensive, 2) The perceived luminance raise by glare illusion by $20 - 35\%$, 3) The undesirable Mach-band effects produced by some convolution kernels. [17] O. Gallo et. al. projected an scheme which is capable of dealing with a large amount of movement in the scene with a reference image previously selected from the stack of images in year 2009 . It create the HDR image by average radiance estimates of all regions and also compensate for camera calibration error [18].

In year 2011 , C. Lau, M. Rouf, M. Trentacoste, R. Mantiuk and W. Heidrich. Proposed a novel view of High Dynamic Range capture, which is depend basically on a computational photography approach. Where firslyt optically encoding done with both the high light information into LDR image that can be captured with a conventional image sensor and low dynamic range part of the scene and high light information into LDR image that can be captured with a conventional image sensor. This process overcome by using a cross-screen or star filter then decode, in software [19]. Kanchit Pamanee, Angela Duangchit,

Roungsan Chaisricharoen has projected a new method recovering information from the surrounding area of glare centroid in 2013 . Three-dimensional recursive search (3DRS) is assigned to extract luminance information separate them from intensity of edges due to material to find out edge features in animated images from Macroblock of the previous non-glare affected frames. To improve luminance of the distorted MB tone mapping method is applied. The result shows 15 % implementation in frames which contain glare area under the higher peak-signal-to-noise ratio (PSNR) compared to glare simulation [20].

III. CONCLUSION

In this paper , there are various schemes or approaches are used for removing glare in different types of images like HDR, LDR , flash and ambient image which contain some photographic artifact .So here in below Table I ,we visualized and studied different kinds techniques or filters and there performance factor is evaluated on some basic criteria :- image type, method/filters, exposure used and among all techniques we observed that gradient projection and flash sampling techniques gives more relevant result as compared to the others techniques.

TABLE I
OVERALL REVIEW ON BASIC CRITERIA

Sr. no	Author name	Year	Image Type Or formate	Techniques and Filters used	Exposures Time Formate
1	S. Mann and R.W.Picard [1]	1995	Digital image	Self-colibration & Wyckoff filter	Under exposure, proper Exposure, over exposure
2	P.E.Debevec and J. Malik[2]	1997	HDR	Image compositing scheme	By taking different amount of exposure
3	S.K.Nayar and T. Mitsunaga [4]	2000	HDR	Spatially varying pixel	Varing F-number exposures
4	R. Fattal et al. [5]	2002	HDR, LDR	Gradient function and poisson equation	Increasing from left (1/1000 of sec) to right (1/4 of sec)
5	P. Perez et al. [6]	2003	LDR	Poisson equation	Under exposure
6	G. Petschnigg et al. [9]	2004	Flash or no flash	Noise removal and Bilateral filtering	Long exposure
7	Amit Agrawal et al. [13]	2006	HDR & Flash or ambient	Gradient projection and flash sampling	Increasing from left 1/250 to the right 4
8	R. Raskar et al. [15]	2007	2-D image	4-D Ray Sampling	Single exposure and multiple exposure
9	C. Lau et al. [19]	2011	HDR	Encoding method and Cross-screen filter	Long and short exposure

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