A Survey on Pixel Enhancement Techniques

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Abstract— Conventional images are store an exceptionally constrained element range of shine. The genuine luminance in the brilliant region of such images is regularly lost because of clipping. When clipping changes the colour ratio of a pixel, it also results in colour distortion. In this survey, explore existing algorithms and ways to improve both the luminance and chromaticity of the clipped pixels. A literature of various work in HDR presented.

Key words: Clipping, colour restoration, high dynamic range (HDR), Low dynamic range (LDR), inverse tone mapping

I. Introduction

Due to growth in the field of image processing, HDR shows that increased critical enthusiasm for industry. It is realized that the dynamic scope of conventional showcases is exceptionally limited compared to the range of intensities perceivable by the human vision system. Linear displays normally have a dynamic scope of around two orders of magnitude, whereas the human visual system has an overall dynamic range of nearly 10 orders of magnitude, and can also perceive intensities over a range of about five orders of magnitude [Ferwada, 2001] and [E. Reinhard et. al, 2006]. This has motivated the advancement of HDR image capturing and display technology. In this survey paper we consider the issue of HDR content and proper method to display them on a conventional LDR media. Tone mapping so as to map addresses this issue solid contrast from the HDR scene qualities to the LDR displayable extent while saving the image subtle elements and color appearance that are essential to value the original scene content.

II. High Dynamic Range Imaging

This present reality has significantly more brightness variety than can be captured by the sensors available in most cameras today. The radiance of a solitary scene might contain four orders of magnitude from shadows to completely lit areas. Average CCD or CMOS sensors just catch about 256-1024 levels. (The non-linear allocation of levels in a gamma bend can enhance this marginally.) The constrained dynamic range of cameras has roused numerous solutions in recent years. One method of obtaining a full radiance map is to take various images at different exposures also, to consolidate these to make a High Dynamic Range (HDR) map of the scene.

Once a HDR image has been computed, it can at that point be rendered to a display. Subsequent to run of the mill showcases are just ready to yield around two orders of magnitude, a contrast reduction must be performed on the HDR image. This tone-mapping issue has as of late been investigated by various scientists. Before we can see the HDR video, it must be tone-mapped. Applying one of the current algorithms on an edge by-edge premise is not adequate, as this can prompt noticeable transient irregularities in the mapping.

III. Literature Review

Recently developed HDR shows have greatly extended the limited dynamic range of conventional cathode ray tube (CRT), liquid crystal display (LCD), and projector based displays. [Akyuz et al., 2007] shows that High dynamic range displays pictures with more defined subjective quality than LDR shows. With a specific end goal to adequately show legacy LDR pictures and recordings on HDR shows, inverse tone mapping plans have been produced to expand the dynamic range of LDR pictures and recordings.

Legacy pictures and recordings store just a little dynamic range of information due to the limitations of the capturing and display devices. The very illuminated or dull parts of a image are clipped to the upper or lower displayable breaking points, and subsequently, information is lost. Special consideration has been seen to the restoration of the clipped pixels. Over the most recent couple of years, a few routines [4], [5], [6], [7], [8] have been created to improve the luminance of the clipped pixels so that the improve clipped regions have higher dynamic range and look more realistic on HDR displays.

Kesharee Singh et al. present an effective method to eliminate or improve noisy pixels in HDR images for contrast enhancement. These images contains high intensity pixels on which various techniques such as contrast enhancement, brightness enhancement, filtering, segmentation is very difficult, but the technique implemented here not only improves the contrast of the image but also reduces the noise level of the pixels. The performance of result is done on following parameters such as PSNR, time computation, error rate and smoothness factor. In this technique implemented here is efficient in terms of smoothness and time. Various HDR images are tested on the existing technique using Local Tone mapping and the proposed technique using the hybrid combinatorial method of kernel padding and linear transformation and histogram equalization. The work proposed is better in terms of PSNR, Error rate, computational time and the smoothness factor [10].

Ji Won Lee et al. in this proposed a noise elimination technique and an adaptive distinguish improvement for the local TM (Tone mapping). The offered local TM procedure compresses the luminance of HDR Image and decomposes the compressed luminance of a HDR image into multi-scale sub bands using the discrete wavelet transform(DWT). In noise elimination condition, the images that are stale filtered out using a soft-thresholding and bilateral filter, then, the active ranges of the clean sub bands are improved by considering local contrast applying the changed luminance compression function. At the color tone-mapped pictures is reproduced applying an adaptive saturation control factor and generate the tone-mapped image using the projected local TM. Computer imitation by noisy hdr images displays the efficiency of the offered local Tone mapping procedure, in terms of visual value as well as the local distinguishes. It can be used in numerous shows with noise reduction and contrast improvement. The result of images with proposed algorithm gives better from traditional TM algorithms. The proposed local TM algorithm effectively reduces coarse-grain noise and enhances the local contrast [11]

Wen-Chieh Lin and Zhi-Cheng Yan proposed a local TM schemes that compliments both attention And adaptation effects. They allow the HDR saliency chart to evaluate an attenuation chart, which expects the attentive and non attentative regions in an HDR image. The attenuation chart is then used to locally regulate the contrast of the hdr image according to attention and adaptation models found in psychophysics. These practical their tone mapping approaches to hdr images and videos compared with the results produced by three state-of-the-art tone mapping procedures. This experiment shows that their method creates outcomes with superior image quality in terms of preserving particulars and chromaticity of visual salience [12].

R. Mantiuk Tone mapping offer refined techniques for mapping a certifiable luminance extent to the luminance scope of the yield medium yet they regularly cause changes in shading appearance. In this paper various subjective appearance to match changes in image colour after contrast compression and enhancement. The experiment results showed that relation in between contrast compression and color saturation modification that matches color appearance is non-linear and smaller color correction is required for small change of contrast. In this a new evaluation formula for colr correction that can be apply in tone mapping algorithms. The work can also extended to global and local tone mapping and proposed contains original image color after tone scale manipulation[13].

Dejee Singh et al. presents that Image blur is the challenging to purpose of avoid in numerous circumstances and can often ruin a photograph. Image deblurring and re-establishment is the compulsory in digital image processing. Image deblurring is a procedure, which is used to make pictures sharp and valuable by using mathematical models. Image deblurring have wide applications from customer photography, e.g., eliminate motion blur due to camera shake, to radar imaging and tomography, e.g., eliminate the outcome of the imaging method response. There have been many techniques that were proposed in this regard and in this paper, we will scan dissimilar approaches and methods of deblurring. The examination is done on the basis of presentation, kinds of blur and PSNR [14].

Haiyan Zhao offers the thought regarding article combines with human visual feature to check digital watermarking technique to insert watermarks, extracts watermarking in line with the harm state of affairs of watermarking, and that combines with other visual redundancy feature to attain an image scrambling algorithmic program that's simple to recover and a recovery time for broken scrambling image. [15].

Chulwoo Lee [13] has proposed an effective scheme in contrast enhancement. In this proposed a novel contrast enhancement algorithm based on the layered difference representation of histograms Iwanami, T., T. Goto, S. Hirano, and M. Sakurai [17] have proposed regional based dynamic histogram equalization for the contrast enhancement. In this paper DRSHE technique image block is used to enhance the regional image contrast with automatic parameter setting and in short computational time.

Akhilesh Verma, Archana [18]present study of various contrast enhancement method. GA gives effective finding in global spaces to get a best solution. For this no knowledge regarding image Order to select the appropriate enhancement function.

Amina Saleem, Azeddine Beghdadi and Boualem Boashash [19] in this a fusion-based contrast enhancement which adds related information to remove limitation of contrast enhancement algorithms. In this technique adjusts the prerequisite of nearby and worldwide contrast enhancements and a devoted representation of the first picture outside, an objective that is hard to accomplish utilizing ordinary improvement strategies.

Turgay Celik and Tardi Tjahjadi [20] propose an adaptive image equalization algorithm which automatically enhances the contrast in an input image. This algorithm use Gaussian mixture model (GMM) to model the image greylevel allocation, and the juncture points of the Gaussian components in the model are used to partition the dynamic range of the image into input grey-level intervals.

IV. RELATED TECHNIQUES

A. *The Reproduction Of Specular On HDR Displays*

In [4], author propose a tone scale work that exploits the increase in element scope of HDR monitors to recreate the brightness of specular highlights, which were clipped or compressed by the catching and rendering procedure to Standard Dynamic Range image. We approve the utilization of such capacities with a psycho-visual experiment conducted on a HDR display, where the observer's task was to judge pairs of tone-scaled images. The result of the evaluation demonstrates that utilizing part of the augmentation of dynamic range gave by HDR presentations to improve the brightness of specular highlights leads to more natural looking images.

B. *Tone Mapping Of HDR Displays*

Meylan et al. [5] apply a piecewise linear tone er scale function, composed of 2 slopes, one of which is applied to the diffuse areas and another one is applied to the specular reflected areas, in order to particularly enhance the specular highlights. Author addresses the issue of re-rendering pictures to High dynamic range shows which were initially tone mapped to standard showcases. As these new HDR shows have much LDR than standard shows, an image rendered to standard showcases is liable to look too splendid when displayed on a HDR display. In addition, on account of the operations performed amid catch and rendering to standard shows, the specular highlights are liable to be clipped or compressed, which causes a lot of realism. A tone scale function hence proposed to re-render the first tone mapped to ordinary displays that focuses on specular highlights. The proposed method detect specular highlights by utilizing two low pass filters of various sizes alongside morphological administrators.

C. *Inverse Tone Mapping*

In [6], the Median Cut algorithm and Gaussian filter are applied to estimate the light source density map. Then a luminance expansion is applied to improve the clipped regions. In this authors presented a new operator for LDR images, the Inverse Tone Mapping Operator. As the outcomes demonstrate this inverse Tone Mapping Operators (iTMO) performs well for IBL, photos and video sequences dynamic range enhancements in generalIt depends on the inversion of Global Photographic Tone Reproduction administrator and an Expand Map built using density estimation of light source generated by Median Cut. We achieved preferred picture quality over with the naïve algorithm, and we uprooted noise and blocky impacts that can be seen in this algorithm. The iTMO problem is unconstrained, so we made some hypothesizes about the image. The main hypothesis is an input image (or a sequence of number of dark, normal and bright regions. If this is not the case the iTMO and Expand Map cannot create convincing results. The main problem of our algorithm is video processing. In that case we cannot use the Expand Map, because it can vary enough at each frame to create flickering in the video. Also to calculate the best possible Expand Map user interaction is sometimes needed to set the parameters of the density estimation (radius, number of light sources at least). Therefore we can enhance images in case of videos) with a well balanced videos only using iTMO, in order to have smooth results. And this is a very big limit to the range that we want to expand, as we have shown before.

D. LDR2HDR: On-The-Fly Reverse Tone Mapping Of Legacy Video And Photographs

In [7], a smooth brightness enhancement function is obtained by blurring a binary mask with a large kernel of approximately Gaussian shape. In this paper we depict a system for boosting the dynamic range of legacy video and photographs for review on hdr shows. Our accentuation is on real-time processing of video streams, for example, web streams or the sign from a DVD player. We put specific accentuation on strength of the system, and its capacity to manage an extensive variety of substance without client balanced parameters or obvious ancient rarities. The technique can be actualized on both design equipment and on sign processors that are specifically coordinated in the HDR shows.

E. Enhancement Of Bright Video Features For HDR Displays

A semiautomatic classifier was developed in [8] to group the clipped areas as lights, reflections, or diffuse surfaces. Every class of articles is upgraded concerning its relative brightness. All of the above schemes enhance only the luminance, while the chromaticity enhancement is not considered.

In this paper propose the semiautomatic system for enhancement of bright luminous objects in video sequences, so that video intended for low contrast (ldr) display can exploits full potential of new high contrast display. the enhanced video show bright luminous objects for example lamps, candles, explosions, specular reflections, as much brighter than diffuse surfaces, resulting in reproduction that is much closer to viewing in actual scenes. bright object is most important visual cues that guide our depth and shape perception and let our visual system assess illumination and reflection in a scene. it has been exhibited that such enhanced reproduction are usually preferred and regarded to be of better quality.

F. Correction Of Clipped Pixels In Color Images

In [9], system depends on the solid chroma spatial correlation between's clipped pixels and their encompassing unclipped area. After recognizing the clipped ranges in the picture, we segment the clipped areas into locales with comparative chroma, and gauge the chroma of each clipped area in light of the chroma of its encompassing unclipped area. We redress the clipped R, G, or B color channels in light of the evaluated chroma and the unclipped color channel(s) of the present pixel. The last step includes smoothing of the limits between areas of various clipping situations.

For a clipped pixel, frequently not every one of the three red (R), green (G), and blue (B) channels are clipped, nor does likewise measure of clipping occur in every channel. If clipping changes the R, G, B color ratios of a pixel, then the result is color distortion. Truth be told,color distortion occurs very often. Although individuals are usual to the clipping impact in highlights, where the distorted color is desaturated and near white, the distorted colors near the mid tone produce an exceptionally observable and disturbing effect.

V. CONCLUSION

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Despite the fact that individuals are usual to the clipping impact in highlights, where the distorted color I desaturated and near white, the distorted colors near the mid-tone produce an exceptionally perceptible and disturbing effect.

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