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Removing Artifact from DEFTH Histogram and Contrast Modification

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***Abstract*— This work is concerned with the modification of the gray level or color distribution of digital images A common draw-back of classical methods is that it allows large number of artifacts or the attenuation of details and textures. In this work, we propose a generic filtering method enabling, given the original image and the radio metrically corrected one, to suppress artifacts while preserving details. The approach relies on the key observation that artifacts correspond to spatial irregularity of the so called transportation map, defined as the difference between the original and the corrected image. Then Transportation map which is the difference between original image and transformed image is calculated, then a generic filtering method also called TMR filter which draws on the nonlocal Yaroslavsky filter is used to regularize the transportation map so that artifacts are suppressed . On the basis of the histogram-modification framework, the color and depth image histograms are first partitioned into subintervals using the Gaussian mixture model. The positions partitioning the color histogram are then adjusted such that spatially neighboring pixels with the similar intensity and depth values can be grouped into the same sub-interval. By estimating the mapping curve of the contrast enhancement for each subinterval, the global image contrast can be improved without over-enhancing the local image contrast.**

***Keywords*—Histogram equalization, adaptive histogram equalization, Depth Histogram, Transportation map, TMR filter, color transfer, contrast adjustment, contrast equalization**

I. INTRODUCTION

Applying contrast changes to digital images is one of the most essential tools for image enhancement. Such changes may be obtained by applying a prescribed function to the gray values of images, as in contrast stretching or Gamma correction, or by prescribing the histogram of the resulting image, as in histogram equalization or specification from an example image [1]. Such operations are characterized by the way they affect the histogram of an image and may be seen as Modifications of their gray-level distribution. These techniques extend to color images by considering a luminance channel, as in Gamma correction, or by working on each color channel separately. The prescription of the 3-D color distribution is more satisfying because it avoids the creation of false colors, but is also more involved.

Applications of contrast or color changes are of course extremely numerous. With the popularization of digital photography, these techniques have become immensely popular through the use of various "curves" in image editing software. Early uses of contrast equalization are the enhancement of medical images [2] and the normalization of texture for analysis purposes. In a related direction, the construction of *midway* histograms [3], [4] is useful for the comparison of two images of the same scene. More recently, extensive campaigns of old movies digitization have claimed for the development of contrast modification techniques to correct flicker [5], [6]. Similar techniques are commonly used in the postproduction industry [7], [8]. Another field of increasing industrial interest in which contrast changes play a central role is the one of imaging in bad climatic conditions, see, e.g., [9]. Color modification or transfer is also useful for a wide range of applications, such as aquatic robot inspection, space image colorization, and enhancement of painting images.

The drawback of color and contrast modification techniques and compression techniques is to create visual artifacts such as noise enhancement, detail loss, texture washing, color proportion inconsistencies and compression artifacts. Several methods have been proposed in last few years to remove artifacts from color and contrast modification .The simplest one is proposed in [10] in the context of local histogram modifications and amounts to limit the modification depending on gradient values. While improving the results in some cases, this approach let most artifacts untouched. In [11], it is proposed to correct color transfer artifacts by using variation regularization after the transfer. Still in a variation framework, the authors of [12] propose a unified formulation containing both color transfer and regularity constraints in a single energy minimization. For the problem of color proportion, a possible approach is to transfer color after having identified some homogeneous regions, as proposed in [13] and [14]. A related class of works takes interest in the avoidance of compression artifacts, usually using the properties of the compression scheme [15].

Image contrast enhancement techniques have been extensively studied in the past decades. Among various contrast enhancement approaches, histogram modification based methods have received the greatest attention owing to their simplicity and effectiveness [21]. In particular, since global histogram equalization (GHE) tends to over-enhance the image details, the approaches of dividing an image histogram into several sub-intervals and modifying each sub-interval separately have been considered as an alternative to GHE [22], [23]. The effectiveness of these sub-histogram based methods is highly dependent on how the image histogram is divided. The state-of-the-art algorithm [22] models the image histogram using the Gaussian mixture model (GMM) and divides the histogram using the intersection points of the Gaussian components. The divided sub histograms are then separately stretched using the estimated Gaussian parameters.

The histograms of color and depth images are first divided into sub-intervals using the GMM. The intervals of the color image histogram are then adjusted such that the pixels with the similar intensity and depth values can belong to the same interval. The proposed algorithm is thus implicitly depth adaptive, and the experimental results demonstrate the effectiveness of the proposed algorithm. In this paper TMR filter is proposed as a universal approach to remove all visual artefacts.

II. LITERATURE REVIEW

Still in a variational framework, the authors of [17] propose a unified formulation containing both color transfer and regularity constraints in a single energy minimization. For the problem of color proportion, a possible approach is to transfer color after having identified some Color alteration is an active research area in the communities of image processing and computer graphics. There searches much related with this work in the area of color alteration include color transfer, color correction, colorization of gray scale and reverse processing. Applications of this work range from post processing on images to improve their appearance to more dramatic alterations, such as converting a daylight image into a night scene.

First, they convert pixel values in RGB color space to Rudermanetal's perception-based color space l α β in1998. Then, they calculate the mean and standard deviations along each of the three axes, and then scale and shift each pixel in the input image. Last, they transform pixel values to return to RGB space. While this method has produced some very believable results.

Their approach is qualitatively and quantitatively superior to the conventional color correction. Another color correction method has been developed by Schechner and Karpel for underwater imaging and great improvement of scene contrast and color correction are obtained in 2004.Jiaetal propose a color correction approach based on a Bayesian framework tore cover a high quality image by exploiting the tradeoff between exposure etimeand motion blur in 2004.

Colorization is a term that is now used generically to describe any technique for adding color to monochrome still sand footage. Welshetal introduce a general technique for colorizing grey scale images by transferring color between a source, color image and a destination, grey scale image in 2002. Their method transfers then tire color mood of the source to the target image by matching luminance and texture information between the images and allows user interaction.

Levin presents a simple colorization method that requires neither precise image segmentation, nor accurate region tracking in 2004. This method is based on a simple premise: neighboring pixel sinspace-time that have similar intensities should have similar colors. In 2011 Julien Rabin, Julie Delon, and Yann Gousseau removes artifact from color and contrast modification in digital image by using TMR filter.

Histogram equalization is an effective technique for contrast enhancement. The output of conventional histogram equalization (HE) is always excessive contrast enhancement. Noise robustness, white-black stretching and mean-brightness preservation may easily be incorporated into the optimization. The contrast of the image or video can be improved without introducing visual artifacts that decrease the visual quality of an image and cause it to have an unnatural look. Histogram Modification take advantage of available dynamic range, Histogram Equalization tries to create a uniformly distributed output histogram by using a cumulated histogram as its mapping function. But, HE often produces overly enhanced unnatural looking images. To overcome this problem, the input histogram can be modified without compromising its contrast enhancement potential. The modified histogram can then be accumulated to map input pixels to output pixel. A new algorithm that can jointly enhance the sharpness of the depth map and image. As the image or depth map alone cannot provide accurate parameters for the joint enhancement.

III. PROBLEM STATEMENT & MOTIVATION

A common drawback of most method in modification of the contrast or color content in images is visual artifacts. When increasing the contrast, parasite structures that were barely visible become prominent. Most noticeable is the enhancement of noise and compression scheme patterns, such as “block effect” due to the JPEG standard. In the other direction, contrast reduction or color transfer may yield detail loss and texture washing. TMR filter remove those artifact.

In this paper we propose a new global contrast enhancement algorithm using the histograms of color and depth images. On the basis of the histogram modification framework, the color and depth image histograms are first partitioned into sub- intervals using the Gaussian mixture model. By estimating the mapping curve of the contrast enhancement for each sub interval, the global image contrast can be improved without over enhancing the local image contrast.

IV. DESIGN METHODOLOGY

The input image is preprocessed that is color image is separated into three planes and size will be changed to 256x256 images. Adaptive histogram equalization method is used to change contrast of an input image. Adaptive Histogram Equalization method is an extension to traditional Histogram Equalization technique. It enhances the contrast of images by transforming the values in the intensity image. The main steps of the methodology for removal of artifacts are shown in Fig I and include the following: read the input image, preprocessing of image, transformation of image, filtering of image by different methods, comparing performance measures for all filter outputs.

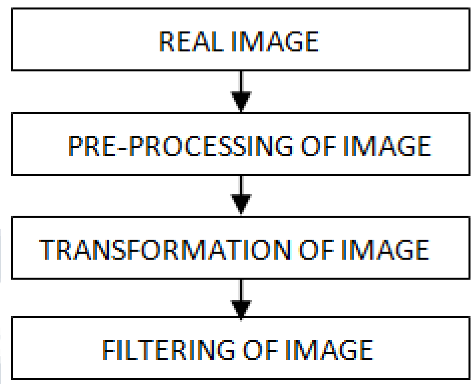

Figure1. Main steps in removal of artifacts

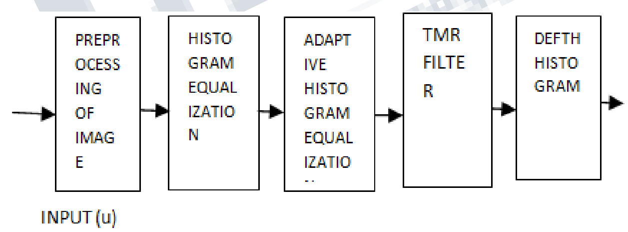

Figure2. Block diagram for removing artifacts from image using DEPTH HISTOGRAM And TMR filter

In Fig II, the input image is preprocessed that is color image divided into three planes, after that Adaptive Histogram Equalization method is applied to change the contrast. Visual artifacts such as Noise enhancement, detail loss, color proportion inconsistencies are introduced.

Figure 3: (a) The color image and (b) its depth image

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We use a pair of color and depth images as input, as shown in Fig. 3. The proposed algorithm modifies the histogram of the color image using the histogram of the depth image as side in- formation. When representing the histogram of the color image, we transform the color space from the RGB space to the hue-sat-uration-intensity (HSI) space and use only the intensity channel. Histogram modification is thus applied to the intensity channel, and the resultant color image is obtained by transforming the color space back to the RGB space.TMR filtering is applied to remove those artifacts. The input image is preprocessed that is color image divided into three planes, then Adaptive Histogram Equalization method is applied to change the contrast and then JPEG Encoding& Decoding Technique is applied for compressing and decompressing. Visual artifacts such as Noise enhancement, detail loss, color proportion inconsistencies, compression artifacts are introduced.

V. TRANSPORTATION MAP REGULARIZATION

Recall that $T(u)$ is the image after color or contrast modification. In what follows, we write $\mathcal{M}(u) := T(u) - u$ for the transportation map of image u. We propose to regularize it thanks to the operator Y_u, a weighted average with weights depending on the similarity of pixels in the original image u. The effect of this operator on an image $v : \Omega \mapsto \mathbb{R}_n$ with $n \geq 1$ is defined as

$$\mathbf{Y}_u(v) : x \in \Omega \mapsto \frac{1}{C(x)} \int_{y \in \mathcal{N}(x)} v(y) \cdot w_u(x,y) dy$$

With weight $w(x,y) = \frac{\|u(x) - u(y)\|^2}{\sigma^2}$

The regularization of image t(u) is defined as Transportation map. $\mathrm{TMR}_u(T(u)) := u + \mathrm{Y}_u \mathcal{M}(u)$. Now, observe that this formulation can be divided in two terms as

$$\mathrm{TMR}_u\left(T(u)\right) = \underbrace{\mathbf{Y}_u\left(T(u)\right)} + \underbrace{u - \mathbf{Y}_u(u)}_{\text{image detail}}.$$

First, the image $T(u)$ is filtered by a nonlocal operator Y_u, following the regularity of the image u. This operation attenuates noise, compression, and color proportion artifacts but also the details of the image $T(u)$. The second operation performed by the TMR filter consists in adding the quantity u, which can be considered as details of the original image (e.g., texture and fine structures).

VI. GAUSSIAN MIXTURE MODEL (GMM)

A Gaussian Mixture Model (GMM) is a parametric probability density function represented as a weighted sum of Gaussian component densities. This paper proposes an adaptive image equalization algorithm that automatically enhances the contrast in an input image. The algorithm uses the Gaussian mixture model to model the image gray-level distribution.The intersection points of the Gaussian components in the model are used to partition the dynamic range of the image into input gray-level intervals. The contrast equalized image is generated by transforming the pixels gray levels in each input interval to the appropriate output gray-level interval according to the dominant Gaussian component and the cumulative distribution function of the input interval

For homogeneous region, Gaussian components with small variances are weighted with smaller values than the Gaussian components with larger variances, and the gray-level distribution is also used to weight the components in the mapping of the input interval to the output interval. This algorithm is free of parameter setting for a given dynamic range of the enhanced image and can be applied to a wide range of image types. The input image P having dynamic range is converted into enhanced image Q within the range using three steps. This are modeling, portioning and mapping. In modeling step, the histogram of the input image is modeled using GMM.As GMM can model any data distribution in terms of linear mixture of different Gaussian distributions with different parameters.

Each Gaussian component has standard deviation, different mean and weight in the mixture model. FJ algorithm is used for estimating the parameters of GMM. After the estimation of best model from the modeling section, the histogram is partitioning to get the input intervals. The intersection points of the Gaussian components are used for partitioning the dynamic range of the input image into several input gray-level intervals. Finally enhanced image is obtained by mapping each input interval to corresponding output interval by adding weight which depends on the rate of the total

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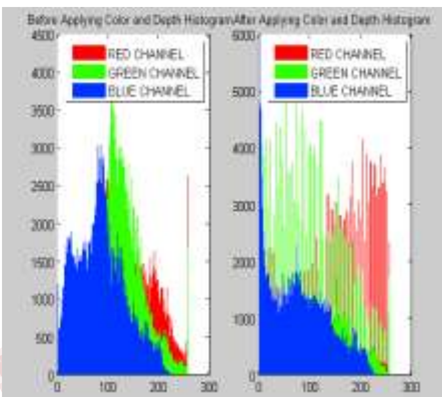
number of pixels that fall into interval and the standard deviation of the dominant Gaussian component.

VII. RESULT

The images after applying TMR filter on transformed Original image are shown in Fig-h, and Fig-I. The Fig-h has less artifacts and much similar to original image as the mean square error for transformed image-I after applying TMR filter is less. And by using Depth Histogram global image contrast is stretched, a local image contrast is also consistently improved without the over enhancement.

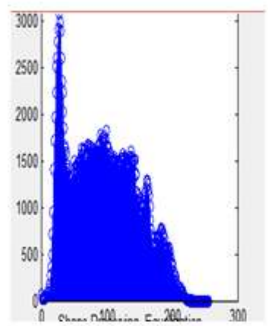


VIII. CONCLUSION

In this paper, we have introduced a generic filtering procedure in order to remove the different kinds of artifacts created by radiometric or color modifications. Several extensions of this work are foreseen. First, notice that the computation time of the TMR operator is similar to those of the Bilateral filter or nonlocal means. Second, the whole procedure would also be strengthened by the automatic estimation of the parameters σ and ρ, even if most experiments give satisfactory results running the same parameter values. Finally, we plan to apply contrast enhancement algorithm using the histograms of color and depth images. The histograms of the color and depth images are partitioned into sub-intervals using the Gaussian mixture model. The partitioned histograms are then used to obtain the layer labeling results of the color and depth images. The sub-intervals of the color histogram are adjusted such that the pixels with the similar intensity and depth values can be-long to the same layer. Therefore, while a global image contrast is stretched, a local image contrast is also consistently improved without the over enhancement.


(a) Original image.


(b) Target color distribution.


(c) Image Histogram


(d) Histogram Equalization


(e) Spatial Adaptive


(f) Shape Preserving

g) Result after Color (h) Removing Artifact by (i) Contrast enhancement

REFERENCES

[1] A. C. Bovik, Handbook of Image and Video Processing (Communications, Networking and Multimedia). Orlando, FL: Academic, 2005

[2] R. H. Selzer, "The use of computers to improve biomedical image quality," in Proc. AFIPS, 1968, pp. 817–834.

[3] J. Delon, "Midway image equalization," J. Math. Imaging Vis., vol. 21, no. 2, pp. 119–134, Sep. 2004.

[4] N. Papadakis, E. Provenzi, and V. Caselles, "A variational model for histogram transfer of color images," IEEE Trans. Image Process., vol.19, no. 11, p. , Nov. 2010.

[5] J. Delon, "Movie and video scale-time equalization application to flicker reduction," IEEE Trans. Image Process., vol. 15, no. 1, pp.241–248, Jan. 2006.

[6] J. Delon and A. Desolneux, "Stabilization of flicker-like effects in image sequences through local contrast correction," SIAM J. Imaging Sci., vol. 3, no. 4, pp. 703–704, Oct. 2010.

[7] G. Haro, M. Bertalmío, and V. Caselles, "Visual acuity in day for night," Int. J. Comput. Vis., vol. 69, no. 1, pp. 109–117, 2006.

[8] M. Bertalmío, V. Caselles, E. Provenzi, and A. Rizzi, "Perceptual color correction through variational techniques," IEEE Trans. Image Process., vol. 16, no. 4, pp. 1058–1072, Apr. 2007.

[9] S. G. Narasimhan and S. K. Nayar, "Vision and the atmosphere," Int. J. Comput. Vis., vol. 48, no. 3, pp. 233–254, 2002.

[10] S. M. Pizer, E. P. Amburn, J. D. Austin, R. Cromartie, A. Geselowitz, T. Greer, B. T.H. Romeny, and J. B. Zimmerman, ―Adaptive histogram equalization and its variations,‖ Comput. Vis. Graph. Image Process., vol. 39, no. 3, pp. 355–368, 1987.

[11] N. Papadakis, E. Provenzi, and V. Caselles, ―A variational model for histogram transfer of color images,‖ IEEE Trans. Image Process., vol.19, no. 11, p. , Nov. 2010.

[12] Y.-W. Tai, J. Jia, and C.-K. Tang, ―Local color transfer via probabilistic segmentation by expectation-maximization,‖ in Proc. IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognit., 2005, pp. 747–754.

[13] A. Abadpour and S. Kasaei, ―An efficient PCA-based color transfer method,‖ J. Vis. Commun. Image Represent., vol. 18, no. 1, pp. 15–34, 2007.

[14] F. Alter, S. Durand, and J. Froment, ―Adapted total variation for artifact free decompression of jpeg images,‖ J. Math. Imaging Vis., vol. 23, pp. 199–211, 2005.

[15] S. M. Pizer, E. P. Amburn, J. D. Austin, R. Cromartie, A. Geselowitz, Greer, B. T. H. Romeny, and J. B. Zimmerman, "Adaptive histogram equalization and its variations," Comput. Vis. Graph. Image Process., vol. 39, no. 3, pp. 355–368, 1987.

[16] N. Papadakis, E. Provenzi, and V. Caselles, "A variational model for histogram transfer of color images," IEEE Trans. Image Process., vol. 19, no. 11, p. , Nov. 2010.

[17] Y.-W. Tai, J. Jia, and C.-K. Tang, "Local color transfer via probabilistic segmentation by expectation-maximization," in Proc. IEEE Comput. Soc. Conf. Comput. Vis. Pattern Recognit., 2005, pp. 747–754

[18] A. Abadpour and S. Kasaei, "An efficient PCA-based color transfer method," J. Vis. Commun. Image Represent., vol. 18, no. 1, pp. 15–34, 2007.

[19] F. Alter, S. Durand, and J. Froment, "Adapted total

variation for artifact free decompression of jpeg images," J. Math. Imaging Vis., vol. 23, pp. 199–211, 2005.

[20] T. Arici, S. Dikbas, and Y. Altunbasak, "A histogram modification framework and its application for image contrast enhancement," IEEE Trans. Image Process., vol. 18, no. 9, pp. 1921–1935, Sep. 2009.

[21] T. Celik and T. Tjahjadi, "Automatic image equalization and contrast enhancement using Gaussian mixture modeling," IEEE Trans. Image Process., vol. 21, no. 1, pp. 145–156, Jan. 2012.

[23] M. Abdullah-Al-Wadud, Md. H. Kabir, M. A. A. Dewan, and O. Chae, "A dynamic histogram equalization for image contrast enhancement," IEEE Trans. Consumer Electron., vol. 53, no. 2, pp. 593–600, May 2007.