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Enhancement of the Image under Different Conditions Using Color and Depth Histogram

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Abstract:

:Image Contrast enhancement without affecting other parameters of an image is one of the challenging tasks in image processing. Contrast is the visual difference that makes an object distinguishable from background. The basic aim of this paper is to provide an improved and good quality image by adjusting the amount of saturation and illumination to achieve more realistic and clear image. The existing Histogram equalization method is inefficient to provide the brightness and the actual appearance of the given image. To overcome this limitation, an image contrast enhancement algorithm based on the joint segmentation of color and depth images is proposed in this paper. The joint segmentation method calculates histogram of each object in an image separately and help to enhance image contrast.

Keywords:

Contrast enhancement, Depth image, Histogram modification, Histogram partitioning.

INTRODUCTION:

Due to the advent of computer technology image-processing techniques have become increasingly important in a wide variety of applications. Contrast enhancement produces an image that subjectively looks better than the original image by changing the pixel intensities. Among various contrast enhancement approaches, histogram modification based methods have received the greatest attention because of its simplicity and effectiveness. 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.

The effectiveness of these sub-histogram based methods is highly dependent on how the image histogram is divided. These image histograms are modelled using Gaussian mixture model (GMM) and divide the histogram using the intersection points of the Gaussian components. The divided sub-histograms are then separately stretched using the estimated Gaussian parameters. Due to the advent of computer technology image-processing techniques have become increasingly important in a wide variety of applications. Contrast enhancement produces an image that subjectively looks better than the original image by changing the pixel intensities. Among various contrast enhancement approaches, histogram modification based methods have received the greatest attention because of its simplicity and effectiveness.

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. The effectiveness of these sub-histogram based methods is highly dependent on how the image histogram is divided. These image histograms are modelled using Gaussian mixture model (GMM) and divide the histogram using the intersection points of the Gaussian components. The divided sub-histograms are then separately stretched using the estimated Gaussian parameters.

Histogram Specification (HS) is another method that takes a desired histogram by which the expected output image histogram can be controlled. However, specifying the output histogram is not an easy task as it changes from image to image. Another method called Dynamic Histogram Specification (DHS) is presented which generates the specified histogram dynamically from the input image.

This method can preserve the original input image histogram characteristics. However, the degree of enhancement is not that much significant. Some researchers have also focused on improving of histogram equalization based contrast enhancement such as Mean Preserving Bi-histogram Equalization (BBHE), Equal area Dualistic Sub-image Histogram Equalization (DSIHE) and Minimum Mean Brightness Error Bi-histogram Equalization (MMBEBHE). This method tries to overcome the brightness preservation problem. DSIHE method uses the entropy value of histogram separation. MMBEBHE is the extension of BBHE method that provides perform good contrast enhancement, they also cause more annoying side effects depending on the variation the gray level distribution in the histogram. Recursive Mean-Separate Histogram Equalization (RMSHE) is another improvement of BBHE. However, it is also not free from side effects.

The above contrast enhancement techniques perform well on some images but they can produce problems when a sequence of images has to be enhanced, or when the histogram has spikes, or when a natural looking enhanced image is strictly required. In addition, computational complexity and controllability become an important issue when the goal is to design a contrast enhancement algorithm for consumer products. In summary, our goal in this paper is to obtain a visually pleasing enhancement method that has low-computational complexity and works well with both video and still images.

To overcome the above mentioned problems we have proposed a new contrast enhancement algorithm using joint segmentation of color and depth image that exploits the histograms of both color and depth images. In this technique 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 same intensity and equal depth values can belong to the same interval. The proposed algorithm is thus implicitly depth adaptive.

II RELATED WORK :

One of the earliest approaches to image contrast enhancement based on the histogram of color and depth image is reported in.

On the basis of the modified histogram framework, the color and depth image histograms are first partitioned into sub-intervals using the Gaussian mixture model [1]. 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 and estimating the mapping curve and improve the contrast enhancement over the local contrast enhancement of an image. Histogram equvilization can be used for contrast enhancement of all types of images. It works by flattening the histogram and stretching the dynamic range of the gray levels by using the cumulative density function of the image.The most widely used application areas for histogram equalization is medical field image-processing, radar image processing, etc. The biggest disadvantage of this method is it does not pre-serve brightness of an image. The brightness gets changed after histogram equalization. Hence preserving the initial brightness and enhancing contrast, are essential to avoid other side effect present Brightness persevering histogram equalization techniques in this technique, the input image is decomposed and two sub images. These two images are formed on the basis of gray level mean value. The drawback introduced by HE method is overcome by this method. Then HE method is applied on each of the sub-images.

This method equalizes both the images independently. Their respective histograms with a constraint that samples in the first sub image are mapped into the range from minimum gray level to input mean and samples in the second sub-image are mapped into the range from mean to maximum gray level. The resultant equalized sub images are bound with each other around input mean. The output image produced by BBHE has the value of brightness (mean gray-level) located in the middle of the mean of the input image [9]. The mean brightness of the image while enhancing the contrast is preserved using BBHE method. This is the main advantage of using this method. Higher degree of brightness preservation is not possible and detail of the image is a loss is drawback of this method The present Dualistic sub image histogram equalization techniques. In this technique the original image is divided into two equal area sub-images based on gray level probability density function of input image.The DSIHE technique for contrast enhancement decomposes an image into two equal area sub- images, one dark and one bright, following the equal area property.

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Resulting image of dualistic sub image histogram equalization (DSIHE) is obtained after the two equalized sub-images will be composed into one image. This is similar to BBHE except difference is that in this method DSIHE chooses to separate the histogram based on gray level with a cumulative probability density equal to 0.5 instead of the mean as in BBHE, i.e. instead of decomposing the image based on its mean gray level, the DSIHE method decomposes the image aiming at the maximize of the Shannon's entropy of the output image. The aggregation of the original image's gray level probability distribution is decomposed [9]. Can not solve over equalization problems and not enough to keep luminance in the some cases this is the drawback of this method.The present Recursive mean separate histogram equalization techniques. In this technique in this method the image is separated on the basis of mean of input image. The term recursive used in RMSHE implies that in this technique instead of decomposing the input image only once, it is decomposed recursively up to a recursion level r, therefore 2r sub images will be generated. Each sub-image is then equalized independently with the histogram equalization method. If r=0, that means no sub-image decomposition is done, i.e. it is equivalent to HE method. If r=1 then it implies that it is equivalent to BBHE.

The advantage of using this method is that the level of brightness preservation will increase with the increase of number of recursive mean separations. Though it is recursive in nature, RMSHE also allows scalable brightness preservation, which is very useful in consumer electronics [10]. High time consumption because perform multi equalization and decomposed the image into power of two drawback of this techniques .In recursive mean separate histogram equalization method the decomposition of giving image on the basis of the mean intensity value of the given image In author [6] present Minimum Mean Brightness Error Bi-Histogram Equalization. The basic principle behind this method is that decomposition of an image into two sub images and applying equalization process independently to the resulting sub images which is similar to BBHE and DSIHE except difference is that this technique searches for a threshold level lt, which decomposes an input image into two sub images in such a way that the minimum brightness difference between the input and the output image is achieved. This is called absolute mean brightness error (AMBE). After this histogram equalization is applied to each sub image to produce output image.

PROPOSED ALGORITHM:

A pair of color and depth images is given as input, as shown in Fig. 1. By using Gaussian mixture model we obtain the histograms of input images. Then t he al gorit h m modifies the histogram of the color image using the histogram of the depth image as side in-formation. . The histogram of the color image is transformed from theRGB space to the hi-saturation-intensity space. Histogram modification is then applied to the intensity channel, and t hen r esult ant col or i mage i s obtained by transf or mi ngt he HI S t o RGB. Fi gur e. 2(a) and (b) sho w t hehistogr a ms of t he col or and dept h i mages wit h t heir Gaussi an mi xtur e models. Figs. 2(a) and (b)) are used to divide the histogram int o s ub-interval s. Let c and d represent the color image and the depth image, respectively.

The histograms of and ar e assumed to be divided into and sub-intervals, respectively, and the intersection points between the –th and th sub-intervals of c and d Layer labeling results of Figs. 1(a) and (b), are denoted as and , respectively. Using the intersection points, and can be decomposed into multiple layers. In histogram based contrast enhancement algorithms, t hemapping f uncti on f or each l ayeri s esti mat ed s ucht hatimage details in each layer can be effectively enhanced.

However, histogram partitioning using only the intensitychannel can assign differ ent l abel s t o t he neighboringpixels that have similar intensity and depth values t hebackground r egi on insi de t hedottedcir cl e as s ho wni n Fi g.2(c) has similar intensity and depth values as input imagebut differ ent l abel s ar e cl utteredi n t he r egi on. Thus, if weuse contrast enhancement on this background region whichresults unnatural images. So we propose an algorithm thatadjusts the histogram partitioning such that a same label isenf or ced f or t he pi xel s wit ht hesi mil arintensit y and dept hvalues.

Figure 1: (a) The color image Teddy (b) its depth

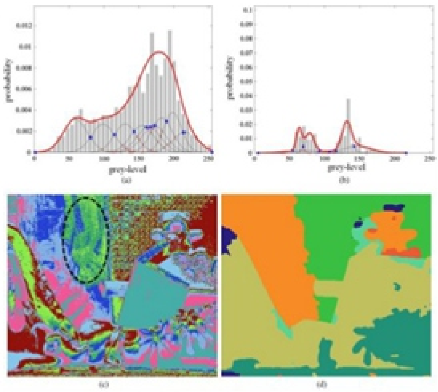

Figure 2: (a)-(b) Histogram and layer partitioning resultsof Figures. 1(a) and (b), respectively. (c) - (d)Layer labeling results of Figs. 1(a) and (b),.

RESULTS:

In order to evaluate the performance of the proposedalgorithm, the Middlebury stereo test images [14] wereused in our experiment. The depth images were obtainedusing the stereo matching algorithm [10] as shown in Fig.3. The pixel values of the color images were then dividedby 4 to simulate low-contrast input images.

Figure 3: Fig. 3. Experimental results corresponding to theinput images in Fig. 2s. (a) -(c) the resultant imageobtained by [2], (d)-(f) the resultant image obtained by theproposed algorithm, (g), (i), (k): the magnified sub regionscorresponding to (a)-(c), respectively, (h), (j), (l) themagnified sub regions corresponding to (d)-(f),respectively.

Using the same histogram partitioning and mapping curvegeneration methods in [2], the effectiveness of theproposed algorithm can be evaluated by comparing theresults obtained with and without modifying the histogramsub-intervals, respectively.

Figure 4 shows that the layerlabeling result became more spatially uniform asincreased. We empirically found that performedwell in enhancing the contrast of images. The results givenhere after were obtained using .

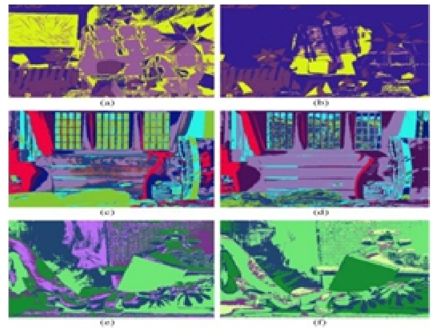

Figure 4: Layer labeling results for the conventionalmethod (first column) and the proposed method (secondcolumn)

Figure 3 shows the experimental results obtainedusing the conventional [2] and proposed algorithms. Bothalgorithms successfully enhanced the global contrast of theinput images shown in Fig. 3. However, the conventionalmethod produced artifacts at some image regions as shownin Figs. 3(g), (i), and (k). This is because the image regionswith the similar intensity and depth values were decomposed into different groups as shown in Figs. 4(a),(c), and (e). By using the proposed algorithm, such regionswere merged into the same layer as shown Figs. 4(b), (d),and (f), and thus the over-enhancement was prevented.

IV. CONCLUSIONS:

In this letter, we proposed a new histogram-based image contrastenhancement algorithm using the histograms of color anddepth images. The histograms of the color and depth imagesare first partitioned into sub-intervals using the Gaussian mixturemodel. The partitioned histograms are then used to obtainthe layer labeling results of the color and depth images. The sub-intervals of the color histogram are adjusted such thatthe pixels with the similar intensity and depth values can belongto the same layer. Therefore, while a global image contrastis stretched, a local image contrast is also consistently improvedwithout the over-enhancement. We plan to extend ourlayer-based algorithm to a segment-based algorithm by using ajoint color-depth segmentation method.

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REFERENCES:

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

2] T. Celik and T. Tjahjadi, "Automatic image equalization and contrastenhancement using Gaussian mixture modeling," IEEE Trans. ImageProcess., vol. 21, no. 1, pp. 145–156, Jan. 2012.

[3] M. Abdullah-Al-Wadud,Md. H. Kabir, M.A.A.Dewan, andO. Chae,"A dynamic histogram equalization for image contrast enhancement,"IEEE Trans. Consumer Electron., vol. 53, no. 2, pp. 593–600, May2007.

[4] T. Luft, C. Colditz, and O. Deussen, "Image enhancement by unsharpmasking the depth buffer," ACM Trans. Graph., vol. 25, no. 3, pp.1206–1213, Jul. 2006.

[5] J. Kopf, M. F. Chen, D. Lischinski, andM. Uyttendaele, "Joint bilateralupsampling," ACM. Trans. Graph., vol. 26, no. 3, pp. 1–5, Jul. 2007.

[6] S.-W. Jung, "Enhancement of image and depth map using adaptivejoint trilateral filter," IEEE Trans. Circuis Syst. Video Technol., vol. 23,no. 2, pp. 258–269, Feb. 2013.

[7] W. Hachicha, A. Beghdadi, and F. A. Cheikh, "Combining depth informationand local edge detection for stereo image enhancement," inProc. Eur. Signal Process. Conf. (EUSIPCO), 2012, pp. 250–254.

[8] S.-W. Jung, J.-Y. Jeong, and S.-J. Ko, "Sharpness enhancement ofstereo images using binocular just-noticeable-difference," IEEE Trans.Image Process., vol. 21, no. 3, pp. 1191–1199, Mar. 2012.

[9] M. M. Subedar and L. J. Karam, "Increased depth perception withsharpness enhancement for stereo video," in Proc. SPIE 7524 StereoscopicDisplays Appl. XXI, 2010, pp. 1–8.

[10] Q.Yang, "A non-local cost aggregationmethod for stereo matching," inProc. IEEE Conf. Comput. Vis. Pattern Recogn., 2012, pp. 1402–1409.