

Image Enhancement using Different Lighting Conditions for Color and Depth Images

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ABSTRACT

In this paper, we propose a new global contrast enhancement algorithm using the histograms of colour and depth images. On the basis of the histogram-modification framework, the colour and depth image histograms are first dividing into subintervals using the Gaussian mixture model. The positions partitioning the colour histograms are adjusted to spatially neighbouring pixels with the same intensity and depth values can be grouped into the same sub-interval. By estimating the mapping curve of the contrast enhancement for each sub-interval, using this model global contrast enhancement can be improved without over-enhancing the local image contrast. Experimental results demonstrate the effectiveness of the proposed algorithm.

INTRODUCTION

Histogram processing is the demonstration of modifying a picture by altering its histogram. Regular employments of histogram handling incorporate standardization by which one makes the histogram of a picture as level as could be allowed. In PC design, the procedure of enhancing the nature of a digitally put away picture by controlling the picture with programming. It is simple, for instance, to make a picture lighter or darker, or to expand or lessening differentiation. Propelled picture improvement programming additionally bolsters numerous channels for adjusting pictures in different ways. Projects specific for picture improvement are some of the time called picture editors Image upgrade is the procedure of altering computerized pictures so that the outcomes are more suitable for showcase or further picture examination. The point of picture improvement is to enhance the interpretability or impression of data in pictures for human viewers, or to give 'better' information for other computerized picture preparing systems. An exceptionally well known strategy for difference upgrade of pictures is Histogram Equalization HE

- 1- Image enhancement
- 2- Image restoration
- 3- Image compression etc.

The rest of the paper is organized as follows. In Section II, histogram Equalization for image contrast enhancement algorithm is described. proposed algorithm steps Explained in Section III, Experimental results are presented in Section IV, followed by the conclusion in Section V.

HISTOGRAM EQUALIZATION

This technique typically increases the global contrast of many pictures, particularly when the usable data of the image is represented by near contrast values. Through this modification, the intensities can be better distributed on the histogram. This allows for areas of lower local contrast to gain a higher contrast. HE accomplishes this by effectively spreading out the most frequent intensity values. This method is useful in pictures with backgrounds and foregrounds that are both dark or both bright. In particular, the method can lead to better views of bone structure in x-ray images, and to better detail in photographs that are over or under-exposed. A key advantage of the method is that it is a fairly straightforward technique and an invertible operator. So in this theory, if the HE function is known,

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then the original histogram can be recovered. The calculation is not computationally intensive. A drawback of the method is that it is indiscriminate. It may increase the contrast of background noise, while decreasing the usable signal. In scientific imaging where spatial correlation is more important than intensity of signal (such as separating DNA fragments of quantized length), the small signal to noise ratio usually hampers visual detection. HE often produces unrealistic effects in photographs; however it is very useful for scientific images like thermal, satellite or xray images, often the same class of images that user would apply false-color to. Also histogram equalization can produce undesirable effects (like visible image gradient) when applied to images with low color depth.

The cutting edge calculation. models the picture histogram utilizing the Gaussian mixture model (GMM) and partitions the histogram utilizing the crossing point purposes of the Gaussian parts. The isolated sub-histograms are then independently extended utilizing the evaluated Gaussian parameters. As of late, specialized leaps forward of the shading picture upgrade have been discovered utilizing profundity or stereo as side data. Stereo coordinating calculations and profundity sensors are presently giving very precise profundity pictures, and in this manner the utilization of the profundity picture for the shading picture improvement turns into a vital exploration issue. In this paper we propose another difference upgrade calculation that adventures the histograms of both shading and profundity images. The histograms of shading and profundity pictures are initially separated into sub-interims utilizing the GMM. The interims of the shading picture histogram are then balanced such that the pixels with the comparable power and profundity qualities can fit in with the same interim. The proposed calculation is hence implicitly depth versatile, and the test results show the adequacy of the proposed calculation.

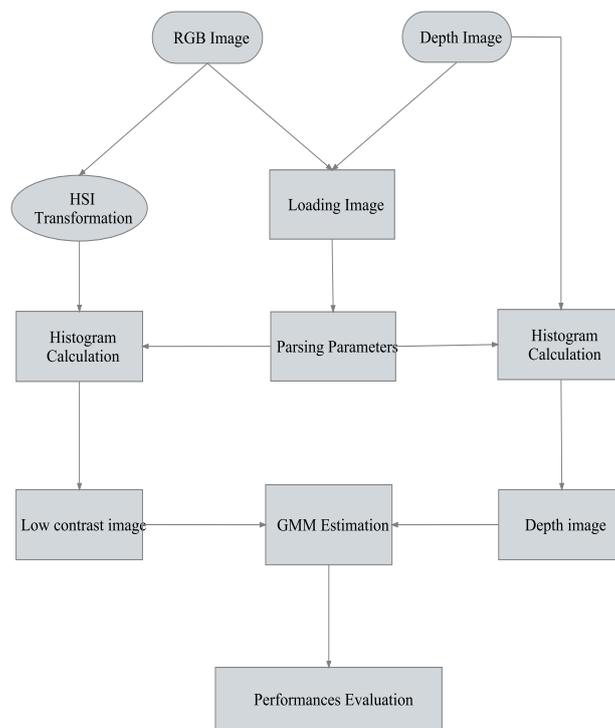


Fig1. Flow Diagram for proposed method

MODULE DESCRIPTION

Depth Image Generation

Depth images are obtained by stereo vision method. The 3D information can be obtained from a pair of pictures, also known as a stereo pair, by estimating the relative depth of points in the scene. These estimates are represented in a stereo disparity map, which is constructed by matching corresponding points in the stereo pair. Color depth, also known as bit depth, is either the number of bits used to indicate the color of a single pixel, in a bitmapped image or video frame buffer, or the number of bits used for each color component of a single pixel. For consumer video standards, such as High Efficiency Video Coding the bit depth specifies the number of bits used for each color component. When referring to a pixel the concept can be defined as bits per pixel which specifies the number of

bits used. When referring to a color component the concept can be defined as bits per channel bits per color or bits per sample. Color depth is only one aspect of color representation, expressing how finely levels of color can be expressed the other aspect is how broad a range of colors can be the definition of both color precision and gamut is accomplished with a color encoding specification which assigns a digital code value to a location in a color space.

HSI Separation

The Hue, Saturation and Intensity qualities were divided from the RGB picture. Hue is the extent to which a shading can be portrayed as like or not quite the same as shading that are depicted as red, green, blue, and yellow. Saturation is the level of contrast between a shading and dark. Intensity is the shine or bluntness of hues. Intensity is the measure of measure of light force saw by eye paying little respect to the color. HSL are the most widely recognized barrel shaped direction representations of focuses in a RGB shading model. Grown in the 1970s for PC design applications, HSL are utilized today as a part of shading pickers, in picture altering programming, and less generally in picture examination and PC vision.

The two representations improve the geometry of RGB trying to be more instinctive and perceptually pertinent than the Cartesian (3D shape) representation, by mapping the qualities into a barrel approximately motivated by a customary shading wheel. The edge around the focal vertical pivot compares to "tone" and the separation from the hub relates to "immersion". These initial two qualities give the two plans the "H" and "S" in their names. The stature relates to a third esteem, the framework's representation of the apparent luminance in connection to the immersion.

Seen luminance is a famously troublesome part of shading to speak to in a computerized configuration (see impediments area), and this has offered ascent to two frameworks endeavoring to comprehend this issue: HSL (L for daintiness) and HSV or HSB (V for quality or B for shine). A third model, HSI (I for power), normal in PC vision applications, endeavors to adjust the favourable circumstances and drawbacks of the other two frameworks. While commonly reliable, these definitions are not institutionalized, and the shortened forms are casually tradable for any of these three or a few other related round and hollow models. Note likewise that while "shade" in HIS alludes to the same property, their meanings of "immersion" contrast significantly. (For specialized meanings of these terms, see Color-production traits.)

Both of these representations are utilized broadly as a part of PC illustrations, yet both are likewise censured for not satisfactorily differentiating shading making characteristics, and for their absence of perceptual consistency. This implies that the shading showed on one screen for a given HSV worth is unrealistic to precisely coordinate the shading seen on another screen unless the two are definitely changed in accordance with outright shading spaces.

Histogram Calculation

Histogram is the graphical representation of the tonal distribution of the image. The histogram values are calculated for input and depth images. The histogram values were compared and the positions where the histogram values were changing is identified and the points were located.

Contrast enhancement techniques in the second subgroup modify the image through some pixel mapping such that the histogram of the processed image is more spread than that of the original image. Techniques in this subgroup either enhance the contrast globally or locally. IFA single mapping derived from the image is used then it is a global method; if the neighborhood of each pixel is used to obtain a local mapping function then it is a local method. Using a single global mapping cannot (specifically) enhance the local contrast.

GMM Estimation

This uses the Gaussian functions to estimate the identified histogram changing points. This will shows us which histogram points have to be changed further. GMM is a probabilistic model for representing the presence of subgroups the values belonging to particular color intensity within an overall histogram calculated.

A GMM is a natural model to use if a class contains a number of distinct subclasses, as is often the case. An alternative to GMMs would then seem to be to treat the components of the GMMs for each block as hidden states and to couple them to each other spatially, thus producing a 2D GMM. While

this might seem like a good idea, the parameter estimation problem becomes much harder, both algorithmically and because there are more parameters to be estimated from the same limited amount of data. In addition, since the semantics of the hidden states is a priori unknown, it is not clear that the dependencies introduced by the GMM are present. We choose to adopt the simpler approach, to be confirmed a posteriori by comparison with the GMM alternative as used, for example, by Li and Gray.

Color Enhancement

Mapping Curve of Color Intensity is obtained by comparing the estimated histogram of original and the depth image. The region that has to be modified is identified and they are modified. The final result is the contrast enhance color image. The principal objective of image enhancement is to process a given image so that the result is more suitable than the original image for a specific application. It accentuates or sharpens image features such as edges, boundaries, or contrast to make a graphic display more helpful for display and analysis. The enhancement doesn't increase the inherent information content of the data, but it increases the dynamic range of the chosen features so that they can be detected easily.

Low-contrast images can result from poor illumination, lack of dynamic range in the image sensor, or even wrong setting of a lens aperture during image acquisition. The idea behind contrast stretching is to increase the dynamic range of the gray levels in the image being processed. It is often necessary to enhance details over small areas. The number of pixels in these areas may have negligible influence on the computation of a global transformation, so the use of global histogram specification does not necessarily guarantee the desired local enhancement.

EXPERIMENTAL RESULTS

In order to evaluate the performance of the proposed algorithm, the Middlebury stereo test images were used in our experiment. The depth images were obtained using the stereo matching algorithm.

Screen Shots



Fig2. GUI design for proposed method

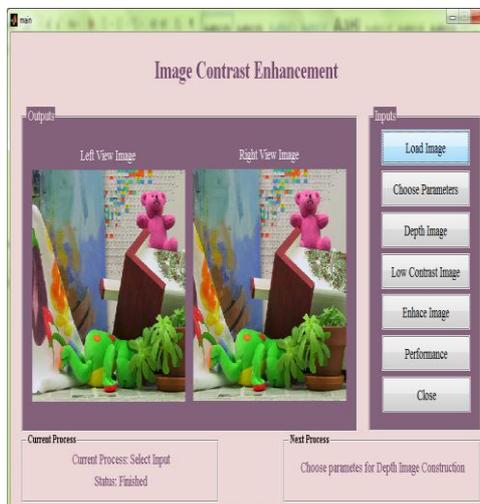


Fig3. Selection of Input Image for process

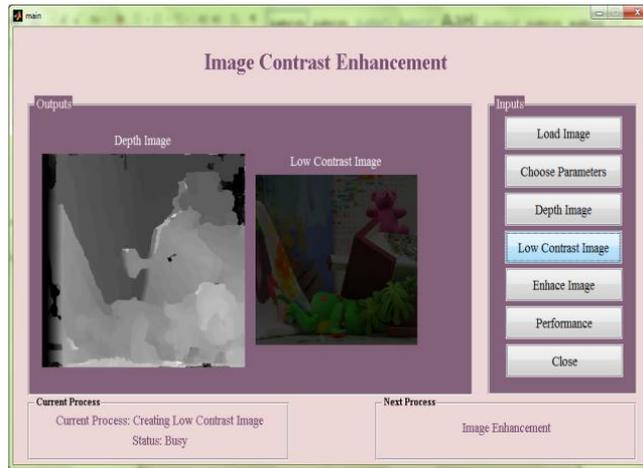


Fig4. Generate low contrast image and Dept image

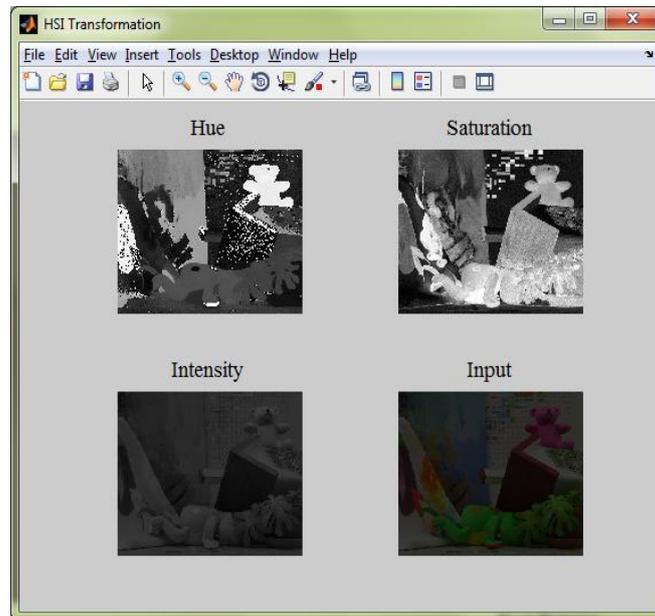


Fig5. conversion from RGB to HSI

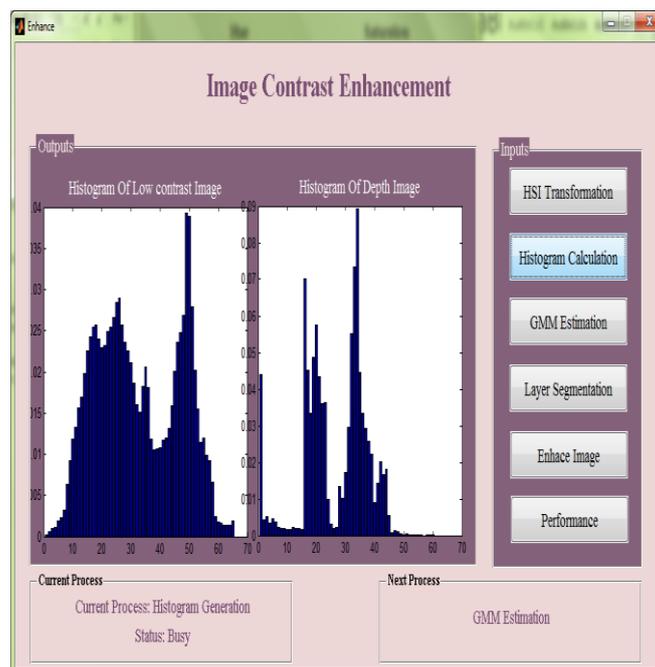


Fig6. Histograms of both Images

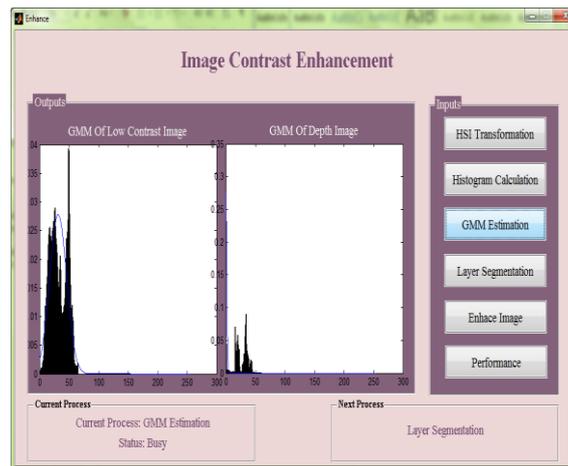


Fig7. GMM Estimation for images



Fig8. Layer Segmentation

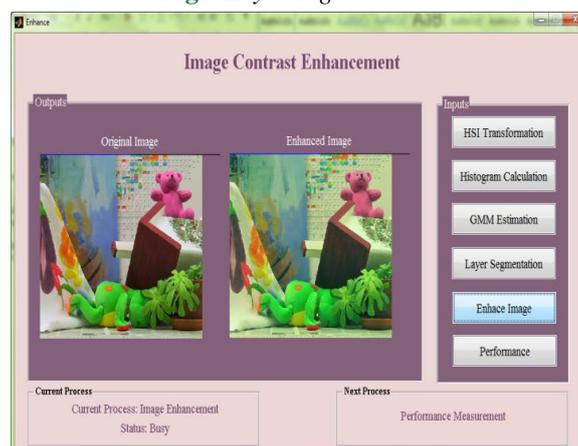
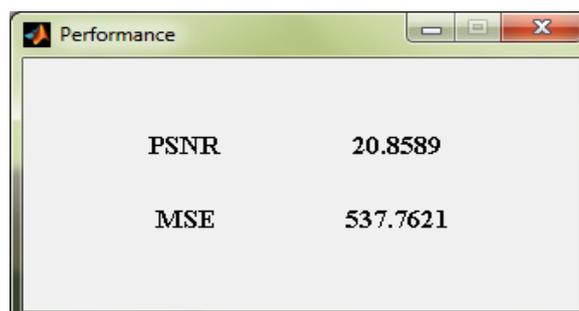


Fig9. Final Enhanced Image



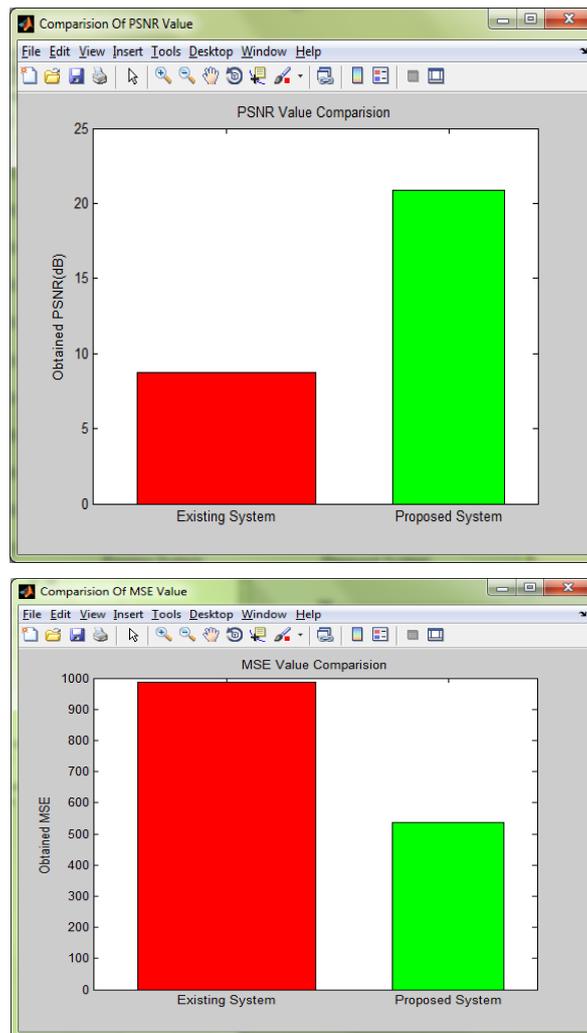


Fig10. Comparison with Existing method

CONCLUSION

In this paper we proposed a new histogram-based image contrast enhancement algorithm using the histograms of color and depth images. The histograms of the color and depth images are first dividing into sub-intervals using the GMM. The divided 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 same intensity and depth values can belong to the same layer. Therefore, while a global image contrast is stretched, a local image contrast is also consistently improved without the over-enhancement. They plan to extend our layer-based algorithm to a segment-based algorithm by using a joint color-depth segmentation method.

It does not introduce flickering. This is mainly due to the fact that the method uses the input histogram, which does not change significantly within the same scene, as the primary source of information. This method is applicable to a wide variety of images. It also offers a level of controllability and adaptability through which different levels of contrast enhancement, from histogram equalization to no contrast enhancement, can be achieved.

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