Journal of Advances in Science and Technology

Vol. VIII, Issue No. XVI, November-2014, ISSN 2230-9659

IMAGE ENHANCEMENT APPROACH FOR ENHANCING IMAGE OF DIGITAL CAMERAS BY CONTRAST VARIATION METHOD

AN INTERNATIONALLY INDEXED PEER REVIEWED & REFEREED JOURNAL

www.ignited.in

Journal of Advances in Science and Technology
Vol. VIII, Issue No. XVI, November-2014, ISSN 2230-9659

Image Enhancement Approach for Enhancing Image of Digital Cameras by Contrast Variation Method

Girish Padhan[1] Dr. Y. P. Singh[2]

[1]Research Scholar (ECE), Jodhpur National University, Jodhpur

[2](HOD, Math, JNU, Jodhpur)

Abstract – This article introduces a new image Enhancement approach suitable for digital cameras. High contrast images are common in the scenes with dark shadows and bright light sources. It is difficult to show the details in both dark and light proposed to improve the quality of the images. However, most of them often get poor results if the images are high contrast and have wide dynamic range. This method for enhancing the high-contrast digital camera images, which enhances the global brightness and contrast of images while preserving details. It is based on a two-scale decomposition of the image into a base layer, encoding large-scale variations, and a detail layer. The base layer is obtained using an edge preserving filter that is a weighted average of the local neighbourhood samples, where the weights are computed based on temporal and radiometric distances between the center sample and the neighbouring samples. Only the base layer image is enhanced automatically by using histogram equalization method, thereby preserving detail. The experimental results show the proposed method provides a significant enhancement for the high-contrast images and requires no parameter setting. And also in this work processing cost reduction when the new approach is followed.

Keywords: High-Contrast Image, Automatic Enhancement, Camera Images, Histogram Equalization and Weighted Filter.

----------♦----------

1. INTRODUCTION

Contrast of an image is determined by its dynamic range, which is defined as the ratio between the brightest and the darkest pixel intensities. Contrast enhancement techniques have various application areas for enhancing visual quality of low contrast images. Histogram equalization (HE) is a very popular technique for enhancing the contrast of an image [1]. Its basic idea lies on mapping the gray levels based on the probability distribution of the input gray levels. It flattens and stretches the dynamic range of the image's histogram, resulting in overall contrast improvement. HE has been applied in various fields such as medical image processing and radar image processing [2].

In theory, it can be shown that the mean brightness of the histogram-equalized image is always the middle gray level regardless of the input mean. When brightness preservation is important and necessary, this property is not a desirable one in certain applications. The technologies of digital cameras have a great progress recently. We can get the digital photos easily and directly since the digital cameras save the trouble of film processing In general, the range of light luminance the human eye can sense is much larger than the dynamic range of most digital cameras and display devices. And the human visual system also has the brightness adaptation ability, it accomplishes the large variation by changes in the overall sensitivity [4] [5]. However, the range of light brightness we can produce by the cameras or image sensors spans at a very limited dynamic range.

It means that we will lose the detail information in either light or dark areas when we take a photo in the scenes with dark shadows and bright light sources, i.e., it has high dynamic range. Obviously, some enhancement methods are necessary for improving the photos effectively [6] [7]. The traditional photographers usually need to enhance their photos in the darkroom; however, the processing is not only time-consuming but also expensive. In recent years, the digital cameras are very popular; we can get the digital photos directly.

2. METHODOLOGY:-

Image Enhancement

Image enhancement operation improves the qualities of an image. They can be used to improve an image's contrast and brightness characteristics, reduce its noise content or sharpen its details. In view of the wide usage of loosely defined terms covering the general topic of image-enhancement, it is appropriate to give a precise definition of what this term denotes within the present context. Other terms such as image-processing are often used as synonyms, along with those such as image-restoration and image-manipulation, and catch-all phrases such as photo-editing are now widely used in the an ever-growing modern circle of consumer digital-imaging. But all these and other common terms are frequently used interchangeably, and mean quite different things in different contexts. For the present purposes we define image-enhancement, in the sense used here, with the help of Figure 1.

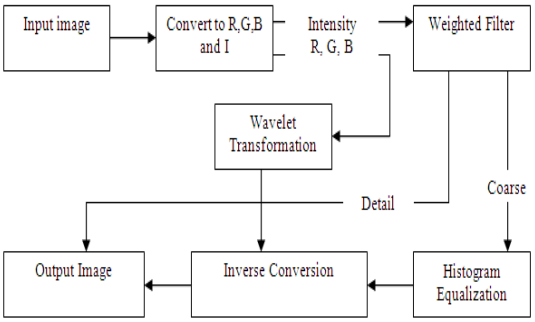
3. THE MEAN DYNAMIC RANGE (MONOCHROME IMAGE):-

Let be a monochrome image $f \in F(\square, V)$. In this section only function f is discussed. Thus, there is not any possibility to make confusion and in order to simplify the shown formulae the parameters (□, □, □, □) defined in the previous section will be written without the argument f . The infimum of the function f within the support □□will be denoted with fi and, respectively, the supremum with fs ,namely:

The dynamic range of function f , denoted $D(f)$, is defined by Jourlin and Pinoli [4,6], thus: $D(f) \square\square [fi, fs]$ (3.3)The dynamic range $D(f)$ is the smallest contiguous interval of real numbers that comprises all the values of the function f. The definition is based only on two values, not on the entire values set. On a practical level, it is not useful due to the presence of some extreme values, which have small appearance frequencies. Jourlin and Pinoli [4,6] proposed touse the mean dynamic range $Dm(f)$ instead of the dynamic range $D(f)$.

1. Proposed Algorithm:-

The contributions of the paper for enhancing the high-contrast digital photos automatically, which enhances the overall brightness and contrast of images while preserving detail. It is based on a separate the colors of the image by decomposing the image into the color image and the intensity image, two-scale decomposition of the image into a base layer, encoding coarse or large-scale image, and a detail layer. The base layer is obtained using an edge preserving filer. This filter is merely a weighted average of the local neighborhood samples, where the weights are computed based on temporal and radiometric distances between the center sample and the neighboring samples. The histogram equalization method is used to improve the brightness and contrast of the base layer image



(Figure 4. The Proposed Algorithm)

4. THE IMAGE ENHANCEMENT METHODS:-

In this section an image enhancement method having as criteria the mean dynamic range maximization is presented. Firstly it is presented the method for monochrome images and then for the colour ones.

4.1 The Enhancement Method for Monochrome Images

Let be a monochrome image $f : \square\square \rightarrow V$, where $V \square\square [0,1]$ .Using the relations (3.12) the mean dynamic range $Dm(f) \square\square [vi, vs]$ is computed. The transform that realizes the enhancement is a piecewise linear one. In fact the values that are less then vi are replaced by 0 , the values that are greater than vs are replaced by 1 and the values that belong to the mean dynamic range $Dm(f) \square\square [vi, vs]$ are linear transformed in such a way to cover the entire interval $V \square\square [0,1]$.

This method was used for the image "woman" shown in fig.

4.2 The Enhancement Method for Color Images

A color image is described in the *RGB* coordinate system bythree scalar functions: *fR* :□→*V* , *fG* :□→*V* ,*fB* :□→*V* that define the *red, green, blue* components ofthe color. There are two possibilities to extend the method from the monochrome images to the color ones: a vector.

The method was used for image "boat" shown in fig. 7. The enhanced image is presented in fig. 8 and the graphic of the transform T in fig. 9. Using a unique transform for all color components the method preserves quite well the color hue.

5. CONCLUSIONS

In this paper there have been presented new enhancement methods for monochrome images and for color images. The methods are based on the mean dynamic range maximization using piecewise linear transforms. A new formula for the measure of the mean dynamic range was presented. The experimental results show that the new measure of the mean dynamic range is robust and has good performances.

REFERENCES

[1] K.R. Castleman. *Digital Image Processing*, Prentice Hall, Englewood Cliffs NJ, 1996.

[2] R.C. Gonzales and P. Wintz. *Digital Image Processing*, 2nd Edition, Addison-Wesley, New York, 1987.

[3] A.K. Jain. *Fundamentals of Digital Image Processing*, Prentice Hall Intl., Englewood Cliffs NJ, 1989.

[4] M. Jourlin and J.C. Pinoli, "Image dynamic range enhancement and stabilization in the context of the logarithmic image processing model", *Signal processing*, Vol. 41, no. 2, pp. 225-237, 1995.

[5] V. Patrascu and V. Buzuloiu, "The mean dynamic range optimization in the framework of logarithmic models". *Advanced Topics in Optoelectronics, Microelectronics, and Nanotechnologies*, Proc. SPIE, Vol. 5227, pp. 73-80, October 2003.

[6] J.C. Pinoli and M. Jourlin. *Modelisation & traitement des images logarithmiques*. Publication Nr. 6, Department de Mathematiques, Univ. de Saint-Etienne 1992.

[7] W.K. Pratt. *Digital Image Processing*. 2nd Edition, Wiley/Interscience, New York, 1991.

[8] V.K. Rohtagi and G.J. Szekely, "Sharp inequalities between skewness and kurtosis", *Statis. Probab*. Lett. 8, pp. 297-299, 1989.

[9] A. Rosenfeld and A.C. Kak, *Digital Picture Processing.* Academic Press, New York, 1982.

[10] J.E. Wilkins, "A note on skewness and kurtosis", *Ann. Math. Statis*. 15, pp. 333-335, 1944.

Figure 7. The original image boat.

Figure 8. The enhanced image.

Figure 9. The

Bibliography:-