

A Combination of Local and Global Method for Contrast Image Enhancement - A Review Approach

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Abstract - Image enhancement is used to improve the poor quality of an image to make it useful for human and for machine use. This paper suggests two methods for contrast image enhancement to preserve brightness of an image. This method is applied on 2D histogram. In 2D histogram preserving color value is very important part. Local feature enhancement technique is used to improve local features of an image. Local feature enhancement technique is used to sharpen the edges. Contrast Stretching with its brightness factor is used to improve the global features of an image. This two method are used in combination that is first take the weighted difference of two methods. The second method is that first we will going to use local feature enhancement technique obtain the output of it and on that output apply Contrast Stretching with brightness factor and obtain the final output that is enhanced image. In this we are also exploring the new ideas of local and global method for contrast image enhancement. Global Contrast Image Enhancement is basically done by three ways Histogram Equalization, Contrast Stretching and Unsharp masking and Edge Sharpening. We will going to use the useful part of all these three methods and try to develop a new method which is combination of three method and that method we will also going to use in this work. The qualitative analysis of this method is done by using various factors, they are discrete entropy, peak signal to noise ratio, image enhancement factor and many more. The comparative analysis is done with another existing method.

Keywords - Contrast Image enhancement, local, global, 2D histogram, discrete entropy, image enhancement factor.

1. Introduction

Image is a discrete space made up of small elements called pixel. Each pixel represents intensity value at each position. A digital image can be captured with different

devices such as a camera, an MRI machine and also with sensors that consume light intensity. There are two types of an image gray scale image and color image.

Gray Scale Image

A gray scale image is image which contains only one single value that is its scalar value which acts its intensity value.

Color Image

A color image consists of digital array of pixel which consist all of its color information. Each digital image can be encoded into 3 channels that is red, blue and green.

1.1 Image Enhancement

Image enhancement is used to improve the quality of a poor or bad image. The enhanced image is used by human or any machine for further operation on it. Image enhancement improves the dominance feature of an image. It is also used to decrease the ambiguity between different topic of digital image processing. Image enhancement is further divided into two broad categories: Spatial domain method and frequency domain method. Spatial domain method is used for direct manipulation of an image. Frequency domain method uses Fourier transform for improvement of an image [1].

1.2 Contrast Image Enhancement

Contrast image enhancement utilize the pixel intensity of an image and it uses as much of bins as possible. There are two type of contrast image enhancement method local

and global. Local method is used to sharpen the edges of an image and global method is used to preserve the luminance for bright pixel and increase it and it make low luminance for dark pixel. Contrast enhancement is divided into two broad categories [2].

1.2.1 Linear Contrast Image Enhancement

It is most probably used for remote sensing of image. In linear contrast enhancement method the total range of sensitivity of digital device can be utilized by increasing the original value of an image[2].

1.2.2 Non Linear Contrast Image Enhancement

It involves histogram equalization method. The limitation of this method is due to unsystematic arrangement of pixel image losses its brightness [2].

1.3 Global and Local Contrast Enhancement Method

1.3.1 Local Enhancement Method

This method is used to feature locally at targeted point in an image. All the small detail of an image is covered under local technique. Local method is used to sharpen the edges of an image. There are two basic type of local enhancement technique. They are adaptive contrast enhancement method and contrast limited adaptive histogram equalization method.

1.3.2 Global Enhancement Method

Global enhancement techniques are fast and simple. This technique are suitable for overall enhancement of the image. In this technique local feature of an image are avoided and focus is on nly global features. Some global techniques for contrast enhancement like BBHE, DSIHE, RMSHE, MMBEBHE, RWSHE etc.

2. Literature Survey

A review of image enhancement technique (Ram deep kaur et al.) [1] This paper provides us complete details regarding contrast image enhancement technique .There are two type of contrast image enhancement technique global and local. Adaptive histogram equalization is used to improve the contrast of an image. In AHE small scale contrast of an image increases and large scale contrast of an image get decreased. Fuzzy contrast image enhancement technique uses fuzzy rules to improve the

poor quality of an image. Global local contrast enhancement(S Somarjeet Singh et al .) [2] This paper describes the local and the global contrast image enhancement method. Local method target on specific area of an image and improves the quality of an image locally by maintaining noise and other artifacts. Global method improves the low contrast of an image can be improved globally. The enhanced image which is obtained by global method lacks the local properties of an image. The combination of local and global method improves the performance of an image [2]. Review of local and global contrast enhancement technique (Shefali Gupta et al.) [3] This paper describes local and global contrast image enhancement technique. Local technique is histogram equalization technique. Global contrast enhancement techniques are as follows BBHE, DSIHE, RMSHE, and MMBEBHE and there are many more [3].

Evaluating the performance of the dominant brightness level based color image enhancement (Rajiv Mahajan et al.) [4] This paper preserves the dominance of brightness level and this is compared with the help of two method they are histogram equalization method and adaptive histogram equalization method. Efficient algorithm for contrast image enhancement of natural images (Shyam lal et al.)[5] This paper suggested one algorithm which is divided into two stages. First stage improves the poor quality of an image by using sigmoid function. The output is further used for contrast limited adaptive histogram equalization method. The obtained output enhances the performance of an image [5].

3. Proposed Approach

In the proposed approach the combination of local and global method is used on 2D histogram.2D histogram consist of more than one channel.2D histogram consist of RGB values. The pixel intensity of every or we can say statistics of color has to maintained when this suggested method is applied on it. In this we will going to use local method for local feature enhancement of an image. Contrast Stretching[6] for global contrast image enhancement of an image. We combine these two methods by using two ways. First method is to use the weighted approach of two methods and get the final output. Second method is to first apply local feature enhancement method and obtain output of it and on that output apply Contrast Stretching method to obtain final output [6].In local feature enhancement approach we calculate the local mean and local variance of an image. In global contrast image enhancement method we use contrast stretching method with brightness factor .In that

we apply all contrast stretching transformation to obtain final output.

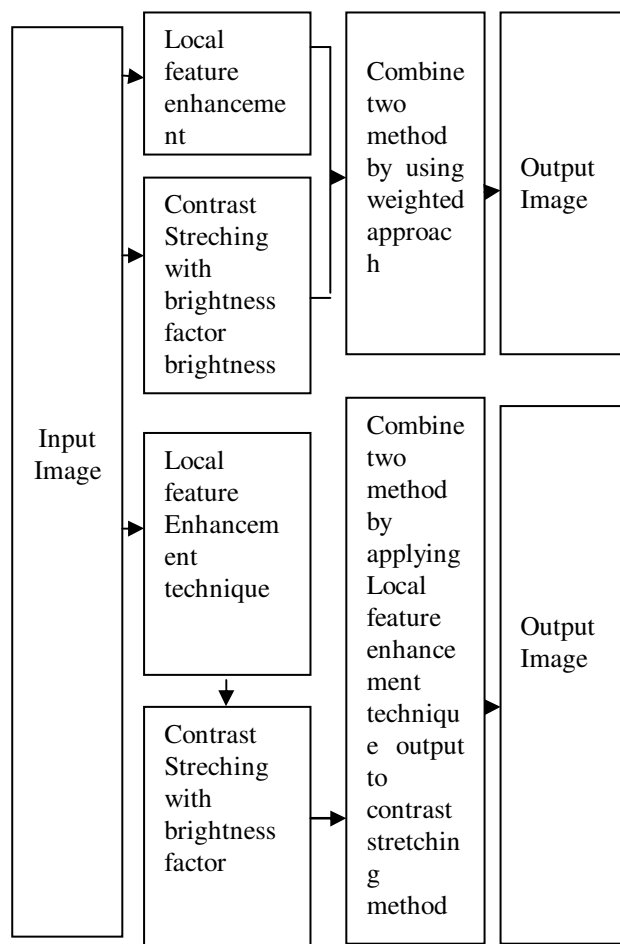


Fig. 1 System Architecture

4. Conclusions

Global contrast image enhancement method enhances the low contrast of an image in a global manner. The enhanced image obtained by global method does not have noise and other type of ringing artifacts in it. The exposure for contrast does not remain same in some part it is low and in some part of an image it is high where high contrast gain occurs. When we use global method we lack local details. When local contrast image enhancement method is applied it enhances local details of an image but the output image obtained with noise and other artifacts. Both methods have certain disadvantages when used separately hence the suggested method is used as combination of local and global method which works in a better way. The output which we will going to obtain

from this method will be far more better than other methods. The experiment which we are trying to perform by combining the global methods will also going to work well and this method can be used for any type of image. The qualitative analysis of the method is done by using various factors like peak signal to noise ratio ,discrete entropy, image enhancement factor and many more. The obtain result are compared with the existing method to prove that suggested method is better than existing method.

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