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REVIEW ARTICLE

REVIEW PAPER ON ENHANCEMENT OF IMAGES USING VARIOUS HISTOGRAM TECHNIQUES

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ABSTRACT

Image enhancement is basically improving the interpretability or awareness of information in images for human being spectators and providing `better' input for other automated image processing techniques. Histogram equalization (HE) is simple technique for enhancing image quality. However, excessive contrast enhancement can be resulted by the conventional histogram equalization. A review paper of histogram techniques for image contrast enhancement and preserving brightness is discussed with their major difference as having advantages and disadvantages.

Key words: Image Enhancement, HE, Contrast enhancement.

INTRODUCTION

Image resolution enhancement is a technique that helps to obtained high-resolution images from low-resolution images. It is needed to achieve a good effect of vision, in an improved effective image resolution, required for a good quality of images where it is required to adjust in a better size of image. It is mainly used in practical applications, such as robot vision, medical system, police system, remote image and image disposal software [1]. Improved investigation of high resolution image won the breakthrough progress.

Types of Enhancement

There are many types of enhancement technique

Histogram Equalization (HE): A histogram is a graphical representation of the distribution of data. An image histogram is a graphical representation of the number of pixels in an image as a function of their intensity. The histogram equalization technique is used to stretch the histogram of the given image. Greater is the histogram stretch greater is the contrast of the image.

Brightness Preserving Bi-Histogram Equalization (BBHE)

BBHE divides the image histogram into two parts. In this method, the separation intensity is presented by the input mean brightness value, which is the average intensity of all pixels that construct the input image. After this separation process, these two histograms are independently equalized.

Dualistic sub-Image Histogram Equalization (DSIHE)

DSIHE follows the same basic ideas used by the BBHE method of decomposing the original image into two sub-images and then equalizes the histograms of the sub-images separately.

Minimum Mean Brightness Error Bi-Histogram Equalization (MMBEBHE)

MMBEBHE is the extension of BBHE method that provides maximum brightness preservation.

Recursive Mean Separate Histogram Equalization (RMSHE)

Recursive Mean-Separate Histogram Equalization (RMSHE) is another improvement of BBHE. In RMSHE instead of decomposing the image only once, it perform image decomposition recursively to further preserve the original brightness up to scale r.

Recursive Sub-Image Histogram Equalization (RSIHE)

Recursive Sub-Image Histogram Equalization (RSIHE) with multiple local median intensities to improve the drawbacks of DSIHE method. Instead of separating the image only once, the RSIHE method recursively performs the image separation several times to get multiple sub-histograms.

Recursively Separated and Weighted Histogram Equalization (RSWHE)

The RSWHE segments the input histogram into two or more sub histogram recursively based on the mean or median as used in RMSHE and RSIHE, then apply the weighting process based on normalized power low function to modify the each sub-histogram. And then perform histogram equalization to each weighted output sub-histogram independently.

Dynamic Histogram Equalization (DHE)

DHE divides the input histogram into number of sub-histograms until it ensures that no dominating portion is present in any of the newly created sub-histograms. Then each sub histogram is allotted a dynamic gray level (GL) which further can be mapped by HE. This is done by distributing total available dynamic range of gray levels among the sub-histograms based on their dynamic range in input image and cumulative distribution (CDF) of histogram values. The whole technique can be divided in three parts partitioning the histogram, allocating GL ranges for each sub histogram and applying HE on each of them.

Logarithmic Transformation: The log transformation maps a narrow range of low input grey level values into a wider range of output values. The inverse log transformation performs the opposite transformation. Log functions are particularly useful when the input grey level values may have an extremely large range of values.

Algorithm	Advantages	Disadvantages
HE	A significant improvement in image contrast. This method is useful for the images which are bright or dark.	HE has "mean-shift" problem, it shifts the mean intensity value to the middle gray level of the intensity range. So this technique is not useful where brightness preservation is required.
BBHE	It overcome the mean shift problem of HE	higher brightness preservation is not done
DSIHE	DSIHE is better than BBHE in terms of brightness preservation and entropy	higher brightness preservation is not done
MMBEBHE	higher brightness preservation is provided	Time Complexity
RMSHE	Properly enhanced images. provide not only better but also scalable brightness preservation	This method presents a drawback: the number of decomposed sub-histograms is a power of two. Time complexity is higher than BBHE, DSIHE.
RSIHE	RSIHE is a novel extension of DSIHE and used some characteristics of RMSHE. Offers scalable brightness preservation and reduces artifacts.	Noise problem
RSWHE	for brightness preservation and contrast enhancement better than all above previous techniques, enhance the image contrast as well as preserve the image brightness	Artifacts and noise compression problem
Logarithmic Transformation	Log functions are particularly useful when the input grey level values may have an extremely large range of values. Log Transformation is useful for enhancing details in the darker regions of the image at the expense of detail in the brighter regions the higher-level values.	Not clarity
DHE	Takes control over the effect of traditional Histogram Equalization so that it performs the enhancement of an image without making any loss of details in it.	Compressionproblem
Powers-Law Transformations (Gamma Correction).	Display images at different intensities and clarity. Power-law transformations are useful for general purpose contrast manipulation. For a dark image, an expansion of gray levels is accomplished using a power-law transformation with a fractional exponent	Need more computation time than AGCWD
AGCWD	Hybrid technique of RSWHE and Gamma Correction. Increase the color intensity for contrast enhancement	Time computation is high

Powers-Law Transformations (Gamma Correction: This transformation function is also called as gamma correction. For various values of γ different levels of enhancements can be obtained. If you notice, different display monitors display images at different intensities and clarity. That means, every monitor has built-in gamma correction in it with certain gamma ranges and so a good monitor automatically corrects all the images displayed on it for the best contrast to give user the best experience.

Adaptive Gamma Correction and Weighting Distribution (AGCWD): It hybrids the RSWHE and Gamma correction techniques. As described RSWHE method, a normalized gamma correction function can be used to modify each sub histogram to include multi equalizations with brightness preservation.

Review of Literature

Chao Zuo (2014) proposed spatially weighted histogram equalization that not only considers the times of each grey value appears in a certain image, but also takes the local characteristics of each pixel into account. Here results of spatially weighted histogram had achieved visually more pleasing contrast enhancement while maintaining the input brightness, Ravichandran and Magudeeswaran (2012) proposed mean brightness preserving Histogram Equalization based techniques for image enhancement that partition the histogram of the original image into sub histograms and then independently equalize each sub-histogram with Histogram Equalization. Resuts of this proposed techniques was done under low quality images which results in computationally effective that makes it easy to implement and use in real time systems [2]. A. Vinod Kumar (2012), here author presents about Contrast enhancement of digital images is conveniently achieved by spreading out intensity values known as Histogram Equalization. As here the performance of different Histogram Equalization techniques for gray scale static images had been evaluated on the basis of parameters such as AMBE, PSNR and Entropy metrics. It is well illustrated that Brightness Preserving Dynamic Histogram Equalization (BPDHE) is the most suitable technique in terms of mean brightness preservation but performance of BPDHE is not satisfactory in terms of Entropy [1]. Swati Khidse (2013), here author proposes various image enhancement techniques with image fusion techniques, which help out in various error analysis techniques. Image fusion techniques are assessed using the various metrics. [7]. Shi-Chia Huang (2013), here modified histogram and enhanced contrast in digital images which improves the brightness of dimmed images via gamma correction and probability distribution of luminance pixels. In this, video enhancement with the framing difference as for producing enhanced and higher quality [5]. Mary Kim (2008), here new histogram equalization method, called RSWHE (Recursively Separated and Weighted Histogram Equalization), for brightness preservation and image contrast enhancement is worked out which provides image brightness more accurately and produces images with better contrast enhancement [4].

Problem Defınıtıon

After studying work of various researchers in the field of image enhancement of digital images, it was found that Histogram equalization is an effective image enhancement technique, but brightness of an image can be changed after the histogram equalization, which is mainly due to the flattening property of the histogram equalization. To overcome this problem many modifications on histogram equalization have already been proposed such as BBHE, DSIHE and RSWHE etc. But these methods can generate undesirable artifacts in images such as, over enhancement or excessive noise generation in some cases. AGCWD require high level of computations. So a method should be generated that can enhance image contrast as well as preserve image brightness and having low computational complexity and having results better than existing techniques. There are several reasons for an image to have poor contrast:

- The poor quality of the used imaging device.
- Lack of expertise of the operator.
- The adverse external conditions at the time of acquisition.

Conclusıon and Future Work

In a summary, the different enhancement techniques are studied to enhance the brightness of the digital images in any field. As while designing image enhancement techniques the speed of execution of the program is also an important factor. In This Paper we concluded all techniques with their advantages and disadvantages. In the future various techniques can be hybrid to perform better result as compared to the existing techniques.

REFERENCES

Chao Zuo, Qian Chen, Xiubao Sui, and Jianle Ren, 2014. “Brightness Preserving Image Contrast Enhancement using Spatially Weighted Histogram Equalization, *The International Arab Journal of Information Technology*, Vol. 11, No. 1, January 2014.

Kumar, A. V. and Choudhary, R. R. 2012. “A comparative analysis of image contrast enhancement techniques based on histogram equalization for gray scale static images”, *International Journal of Computer Applications*, Vol. 45, No. 21, pp. 11-15.

Mary Kim and Min Gyo Chung, “Recursively Separated and Weighted Histogram Equalization for Brightness Preservation and Contrast Enhancement”, Manuscript received July 13, 2008 0098 3063/08/$20.00 © 2008 IEEE.

Ravichandran, G., Magudeeswaran, V. 2012. “An efficient method for contrast enhancement in still images using Histogram Modification Framework”, *Journal of Computer Science,* Vol. 8, No. 5, pp. 775-779.

Shi-Chia Huang, Fan-Chieh Cheng, and Yi-Sheng Chiu, “Efficient contrast enhancement using adaptive gamma correction with weighting distribution”, IEEE Transaction on Image Processing vol.22, No. 3, PP 1032-1041, 2013.

Soong-Der Chen, Abd. Rahman Ramli, “Contrast Enhancement using Recursive Mean-Separate Histogram Equalization for Scalable Brightness Preservation”, Manuscript received May 21, 2003 0098 3063/00 $10.00 © 2003 IEEE.

Swati Khidse and Meghana Nagori, “A Comparative Study of Image Enhancement Techniques”, *International Journal of Computer Applications* (0975–8887), Volume 81 – No 15, November 2013.

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