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A SURVEY ON ENHANCED DIGITAL IMAGE HISTOGRAM EQUALIZATION METHOD

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Abstract

Image improvement is one among the difficult problems in low level image process. Distinction improvement techniques are used for rising visual quality of low distinction pictures. Histogram equalization (HE) technique is one such technique used for distinction improvement. The image histogram requirement for an improvement in existing Automatic contrast improvement methodologies that are applied in many low level image process techniques has LED to usage of the many bar graph leveling techniques. During this paper, numerous techniques of image improvement through bar graph leveling are overviewed. To gauge the effectiveness of the strategies illustrated, we've used the PSNR, tenengrad, and distinction as parameters. These parameters show that however the results vary on applying completely different techniques of improvement. The work is implemented on the MATLAB background. The varied techniques are reviewed.

Keywords- Contrast Enhancement, Foreground Enhancement, Histogram Equalization, Automatic contrast enhancement, RGB (red, green, blue), noise.

I. INTRODUCTION

Digital image improvement is one amongst the foremost necessary pictures process technology that is important to enhance the visual look of the image or to supply a far better transform representation for future automatic image process like image analysis, detection, segmentation and recognition. Several pictures have terribly low dynamic vary of the intensity values because of lean illumination and so got to be processed before being displayed. Sizable amount of techniques has centered on the improvement of grey level pictures within the spatial domain. These strategies embrace bar graph leveling, gamma correction, high pass filtering, low pass filtering, homomorphic filtering. Developed a way for distinction improvement victimization brightness protective bi-histogram leveling. Similar methodology for image distinction improvement is developed .A block overlapped bar graph equalization system for enhancing distinction of image is developed [1].presented an integrated neighborhood dependent approach for nonlinear enhancement (AINDANE) of color pictures. They applied the improvement to the grey element of the initial color image and obtained the output increased color image by linear color restoration method [2].

Histogram Processing: Histogram process is used in image improvement. The data inherent in bar chart also can utilize in different image process application like image segmentation and compression. A bar chart merely plots the frequency at that every grey-level occurs from zero (black) to 255 (white). The bar chart could be a distinct operates that's shown in figure. Bar chart represents the frequency of prevalence of all gray-level within the image, meaning it tell US however the values of individual component in a picture are distributed. bar chart is given ash (rk) = nk/N wherever rk and nk are intensity and range of pixels in image with intensity severally. A graphical illustration is comparable to a bar graph that organizes a bunch of information points into user specified ranges. The bar chart condenses a an information series into an simply understood visual by taking several data points and grouping them into logical ranges or bins [3]

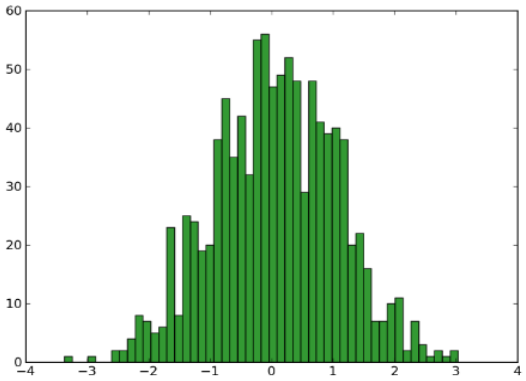

Fig1. Image Histogram Processing

Histogram Equalization: HE techniques are wide utilized in our way of life, specified within the field of client physics, medical image process, image matching and looking out, speech recognition and texture synthesis because it's high efficiency and ease. The most plans of HE-based strategies are to re-assign the intensity values of pixels to create the intensity distribution uniform to utmost extent to boost a picture, a brightness preserving Bi-HE (BBHE) methodology was projected in. The BBHE methodology decomposes the initial image into 2 sub-images, by using the image mean grey level, then applies the HE methodology on every of the sub pictures severally. At some extent BBHE preserves brightness of image. Dualistic sub-image bar chart equalization (DSIHE) is comparable to BBHE however DSIHE uses median as separation intensity to divide the bar chart into two sub-histogram. Minimum Mean Brightness Error Bi-HE (MMBEBHE) is an extension of the BBHE methodology. In MMBEBHE the separation intensity is minimum mean brightness error between input image and output image. Algorithmic mean separate HE (RMSHE) is an reiterative technique of BBHE, rather than moldering the image one time, the RMSHE methodology proposes for acting image decomposition recursively, up to a scalar r, generating sub-image. In RMSE, once r will increase the brightness increase, however variety of decomposed sub bar chart may be a power of 2. Multi-histogram equalization (MHE) overcomes the disadvantage of bi-HE, it decomposed the input image into many sub-image then applying the classical HE method to everyone [4].As its name suggests, the bar chart is

separated on the idea of norm recursively. Therefore we will say that it's extension of BBHE wherever division is completed one time and here it's wrapped to formula level r. that the variety of sub pictures can become 2r then as BBHE every sub image is equal severally. By this they'll additionally conclude that the brightness preservation will increase with increase within the formula level [5, 6].

II. RELATED WORK

In A. Ramli et al. [7]. Histogram equalization is generally utilized for contrast enhancement. Nonetheless, it has a tendency to change the brightness of an image and thus, not suitable for buyer electronic items, where safeguarding the first brightness is vital to abstain from bothering relics. Bi-histogram equalization (BBHE) has been proposed and broke down scientifically that it can protect the first brightness to certain amplifies. Nonetheless, there are still cases that are not took care of well by BBHE, as they oblige higher level of protection. This paper proposes a novel expansion of BBHE alluded to as minimum mean brightness error bi-histogram equalization (MMBEBHE) to give greatest brightness safeguarding. BBHE divides the input image's histogram into two dependent upon input mean before evening out them freely. This paper proposes to perform the partition dependent upon the threshold level, which might yield minimum absolute mean brightness error (AMBE - the absolute contrast between input and output mean). A productive recursive whole number based reckoning for AMBE has been formed to encourage constant execution. Reproduction outcomes utilizing specimen image which speak to images with quite low, quite high and medium mean brightness indicate that the cases which are not took care of well by HE, BBHE and dualistic sub image histogram equalization (DSIHE), might be legitimately upgraded by MMBEBHE.

In L. Yang et al. [8] proposed a spatially variant erosions/ dilations and openings/closings approach. Structuring elements (SE) can locally adapt their shape and orientation across the direction of the structures in the image. The process of extracting shape and orientation of the SE at each pixel from the image is under study. This method is useful in the enhancement of anisotropic features such as coherent, flow like structures. A general method based on fuzzy implication and inclusion grade operators have been discussed.

In C. I. Larnder et al. [9]. The Developing Innovations area of not long from now meeting incorporates two autonomous ventures that change over live video into a cartoon-like image in real-time [10]. In one framework (Real-time video reflection, Northwestern College), you can see your face thinking over at you like a cartoon character, complete with dull line shape diagrams and even color "fill" of different surface territories. When you rotate your head, the cartoon character also rotates its head. Raise your right eyebrow and grin, the character does the same. He really seems as though you, however in a cartoon sort of way. It is most likely a most impossible to miss sensation to see one's self as a cartoon avatar, figuratively speaking, face-to-face.

In Zuiderveld k et al. [10]. Histogram equalization is generally utilized for contrast enhancement as a part of a mixture of requisitions because of its basic capacity and adequacy. Samples incorporate medical image processing and radar signal processing. One disadvantage of the histogram equalization might be found on the way that the brilliance of an image could be changed after the histogram equalization, which is primarily because of the straightening property of the histogram equalization. Accordingly, it is seldom used in buyer electronic items, for example, TV where saving the first input splendor may be essential in place not to present unnecessary visual weakening. This paper proposes a novel growth of histogram.

In Y. Wang et al. [11]. To mitigates the problems faced in BBHE; propose another modified HE named as DSIHE. Here, the histogram is separated in two sub-images based on the median instead of the mean and equalized similar to BBHE. Although DSIHE does not allow significant mean shift, it fails to preserve mean brightness in some cases. Besides this, DSIHE may also create artifacts or fail to enhance to some extent. For example, the image pixel intensities are 1, 2, 3, 200, 205, 208 and 210. Here, the median is 200, as a result the first three pixels can be over-enhanced which is not desired.

In M. G. Chung et al. [12]. Propose RSWHE which is another improved version of HIM [6]. RSWHE consists of three modules such as histogram segmentation, histogram weighting and histogram equalization. In histogram segmentation module, multiple sub histograms are generated based on the image mean and median. Meanwhile, in histogram weighting module, separated histograms are weighted by normalized power law function. This module provides more probabilities to infrequent gray levels. Finally, HE is applied on each of the weighted histogram. However, some statistical information might lose after performing histogram transformation and the desired enhancement may not be achieved.

In S. C. Huang et al. [13]. Besides these HE based image enhancement techniques, some other techniques have been already proposed. AGCWD is proposed by Huang where gamma correction and luminance pixels probability distribution have been used. Although most of the cases AGCWD enhance the brightness of the input image, it might not give satisfactory results if the input image has lack of too bright pixels. Because in this case, the highest possible enhancement never crosses the maximum intensity of the input image which can be easily understandable.

In Ji-Hee et al. [14]. This paper discusses comparison of the performance of histogram color equalization method in gray. Because images contrast is worse after converting. So this paper suggests a 3 dimensional method of color that results

in the same distribution on a gray scale histogram. The performance of Menotti algorithm also discusses on this paper, on its performance that depends on color component. With this, we have a conclusion that the method presented improves the contrast of the lighting effectively by generating the same pdf on a gray scale.

In Joung-Youn et al. [15]. POSHE is a so-called new contrast enhancement algorithm is the main topic on this paper. It is more effective and much closer than local histogram equalization. POSHE has a very important feature that is the own-pass mask-shaped filter gain function density probability sub-region which has the conclusion that the image size can vary. The global equity histogram method is not used because POSHE has an increase in brightness contrast to very large images and causes a preventive effect.

III. EXPECT OUTCOME & CONCLUSION

The field of images contrast enhancement identifies various challenges. Find better visible and get better information. Find best possible answer. In this paper, an efficient formula supported object mean is implemented. The brightness of the image is preserved by victimization BBHE based mostly bar graph equalization. Here in our work we've increased pictures victimization bar graph leveling of pictures by reconfiguring there component levels in bar graph victimization improvement techniques to evaluate the effectiveness of the strategies illustrated, we've used the PSNR, tenengrad, and distinction as parameters. These parameters show that however the results vary on applying totally different techniques of improvement. Additionally the pictures increased through totally different bar graph leveling strategies. Most of the techniques area unit helpful for altering the grey level values of individual pixels and thus the distinction of the complete image. The captured pictures of aerial image forever cause an ambiguity that is that the main concern of analysis. The given paper provides the review of various techniques to boost the standard of a picture. The image improvement quality may be assessed by absolutely the Mean Brightness Error (AMBE), the distinct Entropy (H) and PSNR to assess the improvement quality between the dimmed input image and therefore the increased image.

REFERENCES

[1]. Yu Wang, Q. Chen, and B. Zhang, "Image enhancement based on equal area dualistic sub-image histogram equalization method" IEEE Trans. Consumer Electronics, vol. 45, no. 1, pp. 68-75, Feb. 1999.

[2]. T. K. Kim, J. K. Paik, and B. S. Kang, "Contrast enhancement system using spatially adaptive histogram equalization with temporal filtering" IEEE Trans. Consumer Electronics, vol. 44, no. 1, pp. 82-87, Feb. 1998.

[3]. S. N. Sivanandam, S. Sumathi and S. N. Deepa Introduction to Fuzzy Logic using MATLAB Springer, -Verlag Berlin Heidelberg 2007.

[4]. Zhao Wei, Huang Lidong, Wang Jun, Sun Zebin, "Entropy Maximization Histogram Modification Scheme For Image Enhancement", IET Image Processing, 2014

[5]. Nicholas Sia Pik Kong, Haidi Ibrahim, and Seng Chun Hoo, "A Literature Review on Histogram Equalization and Its Variations for Digital Image Enhancement", International Journal of Innovation, Management and Technology, 2013.

[6]. Kaur M., Kaur J., Kaur J., "Survey of Contrast Enhancement Techniques based on Histogram equalization", International Journal of Advanced Computer Science and Applications, 2011.

[7]. A. Ramli and S. D. Chen, "Minimum mean brightness error bihistogram equalization in contrast enhancement," IEEE Trans. Consumer Electron., pp. 1310–1319, vol. 49, no. 4, Nov. 2003.

[8]. L.O. Chua, and L. Yang, "Cellular Neural Networks: Theory and Applications", IEEE Trans. on Circuits and Systems, Vol.35, 1998, pp. 1257-1290.

[9]. C. I. Larnder, "Augmented perception via cartoon rendering: Reflections on a real-time video-to-cartoon system," ACM SIGGRAPH Computer Graph., pp. 1–8, vol. 40, no. 3, 2006.

[10]. Zuiderveld k, "Contrast limited adaptive histogram equalization," in Graphics Gems IV. New York, USA, 1994.

[11]. Y. Wang, Q. Chen, and B. Zhang, "Image enhancement based on equal area dualistic sub-image histogram equalization method," Consumer Electronics, IEEE Trans. on, vol. 45, no. 1, pp. 68–75, 1999.

[12]. M. Kim and M. G. Chung, "Recursively separated and weighted histogram equalization for brightness preservation and contrast enhancement," Consumer Electronics, IEEE Trans. on, vol. 54, no. 3, pp. 1389– 1397, 2008.

[13]. S.C. Huang, F.-C. Cheng and Y.-S. Chiu, "Efficient contrast enhancement using adaptive gamma correction with weighting distribution," Image Processing, IEEE Trans. on, vol. 22, no. 3, pp. 1032–1041, 2013.

[14]. Han, Ji-Hee, Sejung Yang, and Byung-Uk Lee. "A novel 3-D color histogram equalization method with uniform 1-D gray scale histogram." IEEE Transactions on Image Processing 20.2 (2011): 506-512.

[15]. Joung-Youn, Kim, Lee-Sup Kim, and Seung-Ho Hwang. "An advanced contrast enhancement using partially overlapped sub-block histogram equalization." IEEE transactions on circuits and systems for video technology 11.4 (2001): 475-484.