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A Study of Image Enhancement Techniques for Remote Sensing Images

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Abstract—the fundamental reason of contrast enhancement is to bring out detail that is hidden in an image that is covered up in a picture or to expand contrast in a low contrast picture. This paper presents a literature review on some of the image Enhancement techniques for improving images like histogram equalization, global histogram equalization, bi-histogram equalization, dualistic sub-image histogram equalization, minimum mean brightness error bi-histogram equalization, DBLA etc. The overall objective of this paper is to evaluate the short comings in earlier techniques of image enhancement.

Keywords— Contrast Enhancement, HE, Global HE, Bi HE, DBLA

I. INTRODUCTION

Image enhancement is really a preprocessing part of many image processing applications. The basic aim of image enhancement is to enhance the interpretability or perception of data in images for human viewers, or to supply better input for other automated image processing techniques. There are various reasons for low quality of a graphic such as for instance distortion being introduced by the imaging systems, insufficient expertise of the operator or the adverse external conditions at the time of image acquisition.

Mainly, Image enhancement includes intensity and contrast manipulation, noise reduction, edges sharpening and filtering, etc. Contrast Enhancement is dedicated to the situation of improving the contrast in a graphic to produce various features quicker perceived. Contrast of a graphic is determined by its dynamic range, which is defined because the difference between lowest and highest intensity level. Contrast enhancement techniques have various application areas for enhancing the visual quality of low contrast images. Contrast enhancement is one of many important research issues of image enhancement.

II. CONTRAST ENHANCEMENT TECHNIQUES

A. HISOTGRAM EQUALIZATION

This technique usually escalates the global contrast of several images, especially once the utilizable data of the image is represented by nearby contrast values. All the way through this adjustment, the intensities could be better distributed on the histogram. This happens for parts of lower local contrast to improve a larger contrast. Histogram equalization accomplishes this by successfully spreading out the absolutely frequent intensity values.

The strategy is advantageous in images with backgrounds and foregrounds which are generally bright or both dark. Specifically, the strategy can lead to raised views of bone structure in x-ray images, and raised detail in photographs which are over or under-exposed. A vital advantageous asset of the strategy is that it's a reasonably straightforward technique and an invertible operator. So the idea is that, if the histogram equalization function is famous, then a original histogram could be recovered. The calculation isn't computationally intensive. A disadvantage of the strategy is that it's indiscriminate. It might boost the contrast of background noise, while decreasing the usable signal. In scientific imaging where spatial correlation is more important than intensity of signal, the tiny signal to noise ratio usually hampers visual detection.

Histogram equalization often produces unrealistic effects in photographs; however it is extremely helpful for scientific images like thermal, satellite or x-ray images, exactly the same class of images that user would apply false-color to. Also histogram equalization can produce undesirable effects when positioned on images with low color depth. As an illustration, if positioned on 8-bit image displayed with 8-bit gray-scale palette it'll further reduce color depth of the image. Histogram equalization will continue to work the most truly effective when positioned on images with higher color depth than palette size, like continuous data or 16-bit gray-scale images.

B. GLOBAL HISTOGRAM EQUALIZATION

Let us suppose that X = {X (i,j)} denotes a digital image, where X(i,j) denotes the gray level of the pixel at (i,j) place. The total number of the image pixels is n, and the image intensity is digitized into L levels that are $\{X0, X1, X2 \ldots . X_{L-1}\}$. So it is obvious that ∀ X (i,j)϶$\{X0, X1, X2, \ldots . X_{L-1}\}$.Suppose nk denotes the total number of pixels with grey level of X_k in the image, then the probability density of X_k will be

$$P(X_k) = \frac{n_k}{n}, k = 0,1, \dots \dots L-1 \quad \dots\dots\dots(1)$$

The relationship between p(X_k) and X_k is defined as the probability density function (PDF), and the graphical appearance of PDF is known as the histogram. Based on the image's PDF, its cumulative distribution function is defined as

$$C(rX_k) = \sum_{j=0}^{L-1} p(X_j) = \sum_{j=0}^{L-1} \frac{n_k}{n} \quad \dots\dots\dots(2)$$

Where k=0, 1, ……….., L-1, and it is obvious that c(X_{L-1})=1. The output mean of the HE does not take the mean brightness of the original image into account.

C. BI-HISTOGRAM EQUALIZATION

These strategies separate input histogram into two subsections. These two elements equalized severally. During this methodology the factors accustomed selected the threshold for separation denoted by. ϵ ………..Based on the threshold the input image X are often rotten into sub-images into two sub-images[8].This methodology divides the image histogram into two separate parts as shown in Fig.1. In this method, the separation intensity is conferred by the input mean brightness value, which can be the average intensity of most pixels that construct the input image. When this separation method, these two histograms are severally equal. Using this method, the mean brightness of the resultant image can lie between the input mean and also the middle grey level.

D. DUALISTIC SUB-IMAGE HISTOGRAM EQUALIZATION

Subsequently the basic concepts employed by the BBHE method of decomposing the new image into sub-images and hence equalize the histograms of the sub-images individually, proposed the thus known as equal area dualistic sub-image HE technique. Rather than decomposing the image supported on its mean grey level, the DSIHE technique decompose the images that aims at the maximization of the Shannon's entropy of the output image of decomposing the first image into two sub-images and hence equalize the histograms of the sub-images individually.

E. MINIMUM MEAN BRIGHTNESS ERROR BI-HISTOGRAM EQUALIZATION

Still after the fundamental principle of the BBHE and DSIHE types of splitting an image then applying the HE technique to equalize the ensuing sub-images severally proposed the minimum mean brightness error Bi-HE technique. Such strategy permits us to get the brightness of the output image while not generating the output image for each candidate threshold level l, and its aim is to provide a technique befitting real-time applications

F. DBLA

This algorithm computes brightness adaptive intensity transfer functions utilizing the Low - frequency luminance component in the wavelet domain and transforms intensity value s based on the transfer function. Firstly discrete wavelet transform is completed on the input images and then utilizing the log-average luminance the LL sub band into low-, middle - , and high-intensity layers will undoubtedly be decomposed. Intensity transfer functions are adaptively estimated utilizing the knee transfer function and the gamma adjustment function on the basis of the dominant brightness level of every layer. From then on, the resulting enhanced image is obtained utilizing the inverse DWT. Although various histogram equalization approaches have already been proposed in the literature, they have a tendency to degrade the entire image quality by exhibiting saturation artifacts in both low-and high-intensity regions. The algorithm overcomes this issue utilizing the adaptive intensity transfer function. The algorithm enhances the entire contrast and visibility of local details much better than existing techniques. The method can effectively enhance any low-contrast images acquired with a satellite camera and will also be ideal for other various imaging.

G. ADAPTIVE INTENSITY TRANSFORMATION

The adaptive intensity transfer function is computed in three decomposed layers using the dominant brightness level, the knee transfer function, and the gamma adjustment function. Then, the adaptive transfer function is applied for colour-preserving high-quality contrast enhancement. The resulting enhanced image is obtained by the inverse DWT (IDWT).

III. LITERATURE SURVEY

All Aimi Salihah et al. [1] presented a two phase methodology to be able to obtain an entirely segmented abnormal white blood cell and nucleus in acute leukemia images. In the very first phase, the three contrast enhancement techniques which are partial contrast, bright stretching and dark stretching were used to enhance the image quality. Contrast enhancement techniques enhanced the place of interest of acute leukemia for easing the segmentation process. Within the next phase, image segmentation based on HSI color space has been proposed. The proposed technique helps to enhance the image visibility and has successfully segmented the acute leukemia images into two primary ingredients: blast and nucleus. The combination between contrast enhancements and image segmentation has good effect on improving the accuracy of segmentation. Hence, information gain from the resultant images would become well suited for hematologists to simply help analysis the types of acute leukemia. **Kanwal, Navdeep [2]** dealt with contrast enhancement of X-Ray images and presents here a new approach for contrast enhancement centered on Adaptive Neighborhood technique. A cross methodology for enhancement has been presented. Comparative analysis of proposed technique against today's major contrast enhancement techniques has been performed and outcomes of proposed technique are promising. **Sundaram, M. [3]** presented a Modified Contrast Limited Adaptive Histogram

Equalization. Histogram equalization is a highly effective and simple technique for contrast enhancement. The traditional histogram equalization usually results in excessive contrast enhancement due to insufficient control on the amount of enhancement. The Histogram Modified Contrast Limited Adaptive Histogram Equalization adjusts the total amount of contrast enhancement, which often supplies the resultant image a strong contrast and brings the area details for more relevant interpretation. It incorporates both histogram modifications becoming an optimization technique and Contrast Limited Adaptive Histogram Equalization. This technique is tested for Mias mammogram images. The performance of this method has been determined using the parameter like Enhancement Measure. From the subjective and quantitative measures it's interesting this proposed technique provided better contrast enhancement with preserving the area information of the mammogram images. **Ehsani, Seyed P. [4]** proposed an adaptive and iterative histogram matching algorithm for chromosome contrast enhancement especially in banding patterns. The reference histogram, with which the initial image must be matched, is done based on some processes on the very first image histogram. Usage of raw information in the histogram of initial image can lead to more dependency to the input image and acquiring better contrast improvement. Moreover, the iteration procedure results in a gradual contrast enhancement and getting the most effective result. The iteration steps may differ greatly regarding the image characteristics and histogram. To have the ability to measure the performance of the proposed algorithm in comparison with existing image enhancement techniques, Constant Gain Transform and Local Standard Deviation Adaptive Contrast Enhancement , a quantitative measurement, the contrast improvement ratio, is utilized. The experimental results indicated that the proposed method showed the most effective results as it pertains to the CIR measure and, along with in visual perception. **Ke, Wei-Min et al. [5]** proposed an innovative image enhancement framework that combines bilateral tone adjustment and saliency-weighted contrast enhancement methods. Unlike most curve-based global contrast enhancement methods, BiTA enhances the mid-tone regions that normally contain important scenes, along with the bright and dark regions. For local contrast enhancement, SWCE integrates the thought of image saliency directly into an easy filter-based contrast enhancement method. Regions with higher saliency values, which indicate that the regions have a larger extent of human interest, deserved a larger degree of enhancement. Furthermore, they presented the ratio of saliency-weighted relative entropy to noise to judge the enhancement quality. Simulation results revealed that the proposed schemes achieved high contrast enhancement with little noise and great image quality. **Jha, Rajib Kumar et al. [6]** proposed a contrast enhancement technique using scaling of internal noise of a dark image in discrete cosine transform (DCT) domain. The mechanism of enhancement is brought on by noise-induced transition of DCT coefficients from an unhealthy state to an enhanced state. This transition is effected by the inner noise present due to insufficient sufficient illumination and might be modeled with an over all bistable system exhibiting dynamic stochastic resonance. The proposed technique adopted a nearby adaptive processing and significantly enhances the image contrast and color information while ascertaining good perceptual quality. When compared to the existing enhancement techniques such as for example adaptive histogram equalization, gamma correction, single-scale retinex, multi-scale retinex, modified high-pass filtering, multi-contrast enhancement, multi-contrast enhancement with dynamic range compression, color enhancement by scaling, edge-preserving multi-scale decomposition and automatic controls of popular imaging tool, the proposed technique gives remarkable performance with regards to relative contrast enhancement, colorfulness and visual quality of enhanced image. **Jha, Rajib Kumar et al. [7]** proposed a nonlinear non-dynamic stochastic resonance-based technique for enhancement of dark and low contrast images. A low contrast image is treated as a sub-threshold signal and noise-enhanced signal processing is positioned on improve its contrast. The proposed technique uniquely utilizes addition of external noise to neutralize the effectation of internal noise of a low contrast image. Random noise is added repeatedly to a graphic and is successively hard-thresholded followed closely by overall averaging. By varying the noise intensities, noise induced resonance is obtained at particular optimum noise intensity. Performance of the proposed technique has been investigated for four types of noise distributions - gaussian, uniform, poisson and gamma. Quantitative evaluation of the performances has been done in terms of contrast enhancement factor, color enhancement and perceptual quality measure. Comparison with other existing spatial domain techniques demonstrates the proposed technique gives remarkable enhancement while ascertaining good perceptual quality. **Cheng, H. D., and Yingtao Zhang [8]** proposed an approach for the detection of over-enhancement. The important thing contributions of the paper are as follows. The causes for generating over-enhancement are investigated and analyzed deeply. An objective criterion for detecting over-enhancement is proposed. The experimental results demonstrate that the proposed approach can locate the over enhanced areas accurately and effectively, and provide a quantitative criterion to measure the over-enhancement levels well. The proposed approach might be ideal for dynamically monitoring the caliber of the enhanced image, and optimizing the parameter settings of the contrast enhancement algorithms. **Xu, Hongteng et al. [9]** proposed an histogram-based model for contrast enhancement ;.Based on the analysis when it comes to the relationships of histogram with contrast, they begin a style which achieved contrast enhancement by an optimum transform of histogram, gave two metrics called contrast gain and nonlinearity of transform to measure the strength of enhancement and the seriousness of distortion caused by enhancement respectively. The ratio of the 2 proposed metrics not merely gives guidance for the configuration of parameter in the algorithm, but additionally supplies a helpful measurement for contrast distortion, which may be a possible way to fix judge whether the contrast of a picture is optimal. Experimental results showed the superior performances of the proposed algorithm in image enhancement**. Lee, Eunsung et al. [10**] presented a contrast enhancement approach predicated on dominant brightness level analysis and adaptive intensity transformation for remote sensing images. The proposed algorithm computes brightness-adaptive intensity transfer functions utilising the low-frequency luminance component in the wavelet domain and transforms intensity values based on the transfer function.

More specifically, they first performed discrete wavelet transform on the input images and then decompose the LL sub band into low-, middle-, and high-intensity layers using the log-average luminance. Intensity transfer functions were adaptively estimated utilising the knee transfer function and the gamma adjustment function on the cornerstone of the dominant brightness level of each and every layer. Following the intensity transformation, the resulting enhanced image is obtained utilising the inverse DWT. Although various histogram equalization approaches have now been proposed in the literature, they often degrade the entire image quality by exhibiting saturation artifacts in both low- and high-intensity regions. The proposed algorithm overcame this matter utilising the adaptive intensity transfer function. The experimental results demonstrate that the proposed algorithm enhances the entire contrast and visibility of local details a lot better than existing techniques. The proposed method can effectively enhance any low-contrast images acquired with a satellite camera and may also be well suited for other various imaging devices such as for instance consumer digital camera models, photorealistic 3-D reconstruction systems, and computational cameras. **Chouhan, Rajlaxmi et al. [11]** proposed an energetic stochastic resonance based technique in spatial domain for the enhancement of dark- and low-contrast images. Stochastic resonance phenomenon in that the performance of something could be improved by addition of noise. DSR is applied in a iterative fashion by correlating the bistable system parameters of a double-well potential with the intensity values of a low-contrast image. Optimum output is ensured by adaptive computation of performance metrics - relative contrast enhancement factor, perceptual quality measures and colour enhancement factor. When compared with the existing enhancement techniques such as for instance as an example adaptive histogram equalisation, gamma correction, single-scale retinex, multi-scale retinex, modified high-pass filtering, edge-preserving multi-scale decomposition and automatic controls of popular imaging tools, the proposed technique gives significant performance in terms of contrast and colour enhancement along with perceptual quality. Comparison with a spatial domain SR-based technique was already illustrated. **Kil, Tae Ho et al. [12]** proposed a dehazing algorithm predicated on dark channel prior and contrast enhancement approaches. The conventional dark channel prior method removes haze and thus restores colors of objects in the scene, but it generally does not consider the enhancement of image contrast. On the contrary, the image contrast method improves the local contrast of objects, nevertheless the colors are generally distorted because of the over-stretching of contrast. The proposed algorithm combines the features of these two conventional approaches for keeping along side while dehazing. With this specific an optimization function is proposed to balance between the contrast and colors distortion, where the contrast measure follows the standard image statistics and the hue component may be used to constrain along side changes. Based on the experimental results, the proposed approach compensates for the disadvantages of conventional methods, and enhances contrast with less color distortion. **Reshmalakshmi, C., and M. Sasikumar [13]** handled a new contrast enhancement algorithm, which maps elements from pixel plane to membership plane and to enhancement/transform plane. Shortcomings of existing contrast enhancement techniques are rectified with the assistance of a mathematical tool called `Fuzzy set '.These fuzzy sets could be moulded to manage the uncertainty and/or vagueness associated with images. To measure the performance, this new algorithm is applied on different images and few evaluation parameters were calculated, which proved the improvement over various other existing contrast enhancement techniques predicated on fuzzy sets. **Chen, Xiaoming, and Lili Lv. [14**] proposed a compositive contrast enhancement algorithm which combines histogram equalization based methods and an multi-scales unsharp masking based methods. This proposed algorithm uses HEBM to achieve global contrast enhancement and UMBM to achieve local multi-scales contrast enhancement. First, they reviewed the techniques developed in the literature for contrast enhancement. After then, they introduced the most recent algorithm in details. The performance of the proposed method is studied on experimental IR data and weighed against those yielded by two well established algorithms. The developed algorithm has good performance in global contrast and local contrast enhancement with noise and artifact suppression. **Maragatham, G., and S. Md Mansoor Roomi [15**] proposed an algorithm to model images featuring its local contrast measure, to classify and distinguish relating to the images having different contrast level. The input image is classified either as low contrast or high contrast image utilising the model. If the classified image is low contrast is going to be enhanced utilising the Stochastic Resonance principle. The outcomes revealed that the proposed automated procedure enhances the low contrast image better compared to conventional enhancement methods. **Nercessian, Shahan C. et al. [16]** presented a multi-scale image enhancement algorithm dedicated to a whole new parametric contrast measure. The parametric contrast measure incorporates not only the luminance masking characteristic, but additionally the contrast masking characteristic of the human visual system. The formulation of the contrast measure could be adapted for every multi-resolution decomposition scheme to be able to yield new human visual system-inspired multi-scale transforms. In this information, it's exemplified utilising the Laplacian pyramid, discrete wavelet transform, stationary wavelet transform, and dual-tree complex wavelet transform. Consequently, the proposed enhancement procedure is developed. The features of the proposed method included the integration of both the luminance and contrast masking phenomena; the extension of non-linear mapping schemes to human visual system inspired multi-scale contrast coefficients; the extension of human visual system-based image enhancement approaches to the stationary and dual-tree complex wavelet transforms, and an instantaneous approach to adjusting overall brightness; and achieving dynamic range compression for image enhancement in the direct multi-scale enhancement framework. Experimental results demonstrated the ability of the proposed algorithm to attain simultaneous local and global enhancements. **Cao, Gang et al. [17**] proposed two novel algorithms to detect the contrast enhancement involved manipulations in digital images. First, they predicated on the detection of global contrast enhancement placed on the previously JPEG-compressed images, which are widespread in real applications. The histogram peak/gap artifacts incurred by the JPEG compression and pixel value mappings are analyzed theoretically, and distinguished by identifying the zero-height gap fingerprints. Second, they proposed to identify the composite image made by enforcing contrast adjustment on each one or both source regions. The positions of detected block-wise peak/gap bins are clustered for recognizing the contrast enhancement mappings placed on different source regions. The consistency between regional artifacts is checked for discovering the image forgeries and locating the composition boundary. Extensive experiments have verified the effectiveness and efficacy of the proposed techniques. **Celik, Turgay [18]** proposed an algorithm, which enhances the contrast of an insight image using spatial information of pixels. The algorithm introduces a novel solution to compute the spatial entropy of pixels using spatial distribution of pixel gray levels. Different in comparison to conventional methods, this algorithm considers the distribution of spatial locations of gray quantities of a graphic instead of gray-level distribution or joint statistics computed from the gray quantities of an image. For every gray level, the corresponding spatial distribution is computed utilizing a histogram of spatial locations of most pixels with the identical gray level. Entropy measures are calculated from the spatial distributions of gray quantities of a graphic to make a distribution function, which can be further mapped to a typical distribution function to attain the final contrast enhancement. The technique achieves contrast improvement in the event of low-contrast images; however, it generally doesn't alter the image if the image's contrast is high enough. Thus, it always produces visually pleasing results without distortions. Furthermore, this technique is along side transform domain coefficient weighting to attain both local and global contrast enhancement at the identical time. The degree of the local contrast enhancement could be controlled. Several experiments on effects of contrast enhancement are performed. Experimental results reveal that the proposed algorithms produce better or comparable enhanced images than several state-of-the-art algorithms. **Huang, S., and W. Chen [19**] proposed a hardware-oriented contrast enhancement algorithm which can be often implemented effectively for hardware design. To be able to be viewed for hardware implementation, approximation techniques are proposed to lessen these complex computations during performance of the contrast enhancement algorithm. The proposed hardware-oriented contrast enhancement algorithm achieves good image quality by measuring the outcomes of qualitative and quantitative analyzes. To decrease hardware cost and improve hardware utilization for real-time performance, a reduction in circuit area is proposed through usage of parameter-controlled reconfigurable architecture. The experiment results revealed that the proposed hardware-oriented contrast enhancement algorithm could offer an average frame rate of 48.23 frames/s at hd resolution 1920 × 1080.

IV. COMPARISON TABLE

Table 1 shows the comparison of the various techniques.

Table 1: Comparison of the various techniques

Ref.	Authors	Year	Technique	Features	Limitations
[1]	Aimi Salihah, A. N., M. Y. Mashor, Nor Hazlyna Harun, Azian Azamimi Abdullah, and H. Rosline	2010	partial contrast technique, bright stretching technique and dark stretching technique	analysis the types of acute leukaemia	introduce the color artefacts.
[2]	Kanwal, Navdeep, Akshay Girdhar, and Savita Gupta.	2011	Region Based Adaptive Contrast Enhancement	procedure enhances the low contrast image	use of adaptive histogram equalization has been ignored
[3]	Sundaram, M., K. Ramar, N. Arumugam, and G. Prabin	2011	Histogram Modified Contrast Limited Adaptive Histogram Equalization	provides better contrast enhancement preserves the local information of the mammogram images	decrease the intensity
[4]	Ehsani, Seyed P., Hojjat Seyed Mousavi, and Babak H. Khalaj	2011	adaptive and iterative histogram matching (AIHM) algorithm	best results in CIR measure	introduce the color artefacts.
[5]	Ke, Wei-Ming, Chih-Rung Chen, and Ching-Te Chiu	2011	bilateral tone adjustment and saliency-weighted contrast enhancement	achieve high contrast enhancement with little noise and great image quality.	use of adaptive histogram equalization has been ignored
[6]	Jha, Rajib Kumar, Rajlaxmi Chouhan, Prabir Kumar Biswas, and Kiyoharu Aizawa	2012	Internal noise-induced contrast enhancement	gives remarkable performance in terms of relative contrast enhancement, colorfulness and visual quality	decrease the intensity
[7]	Jha, Rajib Kumar, Rajlaxmi Chouhan, and P. K. Biswas.	2012	nonlinear non-dynamic stochastic resonance-based technique	gives remarkable enhancement while ascertaining good perceptual quality	introduce the color artefacts.

[8]	Cheng, H. D., and Yingtao Zhang.	2012	detection of over-enhancement	locate the over enhanced areas accurately and effectively	decrease the intensity
[9]	Xu, Hongteng, Guangtao Zhai, and Xiaokang Yang	2012	contrast distortion and optimal contrast enhancement	provides a useful measurement for contrast distortion	use of adaptive histogram equalization has been ignored
[10]	Lee, Eunsung, Sangjin Kim, Wonseok Kang, Doochun Seo, and Joonki Paik	2013	Dominant Brightness Level Analysis and Adaptive Intensity Transformation	enhance any low-contrast images	introduce the color artefacts.
[11]	Chouhan, Rajlaxmi, Rajib Kumar Jha, and Prabir Kumar Biswas	2013	dynamic stochastic resonance (DSR)-based technique	significant performance in terms of contrast and colour enhancement	decrease the intensity
[12]	Kil, Tae Ho, Sang Hwa Lee, and Nam Ik Cho	2013	dehazing algorithm based on dark channel prior and contrast enhancement	enhances contrast with less color distortion	use of adaptive histogram equalization has been ignored
[13]	Reshmalakshmi, C., and M. Sasikumar.	2013	fuzzy technique	procedure enhances the low contrast image	introduce the color artefacts.
[14]	Chen, Xiaoming, and Lili Lv.	2013	Compositive Contrast Enhancement Algorithm	good performance in global contrast and local contrast enhancement with noise and artifact suppression	decrease the intensity
[15]	Maragatham, G., and S. Md Mansoor Roomi	2013	algorithm to model images using its local contrast measure	procedure enhances the low contrast image	use of adaptive histogram equalization has been ignored
[16]	Nercessian, Shahan C., Karen A. Panetta, and Sos S. Agaian	2013	multi-scale image enhancement algorit hm	attain simultaneous local and global enhancements	introduce the color artefacts.
[17]	Cao, Gang, Yao Zhao, Rongrong Ni, and Xuelong Li	2014	global contrast enhancement	verifies the effectiveness and efficacy	use of adaptive histogram equalization has been ignored
[18]	Celik, Turgay	2014	Spatial Entropy-Based Global and Local Image Contrast Enhancement	achieves contrast improvement in the case of low-contrast images	decrease the intensity
[19]	Huang, S., and W. Chen	2014	hardware-oriented contrast enhancement algorithm	achieves good image quality decrease hardware cost and improve hardware utilization	introduce the color artefacts.

V. CONCLUSION AND FUTURE SCOPE

In this paper, a survey on some of the image Enhancement techniques for improving images has been done. Moreover a comparison table has been developed which shows the various techniques, their features and limitations. From the survey, it has been concluded that none of the technique performs better in every field. Therefore, in near future, new integrated Contrast Enhancement technique for Remote Sensing Images using Dominant Brightness Level Analysis can be developed for better results.

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