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Improved Particle Swarm Optimization Based Image Enhancement Using Fuzzy Logic

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Abstract*— Image enhancement performs a significant part in digital image handling programs for both human and computer perspective. The major problems that increases in image improvement is quantifying the way of improvement and indicates that a variety of image improvement methods are scientific and thus needs entertaining techniques and methods to obtain pleased outcomes. In this document, originally a study on various image improvement methods has been done. From the study it has been found that none of the strategy is effective in every part. Therefore this paper has suggested a new particle swarm optimization based image improvement to improve the outcomes further. The trial outcomes has clearly proven that the suggested methods outperforms over the available methods.

***Index Terms*—Contrast Enhancement, Fuzzy Logic, Histogram Equalization, Particle swarm optimization.**

I. INTRODUCTION

Primary or can say aim of image improvement is for handling a given picture so that the result is more appropriate than the given unique picture for the particular programs. Enhancement increases and increases the picture functions such as sides, limitations, comparison to create a visual show which is more useful for show and the research. Image improvement is generally a technique that is used for modifying electronic pictures so that the result is more appropriate either for displaying or can say for more research. One can also say that if the disturbance is being removed from an picture, it will create the work simpler for the recognization of the key functions of an picture. It is also determined that improvement never in convert increases the integrated details and the given material of the details, but else it in convert improves the powerful variety of the chosen countenance due to which they may be recognized clearly. The improvement never improves the natural in material and the given details of the details, whereas it improves the powerful variety of the chosen functions for their obvious and simple recognition. Also one can say that if the disturbance is being removed from an picture so that it will make simpler for acknowledging the key functions of the particular picture. Image handling is for the picture sequence which is basically employed for improving the performance of the picture data. Image handling is a field which includes pressure, recognition of functions and category of pictures. There are various picture improvement techniques to enhance the exposure of the pictures, it generally uses contrast improvement technique for this purpose and also spatial filtration methods which enhances sides and remove much of the picture cloud. Image improvement differs in many picture handling areas, picture improvement performs a significant role in digital picture handling programs for both human and pc perspective. Rather it is used to enhance the visible quality of information included in an picture, making it simpler for visible presentation, understanding and research by pc perspective system. The major difficulty that increases in picture improvement is quantifying the means for improvement and indicates that a huge number of picture improvement techniques are scientific and thus requires entertaining procedures and methods to obtain satisfied results. . Thus generally picture improvement is a technique that is intended for modifying the electronic pictures for the result that turns out to be more appropriate in case of either displaying or for more research for improving or can say for improving the high company's pictures. Image improvement differs in many picture handling areas, picture improvement performs a significant role in electronic picture handling applications for both human and computer vision and increases the visual high company's given pictures. Enhancement increases and increases the picture features such as sides, limitations, contrast to make a graphic show which is more useful for show and the analysis. Image improvement is generally a technique that is used for modifying electronic pictures so that the result is more appropriate either for displaying or can say for more research. Here it increases the Exposure or the whole high top quality of an picture without presenting the visible façade that are not real and non appropriate relics. The primary international comparison improvement method usually enhances the luminance for the smartest pixels thereby reducing the luminance of the black pixels of an picture. So by not dropping the powerful range pressure, the community comparison improvement that is being relied is being suitable for getting enough comparison of the given picture that is improved. Contrast improvement enhances and enhances the visible quality of an picture along with the particular picture functions for further handling of the picture and analyzed by a computer perspective system. The procedures segmentation and recognition of the given functions and item in a given picture of a particular field, the content of the information of the picture has to be improved for the analyzed efficiency. Comparison improvement is basically the general movie handling projects that needs to improve the quality of the picture on flat panel shows and other programs. The real life programs of computerized contrast improvement

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techniques are numerous and include different areas including the medical picture, geophysical lead generation, seismic discovery, astronomy, camera and movie handling, antenna and ocean picture, receptors and instrumentation, optics, and monitoring. The most heard over strategy is the histogram equalization strategy being based upon the believed facts that a consistently distributed black and white histogram thus consists of the best visual contrast.

II. APPLICATIONS OF CONTRAST ENHANCEMENT

Medical Imaging: Different pictures are of different low quality and low comparison creates itself challenging to identify and find out the information. Thus, the pictures has to get down on a procedure known as picture improvement which contains an gathering or amassing of techniques that raise for improving the visible part of an picture. Healthcare pictures are one of the primary pictures, and due to these are used in more delicate area that relates a healthcare industry.

Fig 1: Enhancement Results

Camera and Video Processing: Movie improvement is the most general and tough components in video research. The main aim of video improvement is to enhance the appearance of it and for providing a good transform presentation for future automated video handling, as of examining and partition of pictures, by identifying visitors and legal rights techniques. It further allows in examining the qualifications information that is important to comprehend an object's behavior without demanding costly individual visible examination. There are various applications where video is needed, processed and used, such as monitoring, basic identity confirmation, visitors, legal rights techniques, private or military video handling. It further allows in examining the qualifications information that is important to comprehend an object's behavior without demanding costly individual visible examination.

Contrast Enhancement for Optical Imaging: In this one refer that the comparison improvement is done here by indicating the dual-interfering-source as called phased array technique. In-phase and out-of-phase resources evaluate an interference-like design, which denies the background alerts. The perturbation being created by little things allows for improved recognition understanding. A frequency-domain device has been created to realize the consumption and fluorescence recognition by analyzing the recognition understanding for single- and dual-source by indication to noise analysis thus revealing that the dual-source method gives higher recognition understanding. Basically, there are two forms of comparison improvement persisted here the first is to improve the item recognition understanding through the adjustment of dual-interfering resources. The outcome disturbance like design converts the conventional consumption and improving the ability in discovering little heterogeneity.

Contrast Enhancement on under water images: Marine field is the medical areas of research for the scientists. These under water Automobiles and Managed Automobiles are generally decided to catch the information as of underwater mines and of reefs of reefs, sewer lines and telecom wires taken by the underwater atmosphere. These are generally recognized by the inadequate exposure they form due to mild is significantly attenuated as it goes. The underwater pictures goes from non-uniform illumination, low comparison and for cloud pictures, there are certain filtration that are used on the deteriorated and ruined pictures. Marine pictures are generally intended by their insufficient visibility as light is attenuated and the views outcomes poorly compared and cloud. It uses various filtrations such as anisotropic filtration, bilateral filtration, homomorphic filtration. It follows in various levels where it catches various pictures and thus works tests by different filtration.

III. IMAGE ENHANCEMENT TECHNIQUES

Image Enhancement: Image enhancement is particularly a method for modifying electronic pictures for accomplishing the result as more appropriate either for displaying or for more research. It can be said that if one remove disturbance or lighten up a picture, it will make simpler for monitoring the key functions. The enhancement do not increases the integrated information and material of the information, else improving the powerful variety of the chosen countenance by a result of which they can be recognized clearly. The enhancement never improves the natural in material and the given information of the information, whereas it improves the powerful variety of the chosen functions for their obvious and easy recognition.

Contrast Enhancement: It enhances the Exposure and the full quality of an picture by not mentioning the impractical visible façade or non relevant relics. The global comparison improvement techniques basically increase the luminance for bright pixel and thereby reducing the luminance for the dark p. So by not losing the powerful range pressure, the community reliant comparison improvement is satisfied to get comparison for picture improvement. The real life applications of computerized comparison improvement techniques are numerous and include different areas such as the medical picture, geophysical lead generation, seismic discovery, astronomy, camera and video handling, antenna and

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ocean picture, receptors and instrumentation, optics, and monitoring. The most heard over strategy is the histogram equalization strategy being centered on the believed facts that a consistently allocated black and white histogram thus consists of the best visible comparison. Several other advanced and traditional histogram centered improvement techniques represents bi-histogram equalization, multi flexible histogram equalization process and the shape protecting local histogram techniques.

Dominant Brightness Level Analysis: Generally the Prominent Lighting indicates an effective or can also say an impressible technique of the pictures. Comparison improved pictures may contain the strength distortions and reduce picture information in different places. So to get over the problems of this contrast improved pictures, for rotting the feedback picture into several areas of single prominent lighting stages, an easy managing of the picture can be similarly decomposed into different stages. The result disturbance like design converts the traditional consumption and improving the ability in discovering small heterogeneity. The next kind of comparison improvement can be found in the recent developments in the molecular specific, neon comparison types. Contrast improved pictures may contain the strength distortions and lose picture data in different areas.

Adaptive Intensity Transformation: The joint exchange operates, the modification operates, the flexible strength transformation operates is splitted into three decomposed levels with help of the prominent lighting levels. And after that this is being intended for shade protecting high-quality comparison pictures. And thereby the result is by means of enhanced picture with the distinct wavelet convert.

Discrete Wavelet Transform: For analyzing an invariant experience identification, the technique that is being appropriate device to be used is the distinct wavelet convert. By indicating 1-D DWT to the series of the picture thus after the outcomes are decomposed along the content, the 2-D wavelet breaking down of an picture is analyzed. So the function indicates four decomposed sub group pictures generally known as low–low (LL), low–high (LH), high–low (HL), and high–high (HH). DWT distinguishes the feedback low comparison satellite tv pictures into the various regularity sub groups.

IV. CONTRAST ENHANCEMENT TECHNIQUES

HISTOGRAM EQUALIZATION

Histogram equalization achieves this by successfully growing out the most regular strength principles. The strategy is useful in pictures with qualifications scenes and foregrounds that are both shiny or both black. In particular, the strategy can cause to better opinions of navicular bone framework in x-ray pictures, and to better details in pictures that are over or under-exposed. A key benefit of the strategy is that it is a pretty uncomplicated strategy and an invertible owner. So theoretically, if the histogram equalization operate is known, then the unique histogram can be retrieved. The computation is not computationally intense. A drawback of the strategy is that it is infrequent. It may improve the comparison of qualifications disturbance, while reducing the useful indication. In medical picture where spatial connection is more important than concentration of indication (such as splitting DNA pieces of quantized length), the small indication to disturbance rate usually effects visible recognition. Histogram equalization often generates impractical effects in photographs; however it is very useful for medical pictures like satellite tv or x-ray pictures, often the same type of pictures to which one would apply incorrect color.

ADAPTIVE HISTOGRAM EQUALIZATION: Flexible histogram equalization (AHE) is a pc picture handling strategy used to enhance comparison in pictures. It varies from common histogram equalization in the regard that the adaptive technique determines several histograms, each corresponding to a unique area of the picture, and uses them to redistribute the lightness principles of the picture. It is therefore appropriate for helping the regional comparison. However, AHE will over amplify disturbance in relatively homogeneous areas of an picture. A version of adaptive histogram equalization known as comparison restricted adaptive histogram equalization (CLAHE) stops this by restricting the boosting.

FUZZY IMAGE ENHANCEMENT TECHNIQUE: Fuzzy-logic is being efficiently utilized in different areas of picture handling. Recently, unclear centered methods for picture improvement have been developed with better performance com-pared to conventional and other advanced methods like GLG. Fuzzy picture handling consists of mainly three stages: picture fuzzification, adjustment of account principles, and, if necessary, picture defuzzification. The main power of unclear picture handling is in the middle step (modification of account values). After the picture data are modified from gray-level sector to the unclear account sector (fuzzification), appropriate unclear methods modify the account principles. This can be a unclear clustering, a unclear rule-based strategy, a unclear incorporation strategy and so on. In unclear centered picture improvement methods histogram is used as the basis for unclear modeling of images. Two major contributions in the field of picture improvement using the unclear structure have been established in the past few decades.

V. LITERATURE SURVEY

Zhao, Jie et al. [1] suggested local comparison unclear improvement criteria for distant detecting picture based on the general unclear set (GFS) in NSCT domain. The trial results have confirmed that the suggested criteria is more effective and flexible for distant detecting picture

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comparison improvement, and superior both in visible quality of improvement and anti-noise performance. Choudhury, Anustup, and Gérard Medioni [2] resolved the problem of comparison improvement for shade pictures. Methods straight based on gray-level improvement such as histogram equalization generate significant relics, such as serious shade changes. Other improvement methods that are based on the Retinex concept are affected from powerful `halo' effects. The technique to improve pictures is motivated from the Retinex concept and tries to imitate human shade understanding. The technique helps in accomplishing shade consistency and also outcomes in shade comparison improvement. They indicated the strength as a product of lighting and reflectance and calculate these independently. Enhancement is then used to the illuminant element only. Non-local means narrow is used to calculate the illuminant and then the improvement of the lighting is conducted instantly without any guide involvement and increased back by the reflectance to obtain improvement. They compared their outcomes with those from other improvement methods and with outcomes from professional software programs such as PhotoFlair that uses multi-scale retinex with shade recovery and Picasa and notice that outcomes are continually 'visually better'. Lastly, they conducted a mathematical research of outcomes and quantitatively show that strategy generates efficient and significant picture improvement. This is verified by scores from human experts. Arici, Tarik et al. [3] provided a general structure based on histogram equalization for picture comparison improvement. In this structure, comparison improvement is presented as an marketing problem that reduces a cost operate. Histogram equalization is an efficient technique for comparison improvement. However, traditional histogram equalization (HE) usually results in extreme comparison improvement, which in turn gives the prepared picture an artificial look and makes visible relics. By presenting created charge terms, the level of comparison improvement can be adjusted; disturbance sturdiness, white/black extending and mean-brightness maintenance may easily be integrated into the marketing. Analytic alternatives for some of the important requirements are provided. Lastly, a low-complexity requirement for comparison improvement is provided, and its efficiency is confirmed against a lately suggested method. Khwaja, Asim A., and Roland Goecke [4] suggested an flexible asymmetric gain control operate that is used to the two comparison charts which are then used to rebuild the picture leading to its comparison improvement. The image's mean luminance can be modified as preferred by modifying the asymmetricity between the acquire management aspects of the two charts. The design works local comparison improvement in the comparison sector of an picture where it gives itself very normally to such improvements. Furthermore, the design is prolonged on to color pictures using the idea of color-opponent responsive areas found in the human visible program. Large design increases the contrast right in the color area without getting the luminance information from it. Being neuro-physiologically possible, this design can be valuable in theorising and knowing the acquire management systems in the primate visible program. They in comparison results with the CLAHE criteria. Aimi Salihah, A. N. et al. [5] provided a two stage strategy in order to acquire a fully segmented irregular white blood mobile (blast) and nucleus in serious leukaemia pictures..Contrast improvement techniques improved the specialized niche of serious leukaemia for reducing the segmentation process. In the second stage, picture segmentation based on HSI color area is suggested. The suggested strategy helps to enhance the picture exposure and has efficiently segmented the serious leukaemia pictures into two main components: boost and nucleus. The combination between comparison improvements and picture segmentation has good effect on improving the precision of segmentation. Hence, details gain from the resulting pictures would become useful for hematologists to further research the types of serious leukaemia. Kanwal, Navdeep et al. [6] handled comparison enhancement of X-Ray pictures and provides here a new approach for comparison improvement centered on Flexible Community strategy. Relative research of suggested strategy against the current major comparison improvement methods has been performed and results of suggested strategy are appealing. Ehsani, Seyed P. et al. [7] suggested an adaptive and repetitive histogram related (AIHM) criteria for chromosome comparison improvement especially in banding styles. The reference histogram, with which the preliminary picture needs to be printed, is created based on some procedures on the preliminary picture histogram. Use of raw details in the histogram of preliminary picture will result in more reliance to the feedback picture and acquiring better comparison improvement. The version steps may vary based on the picture features and histogram. In order to evaluate the performance of the suggested criteria in comparison with current picture improvement methods, Continuous Gain Transform (CGT) and Local Standard Deviation Flexible Comparison Enhancement (LSD-ACE), thus the quantitative statistic, the contrast improvement rate (CIR), is used. The trial outcomes indicate that the suggested technique reveals the best outcomes with regards to the CIR evaluate and, as well as in visible understanding. Lin, Shang-Ching, and Pai-Chi Li [8] mentioned that ultrasound examination nonlinear contrast picture using micro bubble-based contrast providers has been commonly examined. However, the level of contrast enhancement is often restricted by overlap between the spectra of the cells and small percolates nonlinear reactions, which creates it challenging to individual them. The use of collection scientific technique breaking down (EEMD) in the

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Volume 4, Issue 12, June 2015

Hilbert-Huang convert (HHT) was formerly researched with the aim of treating this issue. The HHT is developed for examining nonlinear and nonstationary information, whereas EEMD is a technique associated with the HHT that allows breaking down of information into a restricted variety of implicit technique features (IMFs). It was discovered that the contrast can be successfully enhanced in certain IMFs, but guide choice of appropriate IMFs is still needed. This persuaded the existing research to analyze the speculation that the contrast can be enhanced without demanding guide choice by summing properly calculated IMFs and demodulating the indication at appropriate wavelengths. That is, a data-driven procedure for identifying loads and demodulation wavelengths was produced and examined. Phantom outcomes display that an overall contrast enhancement of up to 12.5 dB can be carried out. A fused-image reflection that at the same time shows the traditional B-mode picture is also provided. Sundaram, M., K. et al. [9] suggested the Histogram Customized Comparison Restricted Flexible Histogram Equalization (HM CLAHE) to modify the stage of contrast improvement, which often gives the resulting picture a powerful contrast and delivers the regional details for more appropriate presentation. It features both histogram variations as an marketing strategy and Contrast Restricted Flexible Histogram Equalization. This technique is examined for Mias mammogram pictures. The efficiency of this technique is identified using the parameter like Enhancement Evaluate (EME). From this, the suggested strategy provides better contrast improvement with protecting the regional details of the mammogram pictures. Xu, Hongteng, et al. [10] suggested a novel histogram-based design for contrast improvement. Depending on research about the connections of histogram with contrast, one set up a design which 1) accomplishes contrast improvement by an maximum convert of histogram, 2) gives two analytics known as comparison obtain and nonlinear-ity of convert to evaluate the durability of improvement and the degree of distortions due to improvement respectively. The rate of the two suggested analytics not only gives a assistance for the settings of parameter in the criteria, but also provides a useful statistic for comparison distortions, which can be a potential solution to assess whether the contrast of an picture is maximum. Trial results show the excellent activities of the suggested criteria in picture improvement. Ahmed, M. Mahmood, and Jasni Mohamad Zain. [11] targeted to find out the actual characteristics of modification features used by HE. To understand these statistical computations thoroughly, the document dismantles HE into it's foundations. This analysis' decides that HE manipulates solidity – not comparison - which, in turn, accomplishes solidity changes but no comparison improvement. Hence the research indicates that HE is not a real comparison improvement strategy. Jha, Rajib Kumar et al. [12] suggested a comparison improvement strategy using climbing of inner disturbance of a black picture in distinct cosine convert (DCT) sector. The procedure of improvement is linked to noise-induced conversion of DCT coefficients from a poor condition to an improved condition. This conversion is impacted by the inner disturbance present due to lack of sufficient lighting and can be made by a general bistable system presenting powerful stochastic resonance. The suggested strategy assumes a local flexible handling and considerably increases the picture comparison and shade information while determining good perceptual high quality. When compared with the existing enhancement techniques such as flexible histogram equalization, gamma modification, single-scale retinex, multi-scale retinex, customized high-pass filtration, multi-contrast improvement, multi-contrast improvement with powerful range pressure, shade improvement by climbing, edge-preserving multi-scale breaking down and automated manages of popular picture tool, the suggested strategy gives amazing efficiency in terms of comparative comparison improvement, colorfulness and visible high quality of improved picture. Jha, Rajib Kumar et al. [13] suggested a nonlinear non-dynamic stochastic resonance-based strategy for improvement of dark and low comparison pictures. A low comparison picture is handled as a sub threshold indication and noise-enhanced indication handling is used to improve its comparison. The suggested strategy exclusively uses addition of exterior disturbance to reduce the effects of the effect of inner disturbance (due to inadequate illumination) of a low comparison picture. Unique disturbance is included continuously to an picture and is successively hard-thresholded followed by overall calculating. By different the disturbance extremes, disturbance caused resonance is acquired at a particular the best possible disturbance strength. Efficiency of the suggested strategy has been examined for four types of disturbance withdrawals - Gaussian, consistent, poisson and gamma. Quantitative assessment of their activities have been done with regards to comparison improvement aspect, color improvement and perceptual top quality evaluate. Cheng, H. D., and Yingtao Zhang [14] suggested a novel strategy for the recognition of over-enhancement. The main efforts of the document are as follows. (1) The reasons for producing over-enhancement are examined and examined greatly. (2) An purpose requirements for discovering over-enhancement is suggested. The trial results illustrate that the suggested strategy can identify the over improved areas perfectly and successfully, and provide a quantitative requirements to evaluate the over-enhancement levels well. The suggested strategy will be useful for dynamically tracking the high company's improved picture, and improving the parameter configurations of the comparison improvement methods Chouhan, Rajlaxmi et al. [15] suggested a powerful stochastic resonance (DSR)-based strategy in spatial sector has been suggested for the improvement of dark- and low-contrast pictures. Stochastic resonance

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(SR) is a trend in which the efficiency of a program (low-contrast image) can be enhanced by addition of disturbance. However, in the suggested work, the inner disturbance of an picture has been utilized to generate a noise-induced conversion of a black picture from a state of low comparison to that of high contrast. DSR is used in an repetitive fashion by correlating the bistable program factors of a double-well potential with the strength principles of a low-contrast picture. The best possible outcome is assured by flexible calculations of efficiency analytics - comparative comparison improvement aspect (F), perceptual high quality actions and color improvement aspect. When in contrast to the current improvement techniques such as flexible histogram equalization, gamma modification, single-scale, customized high-pass filtration, edge-preserving multi-scale breaking down and automated manages of popular picture resources, the suggested strategy gives significant efficiency in conditions of contrast and color improvement as well as perceptual high quality. Comparison with a spatial domain SR-based technique has also been shown. Gibson, Kristofor Boyd, and Truong Q. Nguyen [16] developed a perceptually centered comparison improvement measurement as a means to fix the problem of autonomously improving pictures deteriorated by fog that are perceptually attractive to people. A learning centered approach is considered to develop the comparison improvement using individual findings and low-level comparison improvement analytics in accordance with the individual perspective system. In addition, they provide new low-level analytics in accordance with the science of the field to improve the efficiency of current comparison improvement analytics. Reshmalakshmi, C., and M. Sasikumar [17] handled new comparison improvement criteria, which charts elements from pixel aircraft to account aircraft and to enhancement/transform aircraft. Disadvantages of current comparison improvement methods are fixed with the help of a statistical tool called `Fuzzy set'. These unclear places can be molded to manage the doubt and/or vagueness associated with pictures. To assess the efficiency, this new criteria is applied on different pictures and few assessment factors are measured, which shows the improvement over any other current comparison improvement methods depending on unclear places. Celik, Turgay [18] suggested video comparison improvement criteria which automatically enhance the comparison of videos clip using spatial and temporary information. The algorithm is based on the observation that the comparison in videos clip structure can be improved by increasing the grey-level differences between each pixel of it clip structure and its nearby p.. A two-dimensional (2D) histogram of videos clip structure is constructed using common relationship between each pixel and its nearby p. For each movie structure, a 2D target histogram is calculated by considering 2D histogram of it clip structure, and the 2D histograms of forwards and backwards nearby movie frames.

VI. GAPS IN LITERATURE

Following are the different gaps in earlier research:

1. Static modification factor: The current k aspect has been taken statically i.e. 128 by most of scientists.

2. Color misbalancing: Most of the techniques relies on certain predetermined guidelines no focus on the things or areas in the given image; so may discrepancy along with of the outcome picture.

3. Edge degradation: Edges plays significant role in vision processing but image enhancement technique may change the edges too. So can lead to degraded edges.

VII. PROPOSED ALGORITHM

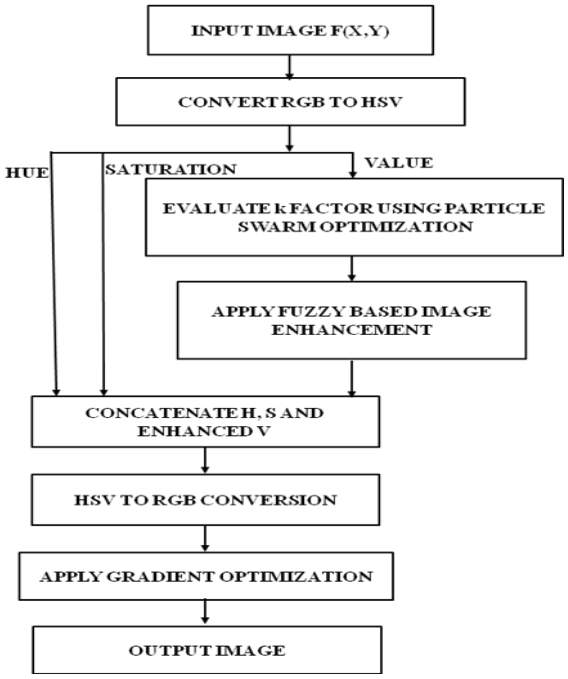

Fig 2: Proposed Algorithm

The key purpose of the suggested criteria is to provide better results than current methods to enhance the exposure of the electronic pictures.

Step 1: In phase 1 picture is approved to the system and some pre-processing functions are used on it.

Step 2: In phase 2 pictures is transformed in HSV aircraft.

Step 3: As H and S element stay continuous but V is the only aspects which need some adjustment while improving the pictures.

Step 4: Now k adjustment different will be examined for image enhancement using particle swarm optimization.

Step 5: Now fuzzy based image enhancement is used on the image.

Step 6: Now concatenate H, S and improved V element.

Step 7: Now once again convert given image to HSV to RGB.

Step 8: Now apply edge preservation smoothing.

Step 9: Get outcome image.

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VIII. EXPERIMENTAL RESULTS

Fig 3: Input Image

Fig 4: Histogram Equalization

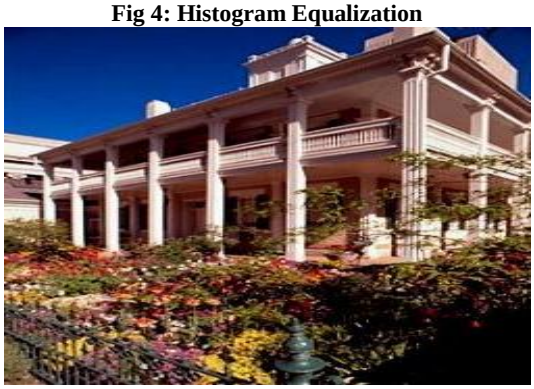

Fig 5: Adaptive Histogram Equalization

Fig 6: fuzzy enhanced image

Fig 7: fuzzy enhanced image using pso without edge preservation

Fig 8: fuzzy enhanced image using pso with edge preservation

Table 1: CII ANALYSIS

IMAGES	HE	AHE	FUZZY	PROPOSED
1	0.6622	0.0499	1.6051	5.5038
2	1.2710	2.9432	2.7250	1.8112
3	1.4999	3.3433	3.0979	4.3920
4	0.6030	0.0023	1.6173	4.4889
5	1.5523	0.4892	0.4681	2.3854
6	2.3454	1.8662	2.0956	3.1308
7	0.7804	0.4859	4.1617	6.0585
8	0.0556	0.3581	2.6225	7.0554
9	0.4485	0.3242	1.8367	5.6521
10	0	5.1363	1.7501	4.5553
11	0.5455	0.0663	0.8019	5.7093
12	1.2010	0.1393	0.7328	3.2592

Table is displaying the relative research of the CII. As CII need to be maximized; it has clearly proven that the CII is highest possible in the situation of the suggested criteria therefore it is offering better outcomes than the available techniques.

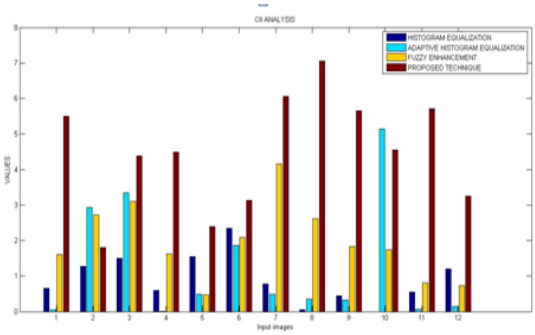

Fig 9: CII Analysis

Table 2: TENENGRAD ANALYSIS

IMAGES	HE	AHE	FUZZY	PROPOSED
1	5.0810	7.6918	9.9448	12.691
2	2.0562	2.1392	6.6563	5.0742
3	1.8940	6.2282	7.7183	8.6629
4	1.6249	3.9157	4.2134	5.1938
5	3.1642	1.4833	4.3093	2.4393
6	1.8604	7.9106	9.8817	10.037
7	1.8069	12.3375	10.549	12.815
8	2.0869	1.8695	5.7127	7.1768

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9	1.7505	3.3505	4.0118	5.1080
10	1.5129	5.8962	8.9687	8.1800
11	1.7955	1.9340	4.7163	5.9522
12	0.8573	2.8203	3.3747	3.7392

Table is displaying the relative research of the Tenengrad. As Tenengrad need to be maximized; it has clearly proven that the Tenengrad is highest possible in the of the suggested criteria therefore suggested criteria is offering better outcomes than the available techniques.

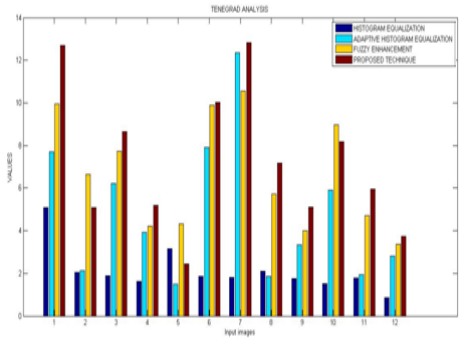

Fig 10: Tenengrad measure

IX. CONCLUSION AND FUTURE SCOPE

In this paper, the opinions has proven certain restrictions as of misbalancing of color, edge deterioration and statically use of k factor, thus to get over the restrictions of earlier methods, a new strategy is suggested which has enhanced the results of fuzzy improvement using gradient optimization. The latest approach has the ability to increase the comparison in electronic pictures in joyful manner by utilizing the slope optimization based flexible k-fuzzy picture improvement criteria. The evaluation has also done by considering various electronic pictures. The evaluation has proven the potency of the suggested strategy over the available methods. This paper has not considered the use of developments of particle swarm optimizations, because the performance of the particle swarm optimization relies on the originally chosen contaminants. So in near future we will use developments of particle swarm optimization.

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