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Analysis on Combination of Local And Globle Contrast Image Enhancement Method

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Abstract: ***Enhancement is one of the tough factors in photo processing (IP). The objective of enhancement is to enhance the structural appearance of an image without any degradation within the enter picture. The enhancement techniques make the identity of key capabilities simpler with the aid of removing noise and different artifacts in a picture. This paper proposes a novel algorithm, which complements the low contrast input picture by using the spatial facts of pixels. His algorithm considers transform domain (TD) coefficient weighting to gain worldwide and local contrast enhancement (LCE) of the picture. Image enhancement (IE) has found to be one of the most important vision applications because it has ability to enhance the visibility of images. It complements the deceivability of visibility pictures. Distinctive methods had been proposed to date for enhancing the excellent of the digital images (DI). To enhance picture quality image enhancement can specifically improve and limit some data presented in the input picture. It is a form of vision system which discounts image commotion, kill antiquities, and preserve up the informative elements. Its item is to open up certain photograph characteristics for investigation, conclusion and similarly use. Experimental results show that proposed algorithm produces better enhanced images than existing algorithms.***
Keywords—LCIE;GCIE;LCIE+GCIE;PSNR;MSE;

I. INTRODUCTION

Digital image processing (DIP) is a technique where in different computer algorithms are used for performing IP on various DIs. In science of imaging, any form of signal processing (SP) can be called as IP wherein input given is in the form of image and the output can either be a picture or characteristics set or image related parameters.[1] The primary goal in the back of image enhancement technique is to regulate the diverse capabilities of low quality picture so that the observer feels it more captivating [2].This technique is used to get an output image which looks comparing better to that of original image and this can be done by upgrading the differences of grey-level between objects and background. There are three groups of enhancement techniques. (1) Manipulating the low frequency (LF) signals to high frequency HF) transformation and (3) Techniques based on modification of histogram [3]. Local Histogram Equalization (LHE) are maximum oftenly used inside the first styles of techniques wherein multistage analysis is done for the decomposition of picture into different frequency bands and also to improve their global and local frequencies. techniques used are bit complex in computations but it helps in the improvement of global and local contrast (LC) at the same time and this can be done by changing the signals in the appropriate bands or scales. Correct parameter setting is also required which can also result in image degeneracy. From those three techniques mentioned above the third technique is more attractive because of its upright and automatic and immediate implementation qualities. Global IE utilizes the two most widely utilized methods they are, Linear Contrast Stretching (LCS) and Global Histogram Equalization (GHE). LCS adjusts linearly the various dynamic levels of a picture while GHE uses input to output mapping that's received from the Cumulative Distribution Function (CDF) and it is the essential of the picture histogram. Seeing that, assessment gain and histogram height are proportional to every different, gray stages which might be having huge pixel populations are increase to a massive gray-stage degrees. While different grey-degree tiers with small pixels are comparison to decrease degrees. Even though display intensities can be efficaciously utilized by GHE, which leads to over enhancement of the picture comparison of high peaks if any inside the histogram, which normally results in noisy and vicious output image look. GHE and LCS are very simple form of adjustments, however we can't expect always proper effects from it mainly pictures that are having massive spatial variation in contrast. Additionally, disagreeable effect of over emphasizing the any kind of noise in a picture. To overcome all these problems procedure were proposed and. such as in LHE method a small window is used which is slides through every pixel of the image consecutively and only those pixels which are in the current position of the window are HE; the gray-level mapping is finished simplest for the middle pixel of the window for enhancement of image. So, it can be said that nearby facts is utilized. Sometimes, HE leads to over enhancement in some of the portion of the image which leads to enhancement of any kind of noise in the input image and also image features are also enhanced. Moreover, methods based on LHE produces undesirable effects of checkerboard.

II. LITRATURE SURVEY

Mohammed Alareqi, et.al [4] This paper presents the design and the implementation of real-time hardware enhancement DIP techniques for biomedical applications in a Spatial domain (SD) on FPGA. It explains numerous enhancement techniques inclusive of inverting image operation, brightness control, segmentation (threshold) and evaluation stretching. A comparative study of all these techniques is carried out to find the best technique to enhance a biomedical picture on FPGA. These techniques are applied to the hand image with veins using Open Access Biomedical Image Search Engine Yujie li, et.al. [5] In this paper, our suggest a novel shallow water imaging version to catch up on the attenuation discrepancy along the propagation direction and an powerful underwater scene enhancement system. The recovered pictures are characterized by using a diminished noised degree, better exposure of the darkish areas, and elevated world contrast the place the best small print and edges are more advantageous drastically Tarun Kumar Agarwal, et.al. [6] This paper offers study of the arithmetical morphological scheme with contrast to many other state-of-art methods for addressing the difficulties of low images contrast. HE is very general method for enhancing contrast in DI. It is modest and effective for GCE of pictures.

III. PROPOSE METHODOLOGY

The combination of local and global method is used on 2D histogram.2D histogram consist of two or more than that channel.2D histogram is made up of RGB values. The pixel intensity as well as statistics of color has to maintain when we work on combination of local and global method. In this work we combine local as well as global method for contrast image enhancement (CIE) to preserve the brightness. The fact is that when contrast occurs image lose its brightness to avoid this we are trying to develop new method. We are using LCS method for local feature enhancement of a picture. LCS is used to sharpen the edges. It is used to enhance the local details of an image. In LCS we will go to use unsharp masking technique. Here use GCS for global contrast image enhancement (GCIE) of a picture. This two method are combined by using combination of local and global method. First on input image LCS process is applied. In proposed work apply various attacks on these three methods then filter the image and last calculate PSNR, MSE and SSIM.

A. Global Contrast Image Enhancement (GCIE)

To perform GCIE technique we're using GCS method. GCS is a simple IE method that changes the range of pixel depth values. This method enhances the pixel intensity into desired range. For GCS a new upper and lower pixel value is needed to be predicted so that image got normalized. The concept of maximum and minimum value is to be deciding the maximum pixel intensity value and minimum pixel intensity value that we will going to use while executing procedure. The Contrast of a picture is a measure of its dynamic range, or the "spread" of its histogram. The dynamic range of a picture is described to be the entire range of intensity values contained inside a picture, or put a less difficult way, the maximum pixel value minus the minimum pixel value.

B. Local Contrast Image Enhancement

For Local contrast image enhancement (LCIE) we will going to use LCS method. In LCS method we will go to target on local feature of an image. For this type of a LCS method we will go to focus on particular area of an image where we want to perform LCIE. For LCIE method we will go to use unsharp masking technique. In unsharp overlaying, picture is separated into additives, the LF unsharp masks received by using low-pass filtering (LPF) of the picture, and the HF element obtained by using subtracting the unsharp mask from the unique photograph itself. The HF issue is then amplified and delivered back to the unsharp mask to form a superior picture. Local enhancement based algorithms only make level of pixels in the fixed region, but effectively reduce the impact of other regions, and greatly enhance the local information.

C. Combination of Local Method and Global Method

Combination we used is of neighborhood and worldwide technique for Contrast IE to hold the brightness. The main aim is to preserve the brightness of an image or if it increased it will be good when CIE is done. GCIE strategies are generally fast in the processing speed of the enhancement as compared to the LCE. Global technique lacks to decorate the nearby detail of a picture. GCE techniques which we often used are LCS, histogram equalization (HE) and so on. GCE method improves the quality of a picture in better way. However, such a situation does not always occur. The image features or we can say characteristic vary considerably on different part of an image. This is one reason for using LCIE. This local contrast feature enhancement method will enhance the local detail of an image which global contrast feature enhancement does not target on. The combination of this two method work like first we use local feature enhancement technique that is LCS.

D. Propose Algorithm

1) *Step 1:* Give image as an input.

2) *Step2:* Apply contrast enhancement method to the input image viz local contrast enhancement method, gobal contrast enhancement method , combination contrast enhancement method.
3) *Step 3:* Then apply attacks to that image viz salt and pepper, Gaussian and poisson.
4) *Step 4:* After applying attacks , filter that image by using median filter and wiener filter
5) *Step 5:* Finally we achieve an enhanced image.

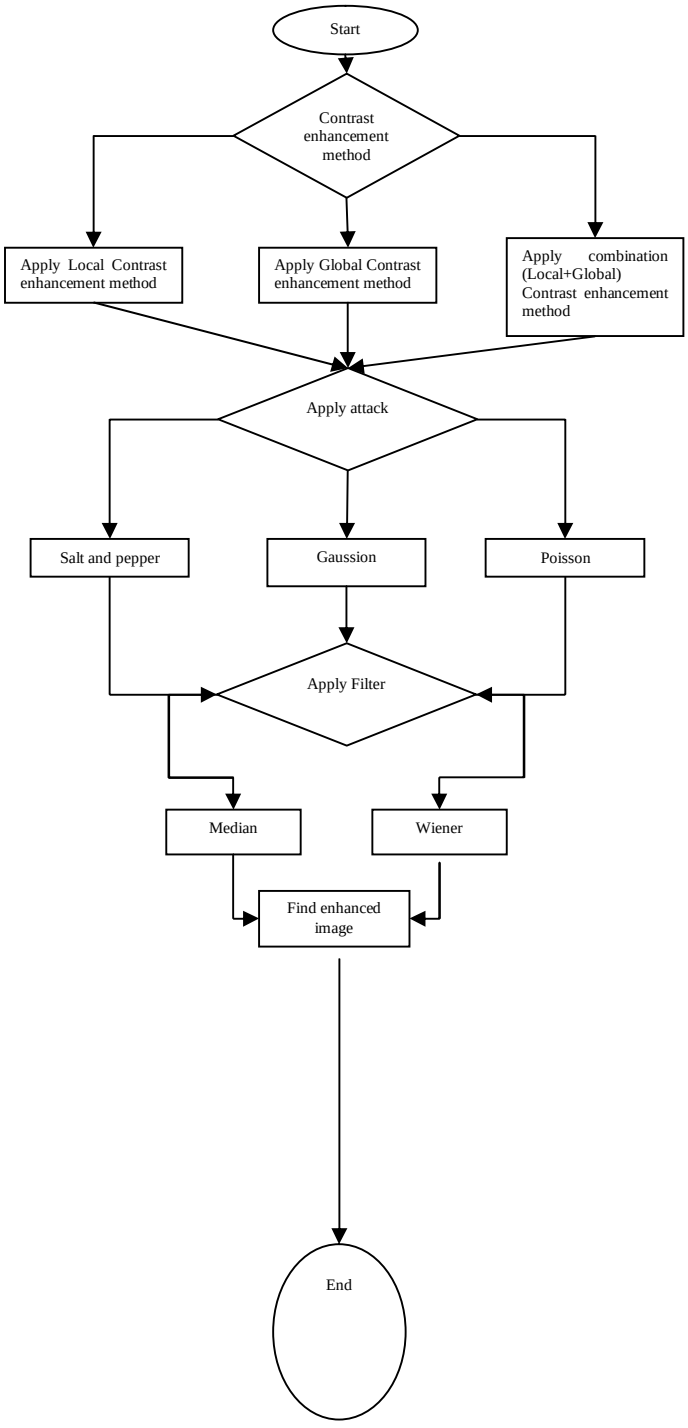

Fig. 1. Flow chart on Propose algorithm

IV. RESULT ANALYSIS

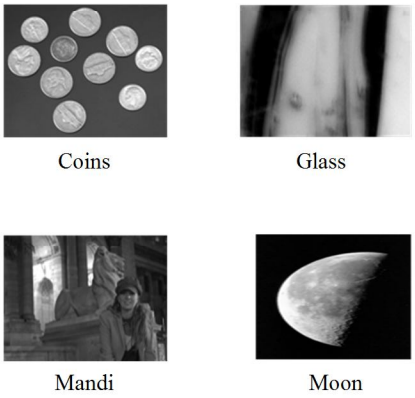

Fig.2.Image dataset

In this figure show test image dataset in which apply local contrasting, global contrasting and combination of both local and global contrasting.

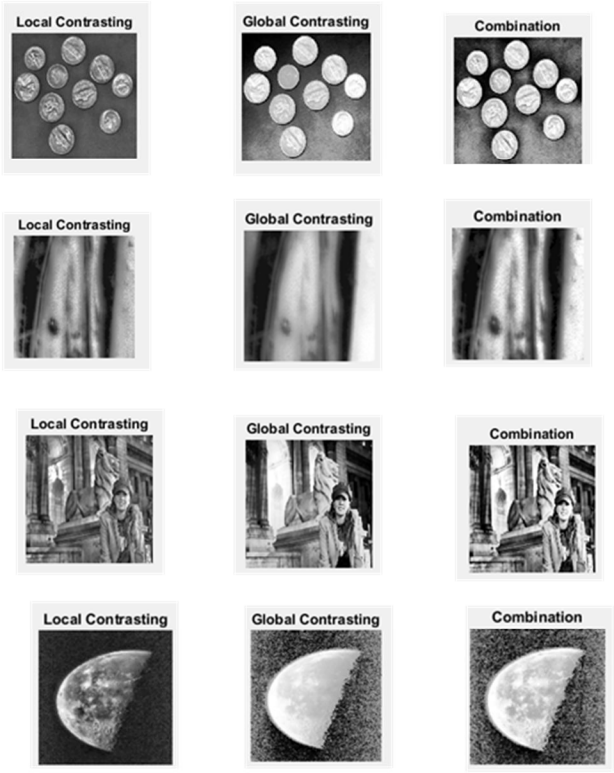

Fig. 3.In this image apply show local contrasting, global contrasting and combine contrasting

TABLE I. COMPARISION OF LOCAL CONTRAST IMAGE ENHANCEMENT, GLOBAL CONTRAST IMAGE ENHANCEMENT AND COMBINATION OF LOCAL METHOD AND GLOBAL METHOD ON VARIOUS IMAGES AND BASIS OF THREE PARAMETERS (PSNR, MSE AND SSIM)

Original image	Local Contrast Image Enhancement			Global Contrast Image Enhancement			Combination of local method and global method		
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	20.0424	11.0021	0.8478	15.2836	6.9554	0.6450	14.7177	7.7462	0.5215
Glass	16.8511	15.0253	0.6388	23.4744	1.7976	0.7759	18.4085	7.9032	0.6365

Mandi	14.2848	2.1711	0.6653	11.6774	1.6739	0.6288	11.1069	3.0077	0.5056
Moon	16.0106	9.0191	0.3321	9.3590	0.0023	0.2776	9.2625	0.0069	0.2875

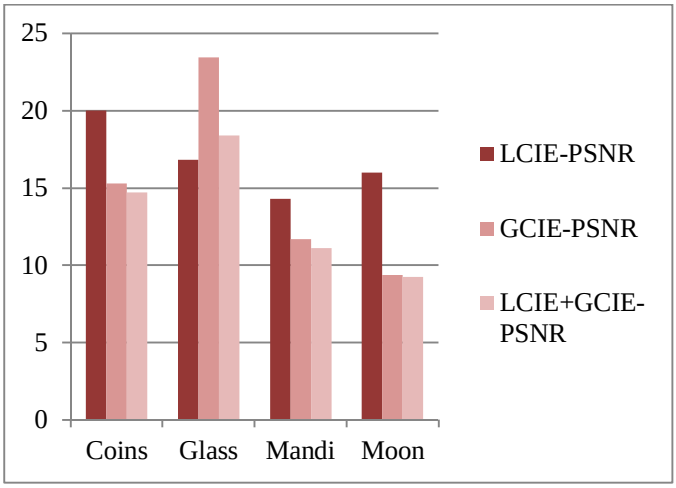

Fig. 4.Comparison of PSNR value on various image with apply LCIE, GCIE and LCIE+GCIE

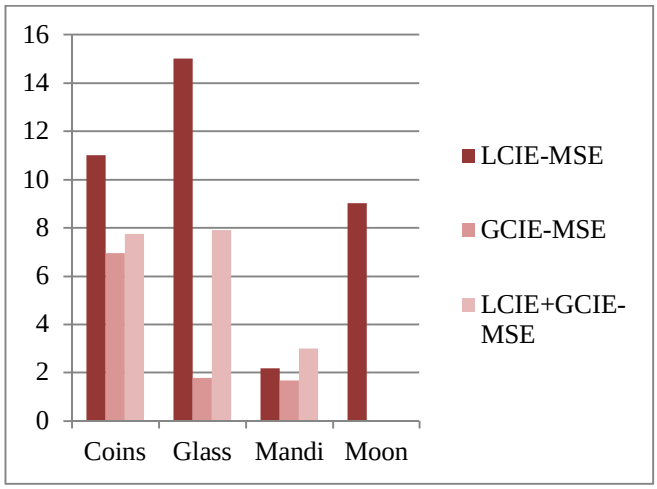

Fig.5.Comparison of MSE value on various image with apply LCIE, GCIE and LCIE+GCIE

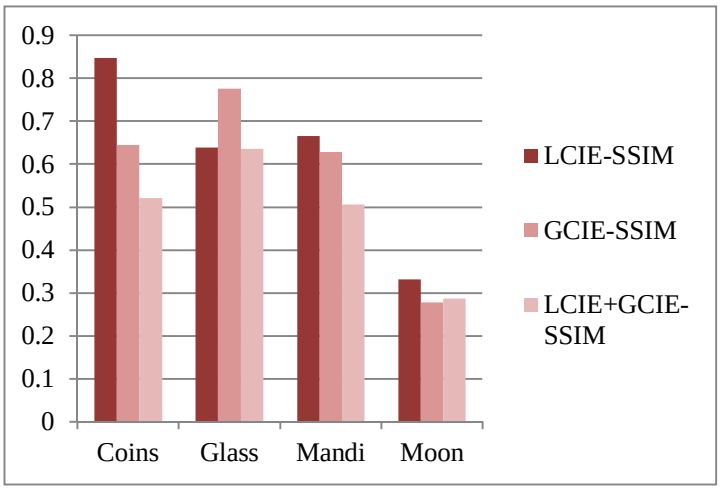

Fig.6 Comparison of SSIM value on various image with apply LCIE, GCIE and LCIE+GCIEProposed result

TABLE II. COMPARISION OF VARIOUS IMAGES USING LOCAL CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND MEDIAN FILTER

Original image	Local Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Median								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	15.4526	8.6781	0.1848	21.9099	8.2843	0.5138	29.4421	3.3639	0.6712
Glass	15.2622	7.2294	0.1234	21.8923	8.3651	0.4618	28.9865	3.5564	0.6766
Mandi	15.5105	8.0551	0.2452	21.8620	8.3045	0.5606	28.3926	3.7996	0.7435
Moon	14.7652	10.8656	0.1594	21.9005	8.3321	0.5083	29.9121	3.2188	0.7212

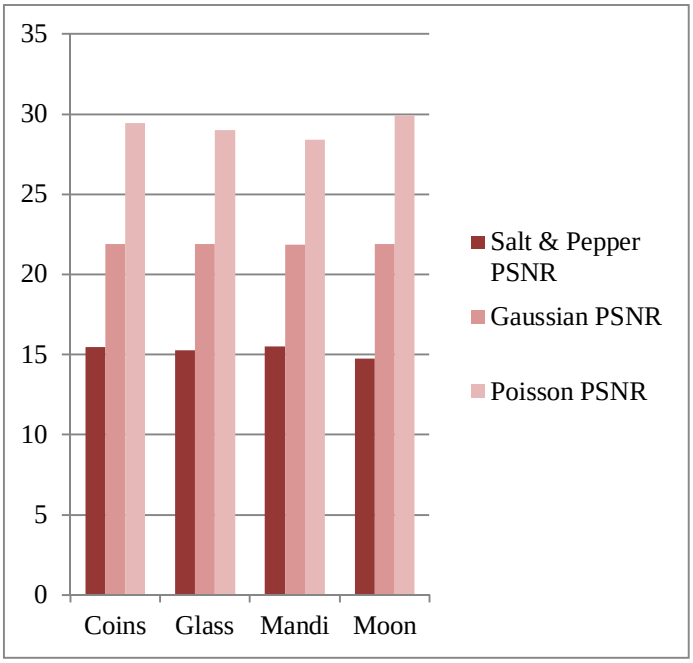

Fig.7.Comparison of PSNR value after apply Median filter on various image using Local Contrast Image Enhancement method

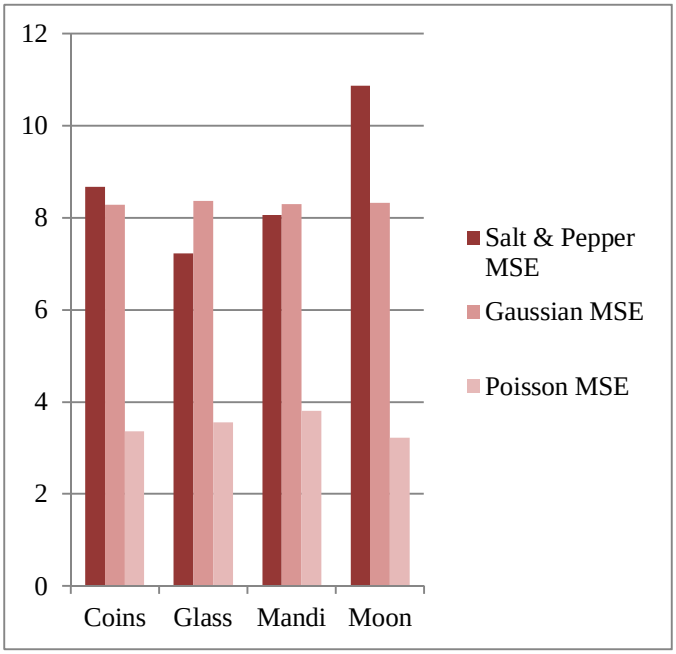

Fig.8.Comparison of MSE value after apply Median filter on various image using Local Contrast Image Enhancement method

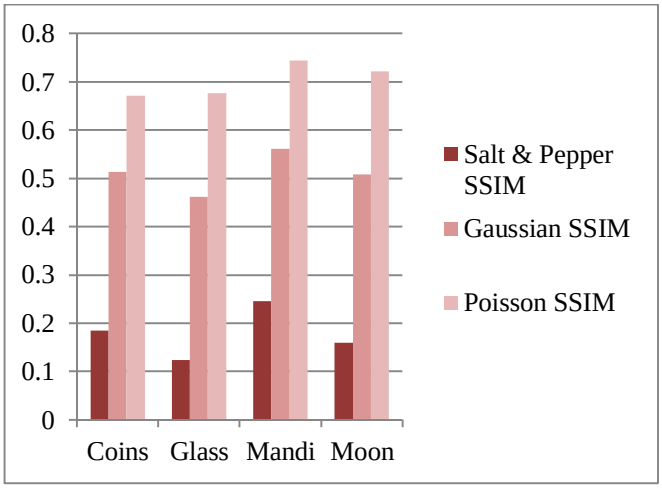

Fig.9.Comparison of MSE value after apply Median filter on various image using Local Contrast Image Enhancement method

TABLE III. COMPARISION OF VARIOUS IMAGES USING GLOBAL CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND MEDIAN FILTER

Original image	Global Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Median								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	14.7777	7.2643	0.1892	22.5151	7.5942	0.5160	28.1190	3.8612	0.6761
Glass	14.7840	6.5303	0.0925	22.8391	7.3252	0.4860	29.1715	3.4868	0.6398
Mandi	14.7886	7.2792	0.2332	22.5297	7.5397	0.5552	28.0932	3.8307	0.7155
Moon	14.2188	10.9264	0.2599	21.0845	8.8499	0.5895	23.9974	6.4034	0.6671

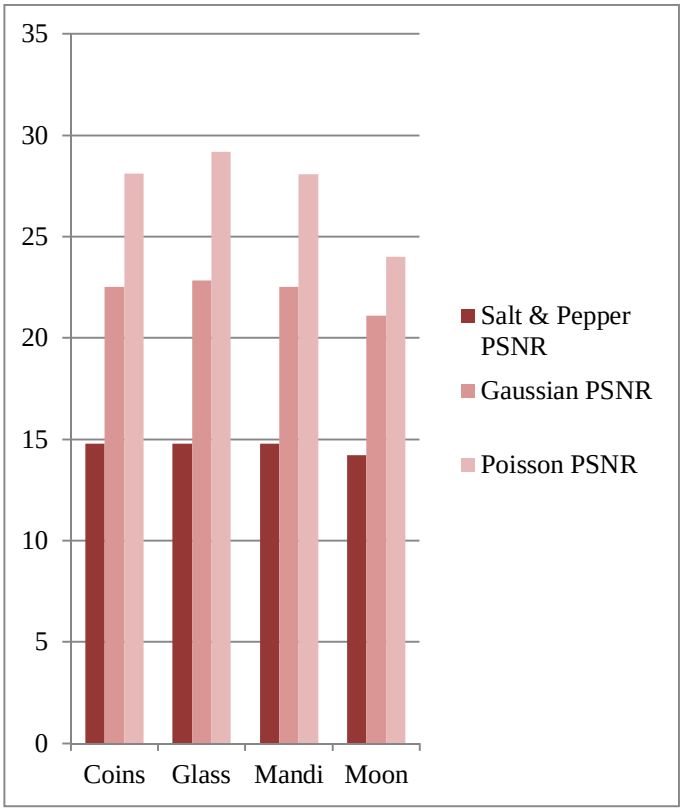

Fig.10.Comparison of PSNR value after apply Median filter on various image using Global Contrast Image Enhancement method

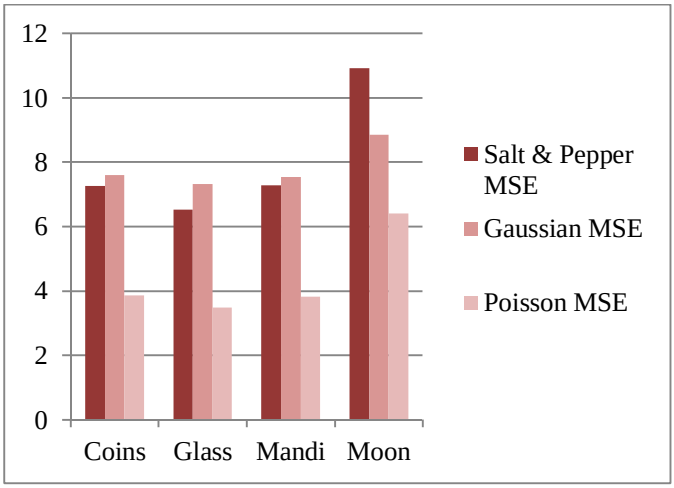

Fig.11. Comparison of MSE value after apply Median filter on various image using Global Contrast Image Enhancement method

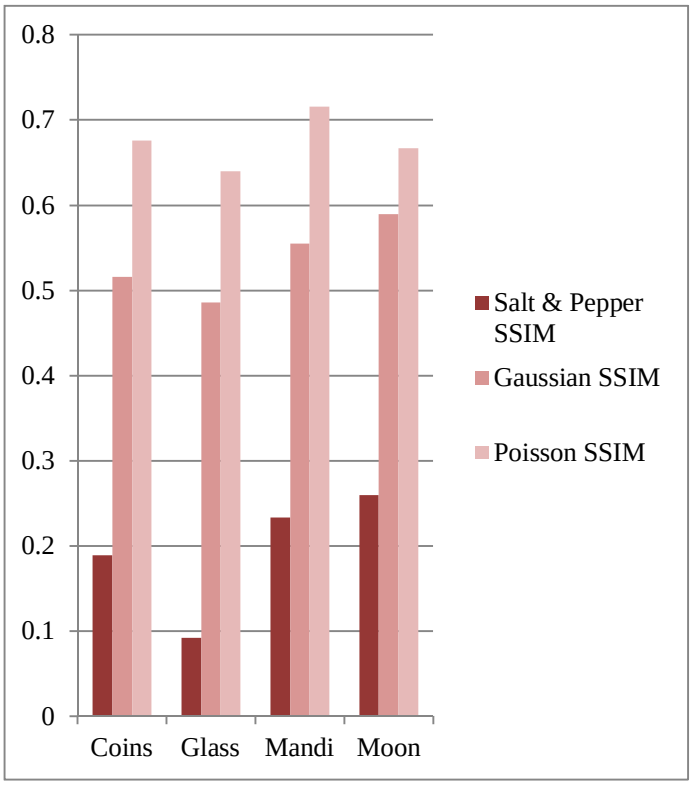

Fig.12.Comparison of SSIM value after apply Median filter on various image using Global Contrast Image Enhancement method

TABLE IV. COMPARISION OF VARIOUS IMAGES USING COMBINE CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND MEDIAN FILTER

Original image	Combine Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Median								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	14.7566	7.7037	0.2454	22.3099	7.7713	0.5540	27.3686	4.2835	0.7154
Glass	14.7904	6.8037	0.1380	22.7565	7.4039	0.5050	28.9506	3.5399	0.6940
Mandi	14.7785	7.7984	0.3231	22.2457	7.7521	0.6138	27.3443	4.2133	0.7696
Moon	14.0510	11.5083	0.2867	20.7844	9.1787	0.6098	23.3780	6.9074	0.6915

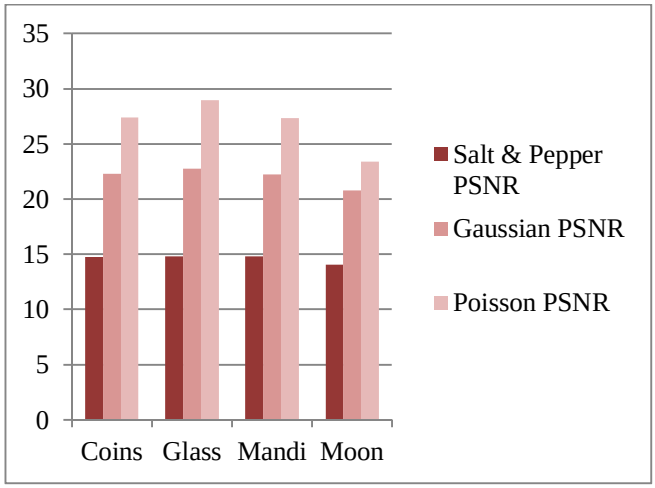

Fig.13.Comparison of PSNR value after apply Median filter on various image using Combine Contrast Image Enhancement method

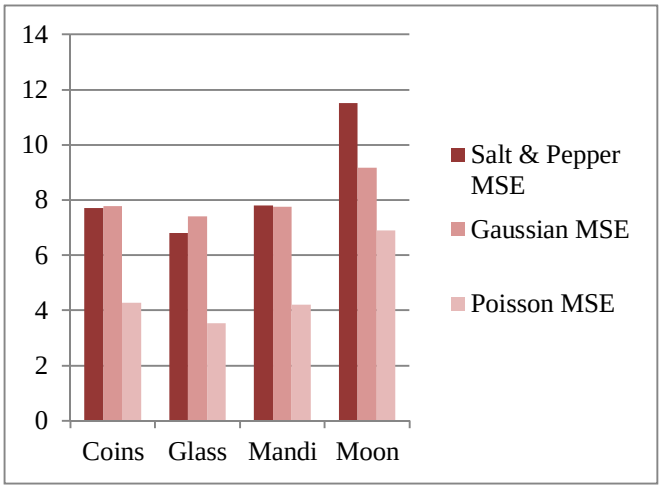

Fig.14.Comparison of MSE value after apply Median filter on various image using Combine Contrast Image Enhancement method

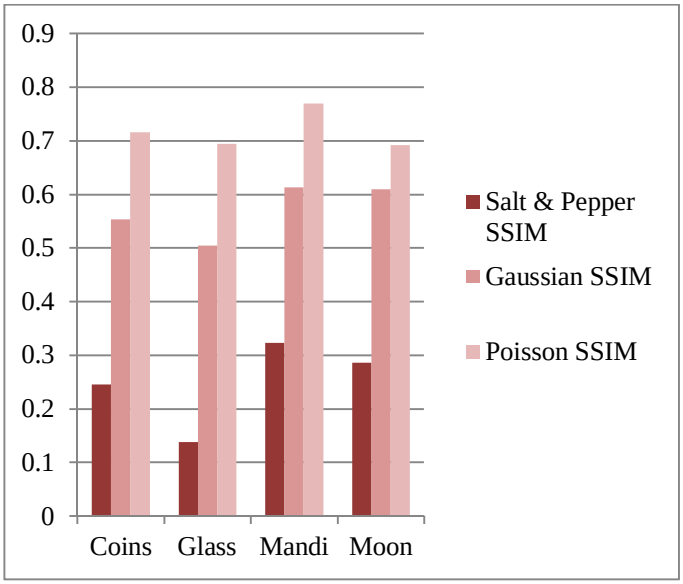

Fig.15.Comparison of SSIM value after apply Median filter on various image using Combine Contrast Image Enhancement method

TABLE V. COMPARISION OF VARIOUS IMAGES USING LOCAL CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND WEINER FILTER

Original image	Local Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Weiner								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	15.4757	8.5834	0.1855	21.8689	8.3252	0.5107	29.4784	3.3479	0.6723
Glass	15.2334	7.2254	0.1219	21.9006	8.3526	0.4631	28.9800	3.5625	0.6758
Mandi	15.4528	8.1878	0.2399	21.8662	8.3034	0.5595	28.3639	3.8172	0.7424
Moon	14.7156	10.9887	0.1579	21.9096	8.3313	0.5094	29.9485	3.2042	0.7228

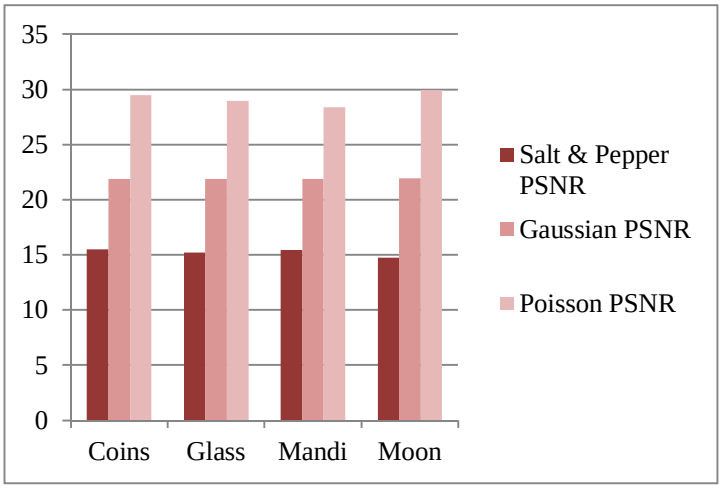

Fig. 16.Comparison of PSNR value after apply Weiner filter on various image Local Contrast Image Enhancement method

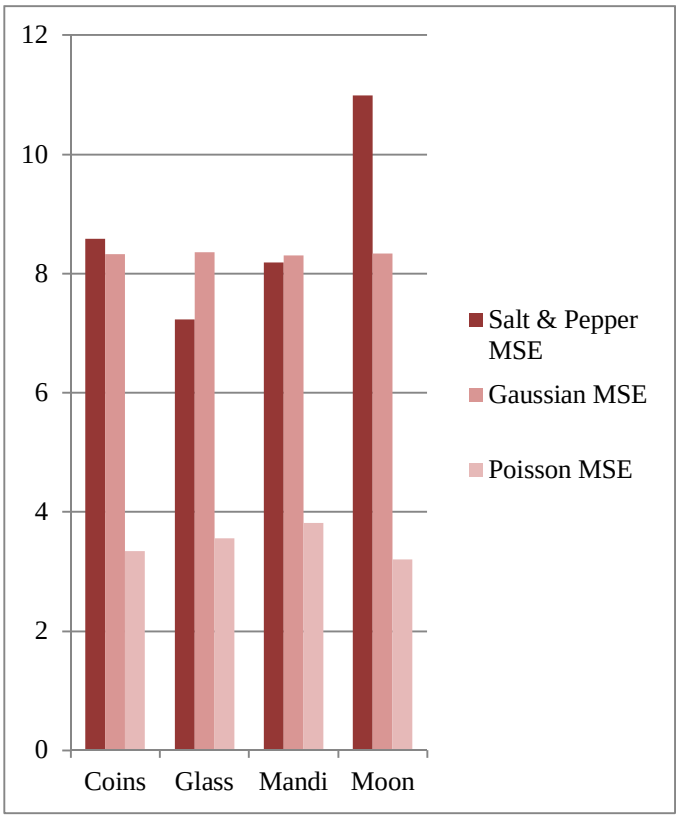

Fig.17. Comparison of MSE value after apply Weiner filter on various image Local Contrast Image Enhancement method

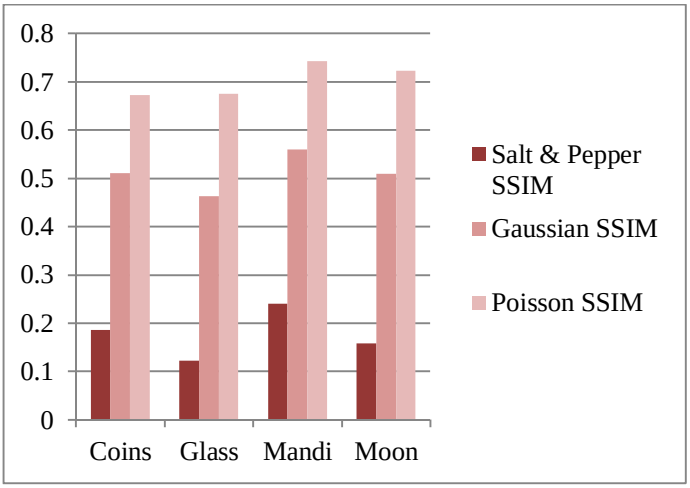

Fig.18.Comparison of SSIM value after apply Weiner filter on various image Local Contrast Image Enhancement method

TABLE VI. COMPARISION OF VARIOUS IMAGES USING GLOBAL CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND WEINER FILTER

Original image	Global Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Weiner								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	14.7660	7.2610	0.1886	22.5014	7.6034	0.5139	28.1505	3.8492	0.6770
Glass	14.7605	6.5664	0.0917	22.8368	7.3263	0.4851	29.1635	3.4917	0.6396
Mandi	14.8049	7.2650	0.2331	22.5412	7.5215	0.5584	28.0977	3.8312	0.7152
Moon	14.2411	10.8480	0.2609	21.0822	8.8622	0.5877	23.9894	6.4100	0.6673

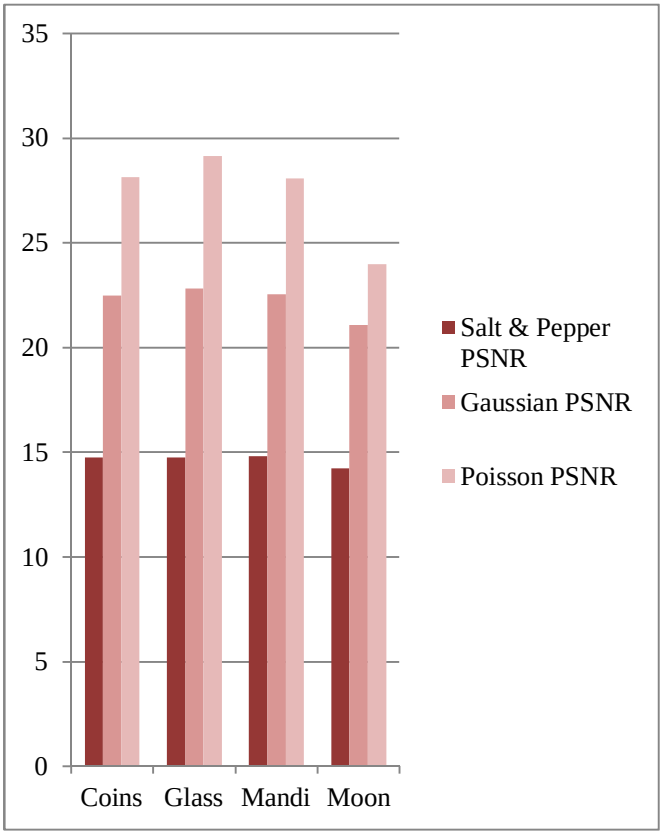

Fig.19.Comparison of PSNR value after apply Weiner filter on various image Global Contrast Image Enhancement method

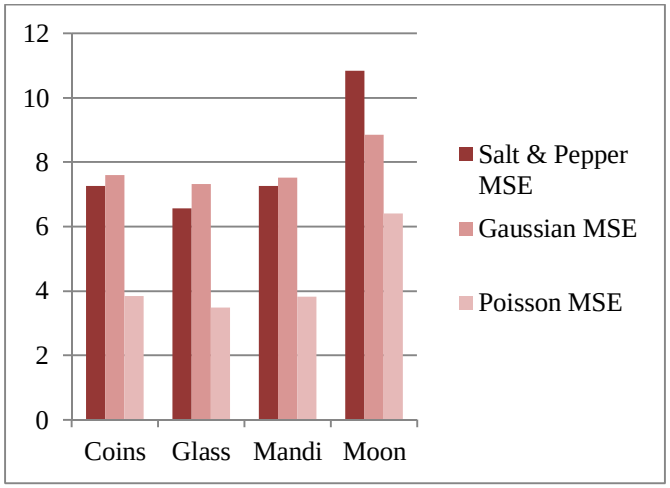

Fig.20.Comparison of MSE value after apply Weiner filter on various image Global Contrast Image Enhancement method

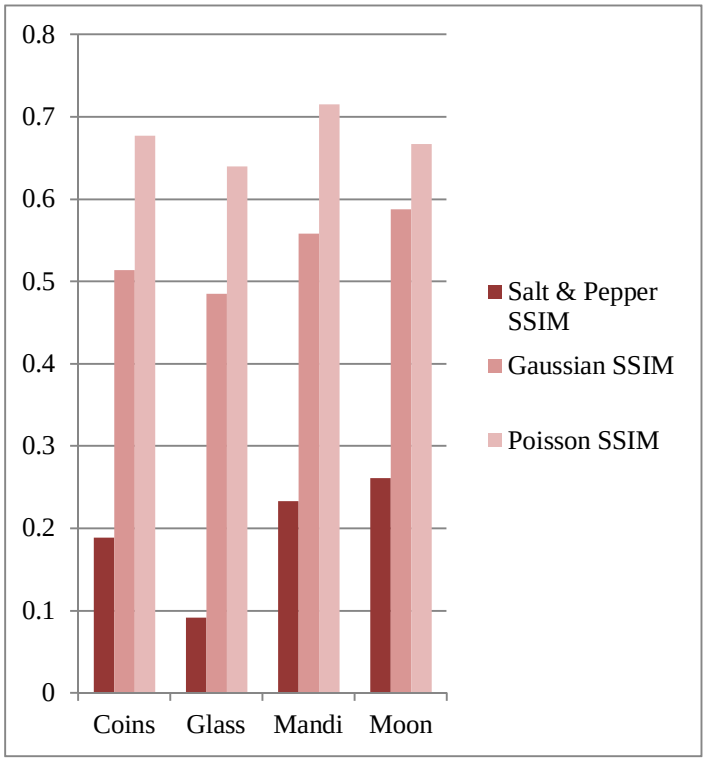

Fig.21.Comparison of SSIM value after apply Weiner filter on various image Global Contrast Image Enhancement method

TABLE VII. COMPARISION OF VARIOUS IMAGES SING COMBINE CONTRAST IMAGE ENHANCEMENT APPLY NOISE (SALT & PEPPER, GAUSSIAN AND POISSON) AND WEINER FILTER

Original image	Combine Contrast Image Enhancement								
	Salt & Pepper			Gaussian			Poisson		
	Weiner								
	PSNR	MSE	SSIM	PSNR	MSE	SSIM	PSNR	MSE	SSIM
Coins	14.8161	7.6998	0.2501	22.3316	7.7495	0.5547	27.3273	4.2965	0.7143
Glass	14.7905	6.7553	0.1353	22.7384	7.4211	0.5053	28.9416	3.5463	0.6945
Mandi	14.7977	7.7216	0.3249	22.2473	7.7493	0.6127	27.3559	4.2138	0.7694
Moon	14.1155	11.3934	0.2881	20.8007	9.1639	0.6106	23.3744	6.9135	0.6925

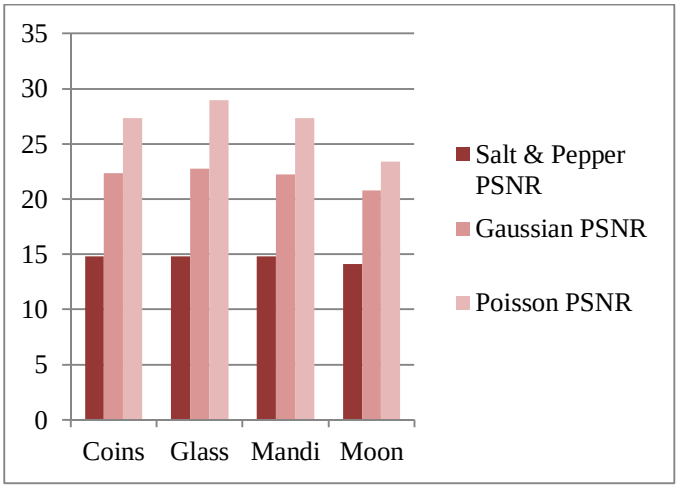

Fig.22.Comparison of PSNR value after apply Weiner filter on various image Combine Contrast Image Enhancement method

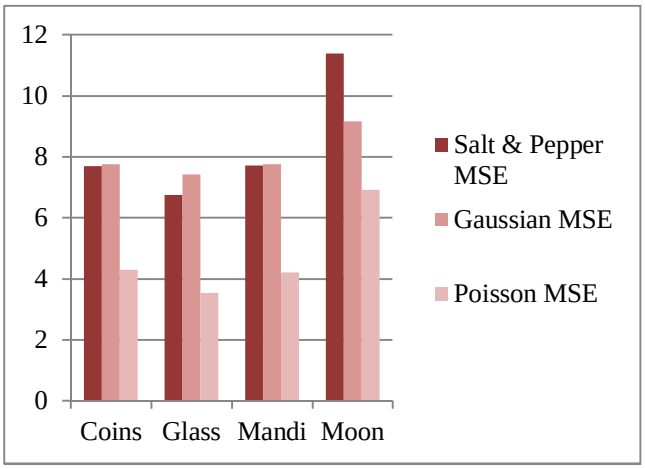

Fig.23.Comparison of MSE value after apply Weiner filter on various image Combine Contrast Image Enhancement method

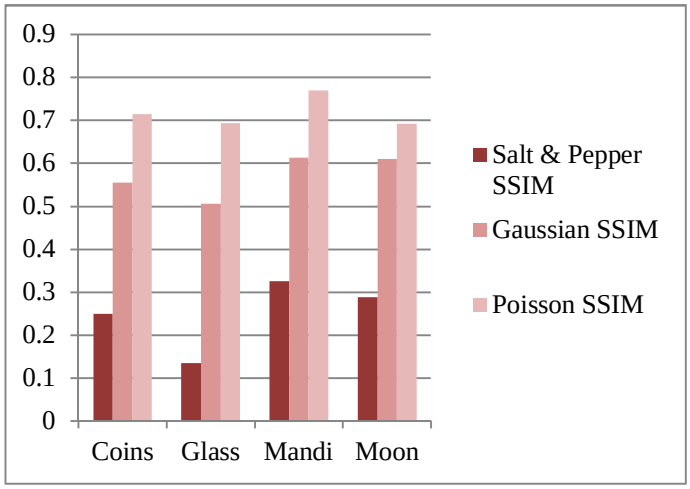

Fig.24.Comparison of SSIM value after apply Weiner filter on various image Combine Contrast Image Enhancement method

V. CONCLUSION

In this paper, numerous techniques of enhancement discussed. Point processing complements the evaluation of the picture. Power law transformation is used for contrast manipulation and for dark images. Frequency domain enhancement methods are used to overcome defects of spatial domain enhancement. In Histogram equalization contrast of the image is enhanced. Spatial filtering is

used to remove the noise in the image. In this thesis apply local contrasting, global contrasting and combination of both local and global contrasting on various attacks and there filter and find better PSNR, MSE and SSIM value.

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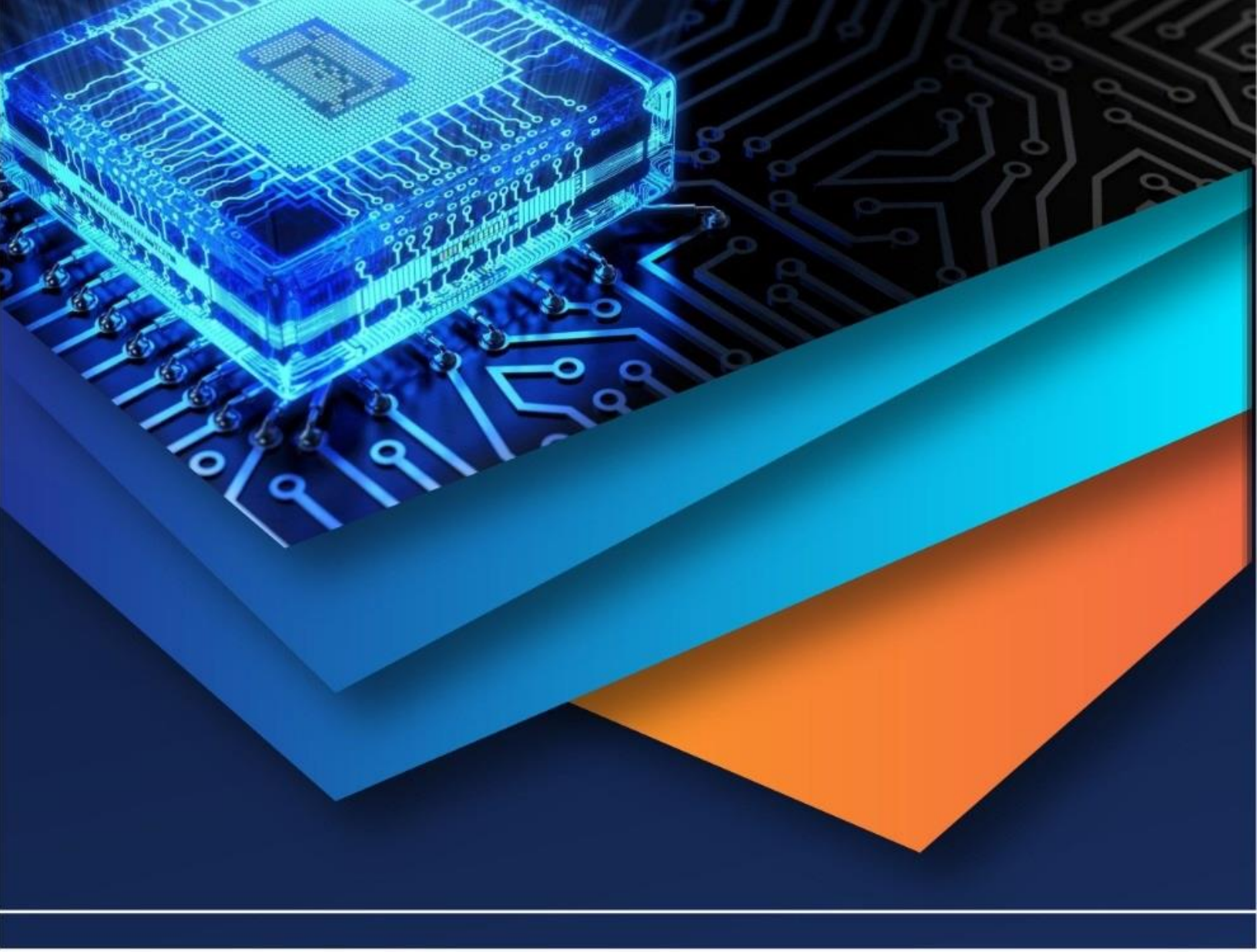

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