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# A Survey Paper on De-Noising & Enhancement of LASER Image Using WAVELET TRANSFORM

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**ABSTRACT**: Transmission of Visual information in the form of digital image is becoming a major method of communication in the modern age but still the image received after transmission is often corrupted with some noise, so the received image needs processing before it can be used in application. Our motive is to remove the noise from noisy laser image because it include various types of noises like random noise, speckle noise, Gaussian noise, salt and pepper noise, Brownian noise etc. Image De-noising is involved manipulation of image data to produce a visually high quality image. Proposed method in this paper is used to improve the quality of image by improving its features. The laser image processing area has received considerable attention in the last decades. Using some special type of filter it is possible to denoise the image. The filter we will employ is homomoprphic & Gaussian low pass filter for smoothing the image. Image denoising is required for various researcher in laser community, for their research activity. Thus laser image de-noising is very important factor for several domains like medical & Engineering application. There are various methods or algorithm are available for de-noising of image like spatial domain filtering, nonlinear filtering, wavelet domain, etc. In all of these wavelet transform have numerous advantages like.
a) wavelet offer a simultaneous localization in the time and frequency domain.
b) it is computationally very fast.
c) one of the most important advantage of wavelet transform is that it separate the fine detail in a signal , very small wavelet can be used to isolate very fine detail in a signal while very large wavelet can identify course detail.

**KEYWORDS**: Laser image , De-noising, Enhancement, Histogram Equalization

## I. INTRODUCTION

The wavelet transform (WT) has emerged as an exciting new tool for statistical signal and image processing. The wavelet domain provides a natural setting for many applications like real-world signals . Digital Image Processing is used for improvement of image quality. Noise is a major issue while transferring image through all kinds of electronic communication.
Problems associated with laser image:

1) (LRV)Limited-range visibility.
2) (LC)Low contrast.
3) (NUL)Non uniform lighting.
4) (BA)Bright artifacts, and noise.

Laser image can be addressed by 2 different points:

i) An image de-noising technique.
ii) Image enhancement technique

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## II. RELATED WORK

Some researcher suggest various result when they analysis the images.

Varinderjit K, A Singh and A K Dogra[2] et al on defining a general mathematical and experimental methodology to compare and classify classical image de-noising algorithms and, second, to propose a nonlocal means (NL-means) algorithm addressing the preservation of structure in a digital image. The mathematical analysis is based on the analysis of the "method noise," defined as the difference between a digital image and its de-noised version.

Algorithm presented by John Y. Chiang and Ying-Ching Chen.[3] et al based on the WCID which helps in effectively restoring image color balance and remove haze. As per the researches, no existing techniques can handle light scattering and color change distortions suffered by image simultaneously. The experimental results demonstrate superior haze removing and color balancing capabilities. Image pre-processing is absolutely necessary due to the quality of image captured under water. Basically, under water image suffer from quality degradation due to retransmission of limited range of light, low contrast and blurred image due to quality of light and diminishing color. When an image is captured, pre-processing is necessarily done to correct and adjust the image for further study and processing.

Dr.G. Padmavathi, Dr. P. Subashini, Mr. M. Muthu K and S K Thakur[4] et al worked on Different filtering techniques .The filters used normally improve the image quality, suppress the noise, preserves the edges in an image, enhance and smoothen the image. Therefore an attempt has been made to compare and evaluate the performance of three famous filters namely, homo-morphic filter, anisotropic diffusion and wavelet de-noising by average filter used for under water image pre-processing. Out of the three filters, wavelet de-noising by average filter gives desirable results in terms of MSE and Peak Signal to Noise Ratio

M C. Motwan, M C. Gadiya , R C. Motwani[5] et al described different methodologies for noise reduction (or de-noising) giving an insight as to which algorithm should be used to find the most reliable estimate of the original image data given its degraded version.

Yiwen Liu, Lingling Li, cuihua Li [13] proposes a denoising method based on wavelet threshold and subband enhancement method for image de-noising. This method uses soft threshold method for the minimum scale wavelet coefficients, takes further decomposing for other wavelet coefficient and takes effective enhancement and mixing threshold processing for each subband after being decomposed. Thus making full use of high frequency information of each of the multi-dimension can add image details and get a better enhancement and de-noising effectively

Huimin Lu, Seiichi Serikawa [14] presents a method for underwater scene enhancement using weighted guided median filter. This method includes include an effective underwater scene enhancement scheme and a shallow water imaging model that compensates for the attenuation discrepancy along the propagation path. The improved images are characterized by a reduced noised level, better exposure of the dark regions, and superior global contrast where the finest details and edges are enhanced significantly

Wan Nural Jawahir Hj Wan Yussof, Muhammad Suzuri Hitam, Ezmahamrul Afreen Awalludin, and Zainuddin Bachok[15] presented a Histogram equalization (HE) method. This method is of contrast adjustment using the images histogram and also works for to enhance a given image. In this method, transformation T is to be considered in such a way that the gray value in the output is equally distributed in [0, 1]. It is also called histogram flattening. Histogram equalization method in which histogram is modified by spreading the gray level areas. When an image's histogram is made equal, all pixel values of the image are redistributed so there are approximately an equal number of pixels to each of the user specified output gray-scale classes e.g., 32, 64, and 256. Contrast is increased at the most populated range of brightness values of the histogram. For very bright or dark parts of the image, it automatically reduces the contrast associated with the ends of a normally distributed histogram. It can also divide pixels into different groups, if few

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output values are over a wide range. But the difficulty with this method is that it is effective only when the original image has poor contrast to start with, otherwise it may degrade the image quality

Table 1. Showing Different Result on the PSNR Value

| Sr. No | Method | PSNR Value |
|---|---|---|
| 1 | Adaptive Wavelet | 76.9359db |
| 2 | Dark Channel Prior | 50.4035db<br>78.706db |
| | Histogram Equalization | 22.3058db<br>22.872db |
| 3 | Homomorphic Filter | 7.477265db<br>6.51281db<br>7.141598db |
| | SRAD Anisotropic diffusion Filter | 23.7148db<br>19.63416db<br>18.27324db |
| | Wavelet By Average Filter | 22.16868db<br>28.99486db<br>28.11223db |

## III. PROPOSED ALGORITHM

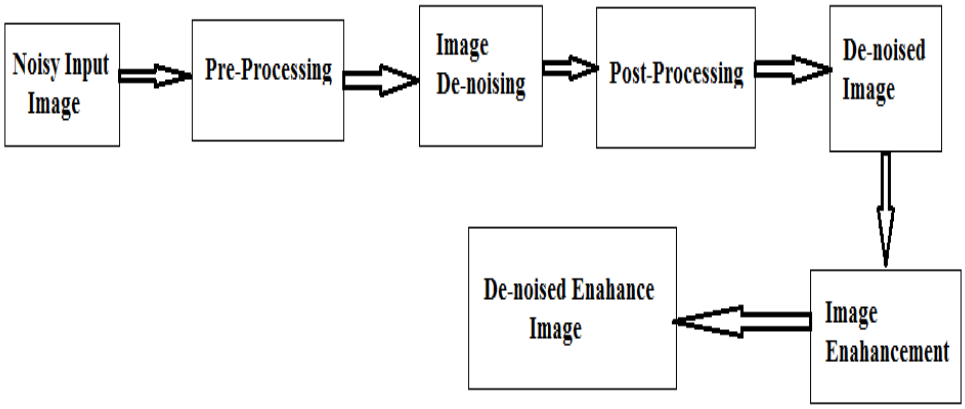


**Figure (a) Block Diagram of Proposed Work**

Proposed work uses prepossessing methodology shown in above block diagram .For de-noising wavelet transform Function, and for better enhancement Histogram Equalization is used. Above all work is performed on MATLAB tool.

***1. Laser image*:** First get noisy laser image. Then we will apply preprocessing procedure on that.

***2. Preprocessing:*** For getting better de-noising image some preprocessing should be done before wavelet threshold de-noising. The preprocessing is done by two ways.

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***2.1. Homo-morphic filtering technology:*** first we will use Homo-morphic filtering technology to eliminate the non-uniform illumination and balance contrasting.

***2.2Gaussian low pass filtering:*** secondly we will use Gaussian low pass filtering procedure for smoothing the particular image.

***2.3The following reasons specify the necessity of pre-processing for laser image:***

i. Laser image is suffered from degradation problem.

ii. The environment where light changing is occur.

iii. Specificity the video captures from unknown rigid scene or unknown color

**3.*Wavelet Transform:*** the wavelet transform is proposed method for above analysis it has more advantages so it always preferred rather than other transform like Fourier transform , z transform etc .Wavelet transform work on time domain as well as frequency domain so it has better advantage on image processing.

**4. *Image De-noising:*** The image processing for laser image is able to denoise the image but is not enhances that image. Our objective is to improve laser image by using de-noising method. Image processing of laser image is important because image suffer from serious problems when they compared with visual Image. By using some filtering algorithm image can be made to look clearer.

***5. Image Enhancement:*** The aim of image enhancement is to provide a better transform representation for future automated image processing. The high-performance of the HE in enhancing the contrast of an image is consequence for dynamic range expansion, HE also flattens histogram. Proposed Method is based on brightness preserving histogram equalization.

## IV. CONCLUSION AND FUTURE WORK

The proposed Method has effective results for de-noising and enhancement of laser imges with better PSNR Ratio. So due to high PSNR the visual Appearance of image is better than before. By applying the proposed method in this paper on various laser images it is possible to produce better result in terms of peak signal to noise ratio.

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