A SURVEY ON DE-NOISING & ENHANCEMENT OF UNDERWATER IMAGES USING ADAPTIVE TRANSFORMATION TECHNIQUE

Mr. Bhavekar G.S (PG Student)[1], Chavate S.P (Assistant Professor)[2]
[1 & 2] Dept. of E & TC, GHRCEM Amt. (MH), India
Email.- gbhavekar@gmail.com

Abstract: Visual information is transmitted in the form of digital images is becoming a major method of communication in the modern age but still the images obtained after transmission is often corrupted with noises so the received images needs processing before it can be used in application. Our motive is that to remove the noise in the underwater image like random noise, speckle noise, Gaussian noise, salt and pepper noise, Brownian noise etc. Image De-noising is involved manipulation to produce a visually high quality of images by improving its features. The underwater image processing area has received considerable attention within the last decades so using some special type of filter it is possible. The filter may be employed as a Homomorphic filter and Gaussian low pass filter. It is required because of several researchers like forensic department, geologist, argeologiest, aquabulle lab, and underwater marine lab and underwater hydro lab and so on, for their research activity. So due to that underwater image de-noising is very important factor for several domains. So there are various methods or algorithms are available for de-noising of images like spatial domain filtering, nonlinear filtering, wavelet domain, etc. So using wavelet transform one have numerous advantages like, wavelet offer a simultaneous localization in the time and frequency domain also using fast wavelet transform.

Keywords: - Underwater images, De-noising, Enhancement, Histogram Equalization.

1. 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 such as involving real-world signals & digital Image Processing for their improvement on image quality. Noise is a major issue while transferring images through all kinds of electronic communication. Underwater images are characterized by their poor factor of visibility because of light have a property of exponentially attenuated in the water and then due to that the output scenes have poor image quality.

Problems associated with underwater images:

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

Underwater images can be addressed by two different techniques,

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

2. LIERATURE REVIEW:

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.

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 underwater images simultaneously. The experimental results demonstrate superior haze removing and color balancing capabilities. Underwater image pre-processing is absolutely necessary due to the quality of images captured under water. Basically, under water images 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 underwater 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] at 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.

Table 1. Showing Different Result on the PSNR Value

Sr. No	Method	PSNR Value
1	Image De-noising done by Dark Channel Prior {	50.4035db 78.706db
2	Image De-noising done by Adaptive Wavelet {	76.9359db

3	Image de-noising done by Homomorphic Filter {
	Image De-noising done SRAD Anistropic Diffusion {
	Image De-noising done Wavelet By Average Filter {
		7.477265db
		6.51281db
		7.141598db
		23.7148db
		19.63416db
		18.27324db
		22.16868db
		28.99486db
		28.11223db

3. PRAPOSED WORK:

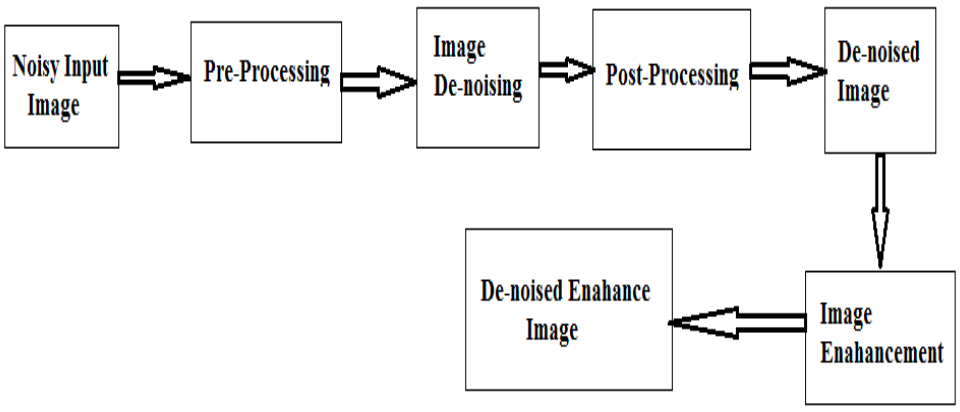

Figure (a) Block Diagram of Proposed Work

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

1. Underwater Images: Obtain an underwater noisy image. Then apply preprocessing.

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

2.1. Homo-morphic filtering technology: At first step Homo-morphic filtering technology is apply on the underwater image for eliminating the non-uniform illumination and balance contrasting.

2.2.Gaussian low pass filtering: At second step Gaussian low pass filtering procedure apply for smoothing the underwater image.

2.3.The following reasons specify the necessity of pre-processing for underwater images:

i. The quality of Underwater image is suffered because of transmission properties of light in the water like absorption and scattering.

ii. The environment where light changing is occur, water turbidness, and also the blue hue is more or less predominant when vehicles are in moving condition.

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

4. Image De-noising: The image processing is done for underwater images, which is able to enhance the image, but it is not efficient to remove noise from underwater image. The Objective is to improve underwater image by using de-noising method, the processing of underwater image is necessary because these image leads serious problems when compared to original Image. In this method pre-processing or post-processing to be done on the underwater image using some filtering techniques, which makes the image more clear and effective, uniform illumination and balance contrast. This step can realize the purpose to reduce the illumination changes, sharpen the edge details, and eliminate the noise in the underwater image

. **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 as a consequence of the dynamic range expansion, HE also flattens histogram.

4. CONCLUSION:

Underwater image suffer from various problems as mentioned above, so for solving the above problem wavelet transform can be an effective tool for de-noising the image. Also by making the used of technique such as Histogram equalization for enhancement the improved visual appearance can be obtained.

REFERENCES:

1. LeiFei Wang Yingying “The Research of Underwater Image De-noising Method Based on Adaptive Wavelet Transform” IEEE 2014.
2. Varinderjit k, A. Singh and A K Dogra.A “Review on Underwater image enhancement”. International Journal of Advanced Research in computer and Communication Engineering Vol. 3, Issue 7 July2014.
3. John Y. Chiang and Ying-Ching Chen.“Underwater Image Enhancement by Wavelength Compensation and Dehazing”,1756 IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 21, NO. 4, APRIL 2012.
4. Dr.G.Padmavathi, Dr.P.Subashini, Mr.M. M Kumar and S K Thakur “Comparison of Filters used for Underwater Image Pre-Processing” IJCSNS International Journal of Computer Science and Network Security, VOL.10 No.1, January 2010 .
5. M C. Motwani, M C. Gadiya , R C. Motwani "Survey of Image Denoising Techniques".2010 https://www.cse.unr.edu/~fredh/papers/conf/034-asoidt/paper.pdf
6. Huimin Lu,Yujie Li,Lifeng Zhang,Akira Yamawaki,Shiyuan Yang,Seiichi Serikawa “Underwater Optical Image Dehazing Using Guided Trigonometric Bilateral Filtering"

7. James S.Walker Wavelet-based Image Compression Sub-chapter of CRC Press book: Transforms and data compression
8. White, E.M., Partridge, U.C., Church, S.C, "Ultraviolet dermal reflection and mate choice in the guppy", In 2003, pp. 693-700.
9. Naveen Venugopal, A.Jothilingam, M.S.Sudhakar, R.Ramesh, P.Karthikeyan.: "Underwater image Enhancement and Edge Detection" international Journal of Image Processing and pattern Recognition Vol. 1: Issue 1.
10. Stewart E. Harris,Robert D.Ballard,ARGO: Capabilities For Deep Ocean Exploration,IEEE.
11. Kashif Iqbal, Rosalina Abdul Salam, Azam Osman and Abdullah Zawawi Talib "Underwater Image Enhancement Using an Integrated Colour Model " 2007
12. R Sathya M Bharati G Divyasri" the research of underwater image de-noising method based on adaptive wavelet transform https://drive.google.com/file/d/0B1TVSYQBSOBAajdXeGd2NENzYUU/view