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Underwater Image Enhancer System

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Abstract: ***This paper introduces an effective technique to enhance the images captured underwater and degraded due to the medium scattering and absorption.***
This method is a single image approach that does not require specialized hardware or knowledge about the underwater conditions or scene structure. It builds on the process of application of filters and gray scaling used for enhancement purpose. The single image is provided as input that is further gray scaled and filtered using Gaussian Blur(used for edge sharpening) algorithm .
The extensive qualitative and quantitative evaluation reveals that this enhanced images are characterized by better exposedness of the dark regions, improved global contrast, and edges, sharpness.
Keywords: **Underwater, Gaussian Filtering, Edges Sharpness, Global Contrast, Absorption.**

I. INTRODUCTION

For an ideal transmission medium, the received light is influenced mainly by the properties of the target objects and the camera lens characteristics.This is not the case underwater. First, the amount of light available under water, depends on several factors. The interaction between the sun light and the sea surface is affected by the time of the day (which influences the light incidence angle), and by the shape of the interface between air and water (rough vs. Calm sea).

The diving location also directly impacts the available light, due to a location-specific color cast: deeper seas and oceans induce green and blue casts, tropical waters appearance.

While protected reefs are characterized by high visibility. In addition to the variable amount of light available under water, the density of particles that the light has to go through is several hundreds of times denser in seawater than in normal atmosphere. As a consequence, sub-sea water absorbs gradually different wavelengths of light. Red, which corresponds to the longest wavelength, is the first to be absorbed (10-15 ft), followed by orange (20-25 ft), and yellow (35-45 ft). Hence the developed system will be able to improve the quality of the underwater images.

II. LITERATURE SURVEY

A. In 2010 Iqbal, K.; Odetayo, M.; James, A.; Salam, R.A.; Talib, A.Z.H. worked on Enhancing the low-quality images using Unsupervised Color Correction Method, The affected underwater images reduced contrast and non-uniform color cast because of the absorption and scattering of light rays in the marine environment. For that they proposed an Unsupervised Color Correction Method (UCM) for underwater image quality enhancement is based on color matching, contrast improvement of RGB color model and contrast improvement of HSI color model.

B. 2011 Jinbo Chen; Zhenbang Gong; Hengyu Li; Sharing Xin, proposed A detection method based on sonar image for underwater pipeline tracker. The surveillance and inspection of underwater pipelines are carried out by operators who drive a remotely operated underwater vehicle (ROV) with camera mounted on it. Though in extremely turbid water, the camera cannot capture any scene, even with supplementary high-intensity light.

C. In 2011 Hung-Yu Yang; Pei-Yin Chen worked on Low Complexity Underwater Image Enhancement Based on Dark Channel Prior. Furthermore, a color improvement method is adopted to improve the color contrast for underwater image. The tentative results show that the proposed approach can well improve the underwater image and decrease the implementation time.

III. METHODOLOGY

. Initially the image to be uploaded is selected from the local system.

A. Preprocessing

The image is collection of several pixels. Each pixel consists of three values i.e. red, green and blue. The enhancement of image can be done on the basis of individual pixel values in the image. Hence the image is been converted into matrix form.

Fig.1 Preprocessing Of Uploaded Image

The matrix size is of 2x2.The preprocessing stage converts this matrix into a vector(made with incrementing counter for each color value) with the respective values of red,green and blue ranging from 0 to 255.Hence at the end of preprocessing stage the three vectors are generated for red,green and blue colors.Preprocess stage also mentions the image height and width as external parameters.

B. Gray Scaling

The uploaded degraded underwater image is gray scaled for the purpose of sharpening the edges of the image.To convert the image into gray scale image each pixel(consisting of RGB values) is converted into gray scaled pixel.

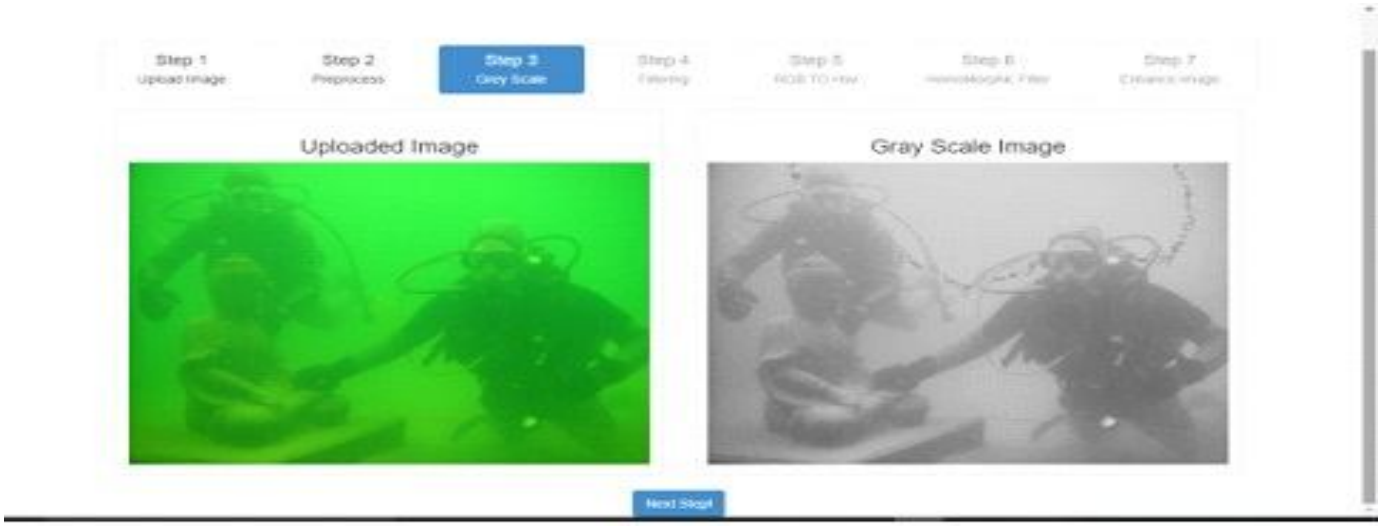

Fig.2 Gray Scaling Of Image

The pixel red value,green value,blue value is multiplied with 0.299,0.13,0.17 respectively for conversion into gray scale pixel.

C. Filtering

The image is filtered using the algorithm Gaussian blur for improving the quality of the image.The brief implementation of Gaussian blur algorithm is shown below.

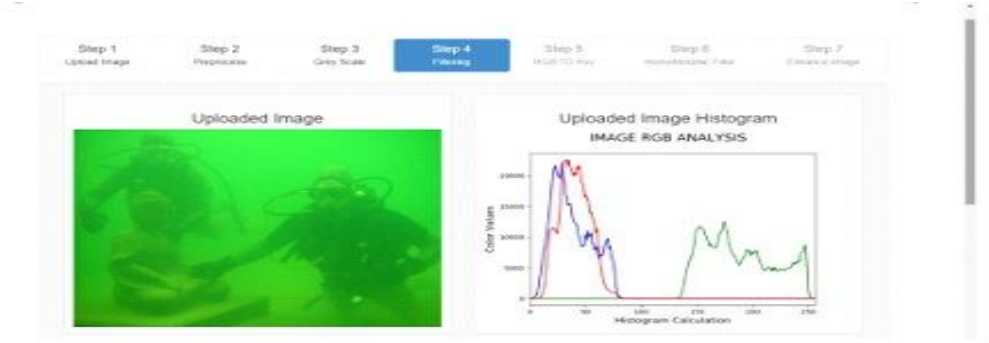

Fig.3 Histogram Analysis Of Image

D. RGB To HSV

HSV stands for hue saturation and value. The averaging of the points in the Gaussian blur graph is done using clustering technique such as KNN clustering algorithm.

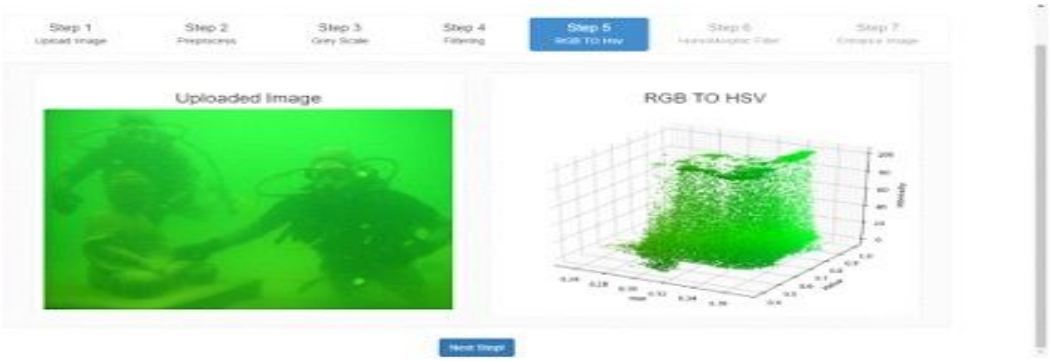

Fig.5 RGB TO HSV Conversion of Image

The k value used in clustering algorithm would be '2' as the matrix size used in preprocess stage is of size 2x2.The unwanted pixels are been removed from the graph and average of the needed pixels are calculated followed by a scatter plot in this stage.

E. Homomorphic Filtering

To improve the further quality of the image another filter is used called as homomorphic filtering.

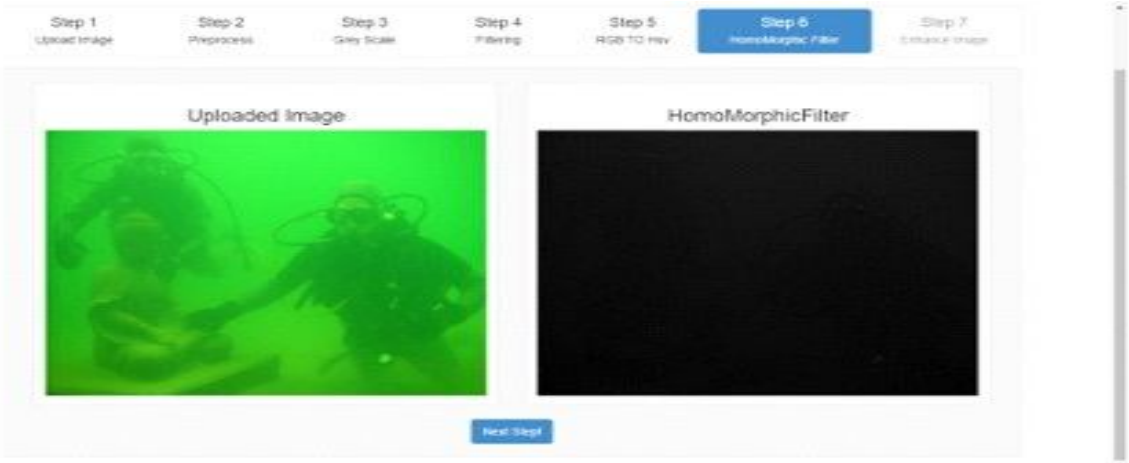

Fig.6 Homomorphic Filtering Of Image

Implementation of homomorphic filtering is done with help of opencv library using the function ImgProc_Threshold().

F. Enhanced Image

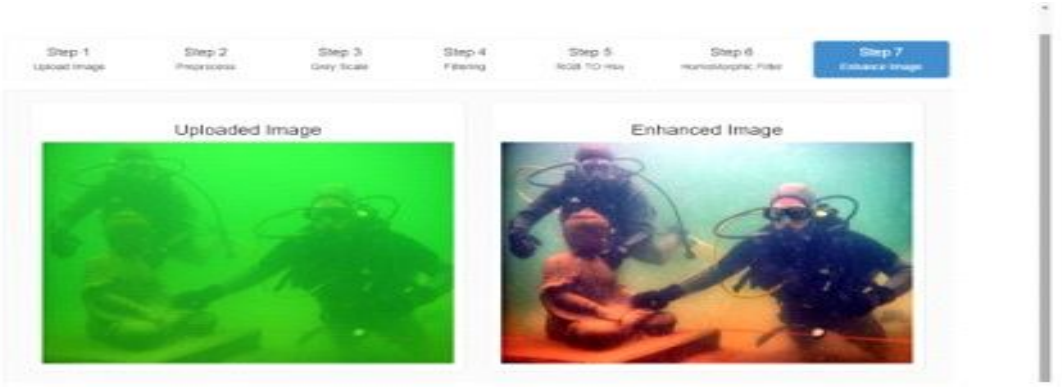

Fig. 7 Enhanced Image

Eventually after sequential execution of above steps results into formation of enhanced image.

IV. CONCLUSIONS

In this paper, there is a proposed efficient and low complexity underwater image enhancement method. The proposed approach contains two mainly procedures, the direct reflection of light from the object and the reflection from the particles of the medium. Thus shown that by choosing appropriate algorithms how to effectively improve underwater images. Our technique has been tested for a data set of underwater images.

The method is faster than existing single image enhanced strategies yielding accurate results and the color contrast of the object in underwater. The experimental results show that the proposed approach can effectively enhance the underwater image.

Future work will be enhancement of videos

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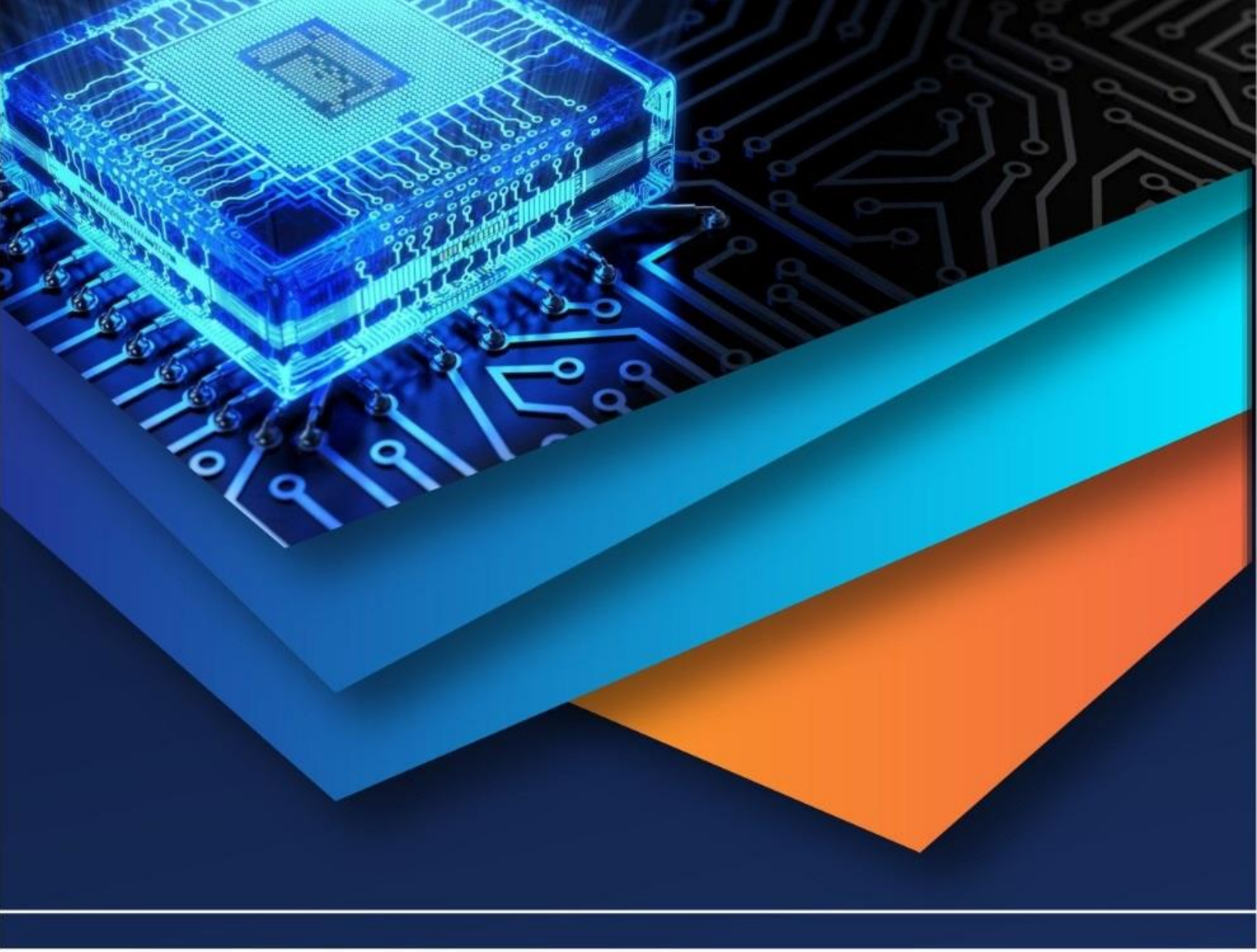

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