**A Project Report on**

**UNDER WATER IMAGE ENHANSMENT**

Submitted to Prof. MILID TIRMARE

**Vishwakarma Institute of Technology, Pune**

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

In partial fulfillment of the requirements of B.Tech.

In

Electronics and Telecommunication Engineering

By

|  |  |  |
| --- | --- | --- |
| Name | Roll-no | Gr-no |
| Ashutosh lahoti | 70 | 11810126 |
| Khushi Bharti | 60 | 11810628 |
| Janhavi Kadtan |  |  |
| Rutuja Kole |  |  |



Academic Year 2019-20 / SEM II

SY B.Tech ET B

Subject: ET2004/ Communication Engineering

Department of Electronics and Telecommunication Engineering

Introduction: Underwater imaging is becoming more and more relevant as companies search for the abundant mineral and biological resources in oceans, rivers and lakes. Significant progress has been made in underwater exploration, but underwater image and video processing techniques still have much potential for development for computer vision applications. Due to the light absorption and scattering in water, color shift and contrast degradation are two major problems of underwater images. Color distortion is mostly caused by the way different light wavelengths travel in water, making the color of underwater images appear bluish-green. Moreover, since light is randomly attenuated and scattered by particles suspended in water, image contrast tends to be seriously degraded. To address these problems and improve the quality of underwater imaging, various image restoration and enhancement methods have been proposed. In image restoration, the goal is to recover the image by directly modeling the degradation process. For example, several haze removal algorithms have been proposed to deal with contrast distortions. Some of these focus on dark channel modeling. To suppress the blurring effect in underwater images, a point spread function is combined with a modulation transfer function. In the visibility of underwater images is recovered by a polarization haze removal method, while [9] combines wavelength compensation with a haze model. Another model-based approach uses a radiation transfer function to restore the visibility of underwater images. A restoration method based on dictionary learning is introduced. In the authors propose a dehazing algorithm that aims to minimize the information loss and restore degraded image. Then a contrast enhancement algorithm is followed to further enhance details. Recently, based on the analysis of image blurriness and light absorption, a depth estimation algorithm is proposed in to recover and enhance underwater images.

THE PROPOSED APPROACH: we used 3 algorithms to produce a color and contrast corrected image.

1. Histogram equalizer

Histogram equalizer basically make histogram more enhanced contrast levels, it reduces the skewness of the histogram of the gray scale’s values of given image. In turn its effects the image by levelling the brightness in the image.

PDF - Probability of occurrence of gray level.

CDF-summation of p at each gray level

2. Low light image enhancement

First you invert the image, using a function then apply a dehazing algorithm by using a function called imreducehaze(), in this function you can give the attribute by how much u have to reduce haze and again inverting the updated image .

This process is used to reduce the haze in the image.

3.Reduction of color distortion by using a different color space

In this we have used different color space to reduce the color distortion in the image so that we can get clear picture. Firstly, we have changed the rgb into lab color is more accurate color space. It uses 3 axes. A green to red B axis blue to yellow Lightness axis

First, we are inverting a single channel and applying dehazing function to it. Then combining it by increasing a saturation

Letter

Description automatically generated

Text, letter

Description automatically generated

Conclusion: Still many researches is ongoing in under water development. We implemented 3 different algorithms Histogram equalizer, Low light image enhancement, Reduction of color distortion by using a different color space. Now we have studied these algorithms using 3-4 images, we can further study which algorithms works best in different lighting condition. In case of underwater pictures. We can increase the dataset and work on it.

References: