Project Proposal - Implementation Of Underwater Image Enhancement

Pranjali Bajpai - 2018EEB1243, Yogesh Vaidhya - 2018EEB1277

1. Abstract

Underwater images find application in various fields, like marine research, inspection of aquatic habitat, underwater surveillance, identification of minerals, and more. However, underwater shots are affected a lot during the acquisition process due to the absorption and scattering of light. As depth increases, longer wavelengths get absorbed by water; therefore, the images appear predominantly bluish-green, and red gets absorbed due to higher wavelength. These phenomenons result in significant degradation of images due to which images have low contrast, color distortion, and low visibility. Hence, underwater images need enhancement to improve the quality of images to be used for various applications while preserving the valuable information contained in them.

The first step in the process includes noise reduction by smoothing the image. Following the noise reduction step, the next step is to perform color correction separately on every color channel. The next step is to perform contrast enhancement in order to improve the visibility of objects in the image. Image fusion refers to combining more than one image to get a high-quality single image. In this case, multi-scale fusion can be used to integrate the color-corrected image and contrast-enhanced image to get a high-quality underwater image. The assessment metrics like PSNR can be incorporated to evaluate the relative quality of the image obtained by this method.

2. References

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b. Weidong Zhang, Lili Dong, Tong Zhang, Wenhai Xu, Enhancing underwater image via color correction and Bi-interval contrast enhancement, Signal Processing: Image Communication, Volume 90, 2021, 116030, ISSN 0923-5965, https://doi.org/10.1016/j.image.2020.116030.