Underwater Image Enhancement using Python

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Abstract: *Since light is selectively attenuated and scattered as it passes through water, underwater imaging is severely affected. Such impairments restrict visual tasks and diminish image quality. There are several enhancing methods available to increase the quality of an underwater photograph. However, the majority of techniques cause distortion in the final photographs. The four-step suggested natural-based underwater picture colour enhancement (NUCE) approach is described below. The first phase presents a novel method for removing the underwater color cast. Gain factors, which are determined by taking into account the variations between the superior and inferior hue channels, are used to enhance the inferior color channels. The dual-intensity image fusion based on the average of mean and median values is offered in the second stage to create lower-stretched and upper-stretched histograms. The combination of these histograms considerably increases image contrast. Next, the swarm-intelligence-based mean equalization is suggested to enhance the output image's naturalness. The mean values of inferior colour channels are modified to be near to the mean value of superior colour channel by combining swarm intelligence algorithms. Finally, the unsharp masking method is used to sharpen the entire image. Experiments on underwater photographs recorded under varying settings show that the suggested NUCE approach offers improved output image quality while considerably outperforming existing state-of-the-art methods.*

Keywords*: NUCE, Histogram, Swarm Intelligence*

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212