

Enhancement of Underwater Haze Image with Edge Reveal Using Pixel Normalization

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Abstract : As light passes from source to observer in the water medium, it is scattered by the suspended particulate matter. This scattering effect will plague the captured images with non-uniform illumination, blurring details, halo artefacts, weak edges, etc. To overcome this, pixel normalization with an Amended Unsharp Mask (AUM) filter is proposed to enhance the degraded image. To validate the robustness of the proposed technique irrespective of atmospheric light, the considered datasets are collected on dual locations. For those images, the maxima and minima pixel intensity value is computed and normalized; then the AUM filter is applied to strengthen the blurred edges. Finally, the enhanced image is obtained with good illumination and contrast. Thus, the proposed technique removes the effect of scattering called de-hazing and restores the perceptual information with enhanced edge detail. Both qualitative and quantitative analyses are done on considering the standard non-reference metric called underwater image sharpness measure (UISM), and underwater image quality measure (UIQM) is used to measure color, sharpness, and contrast for both of the location images. It is observed that the proposed technique has shown overwhelming performance compared to other deep-based enhancement networks and traditional techniques in an adaptive manner.

Keywords : underwater drone imagery, pixel normalization, thresholding, masking, unsharp mask filter

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