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(57) Abstract :
Underwater images typically suffer from color deviations and low visibility due to the wavelength-dependent light absorption and scattering. To deal with these degradation issues, we propose an efficient and robust underwater image enhancement method, called MLLE. Specifically, we first locally adjust the color and details of an input image according to a minimum color loss principle and a maximum attenuation map-guided fusion strategy. Afterward, we employ the integral and squared integral maps to compute the mean and variance of local image blocks, which are used to adaptively adjust the contrast of the input image. Meanwhile, a color balance strategy is introduced to balance the color differences between channel a and channel b in the CIELAB color space. Our enhanced results are characterized by vivid color, improved contrast, and enhanced details. Extensive experiments on three underwater image enhancement datasets demonstrate that our method outperforms the state-of-the-art methods. Our method is also appealing in its fast-processing speed within 1s for processing an image of size 1024×1024×3 on a single CPU. Experiments further suggest that our method can effectively improve the performance of underwater image segmentation, key point detection, and saliency detection.

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