

# An Underwater Image Enhancement Benchmark Dataset and Beyond

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## 摘要

Underwater image enhancement has been attracting much attention due to its significance in marine engineering and aquatic robotics. Numerous underwater image enhancement algorithms have been proposed in the last few years. However, these algorithms are mainly evaluated using either synthetic datasets or few selected real-world images. It is thus unclear how these algorithms would perform on images acquired in the wild and how we could gauge the progress in the field. To bridge this gap, we present the first comprehensive perceptual study and analysis of underwater image enhancement using large-scale real-world images. In this paper, we construct an Underwater Image Enhancement Benchmark (UIEB) including 950 real-world underwater images, 890 of which have the corresponding reference images. We treat the rest 60 underwater images which cannot obtain satisfactory reference images as challenging data. Using this dataset, we conduct a comprehensive study of the state-of-the-art underwater image enhancement algorithms qualitatively and quantitatively. In addition, we propose an underwater image enhancement network (called Water-Net) trained on this benchmark as a baseline, which indicates the generalization of the proposed UIEB for training Convolutional Neural Networks (CNNs). The benchmark evaluations and the proposed Water-Net demonstrate the performance and limitations of state-of-the-art algorithms, which shed light on future research in underwater image enhancement. The dataset and code are available at [https://li-chongyi.github.io/proj\\_benchmark.html](https://li-chongyi.github.io/proj_benchmark.html).

## 关键词

作者关键词: Image enhancement; Image color analysis; Benchmark testing; Image restoration; Electronic mail; Gallium nitride; Training; Underwater image enhancement; real-world underwater images; comprehensive evaluation; deep learning

KeyWords Plus: COLOR; RESTORATION; VISIBILITY; WATER

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