Locally Adaptive Color Correction for Underwater Image Dehazing and Matching

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August 5, 2018

Abstract

To resolve the issue that there is no application to variable color casts in underwater scenarios,author gives an original fusion-based strategy,which is a function of the light attenuation level estimated from the red channel.And only prior work called the Dark Channel Prior(DCP) [1] is used to restore the color compensated image,as for outdoor dehazing.Author think their technique enhances image contrast in a quite effective manner and also supports accurate transmission map estimation.

1. Introduction

In underwater the light propagation is distorted due to the absorption and scattering.These distortions result in scenes with foggy appearance and poor contrast.Moreover, the colors are faded because their composing wavelengths are cut differently according to the water depth.All these reasions enhance the visibility in underwater is a challenging task.And all present works have no good results for underwater images.In this paper author introduce an original color correction strategy as a pre-processing step to improve the conventional restoration method derived from the DCP [1].Their color correction builds on color transfer,which is a technique of choice to counterbalance color casts.From the Fig. 1, we can see the results reducing by author's method and the other method.

2. Underwater Light Propagation

The comprehensive studies of McGlamery [4] and Jaffe [2] have shown that the total irradiance incident on a generic point of the image plane has three main compo- nents in underwater mediums:direct component, forward scattering and back scattering. the simplified underwater optical model is as follows:

$$I(x) = J(x)e^{-\eta d(x)} + B(x)(1 - e^{-\eta d(x)}) \qquad (1)$$

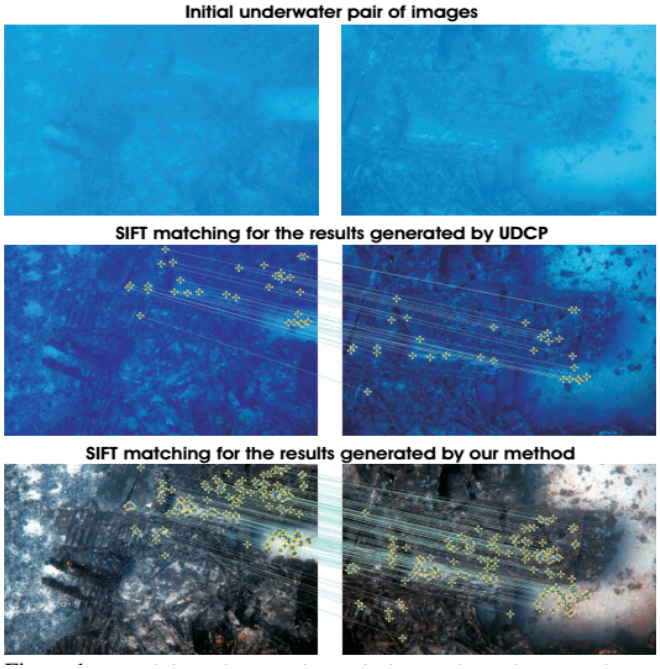

Figure 1. No valid matches are obtained when applying the original SIFT matching procedure [25] on the original pair of underwater images (top row). In contrast, applying the same matching procedure on the images de- hazed by UDCP [20] (mid row) and by our technique (bottom row) results in 30 and 135 correct matches, respectively.

This simplified underwater camera model (1) has a similar form than the model of Koschmieder [3], used to characterize the propagation of light in the atmosphere.

References

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