

# Underwater Image Enhancement

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Advancement in technology have led us to explore the new places left untouched. One such places are the deep water studies, made possible now, which have helped us determine the very existence of our presence and also find the rarest elements as well as marine life. However, recording these events successfully is still a major challenge faced by us due to the absence of light. Also, scattering and absorption phenomena add an additional challenge to successfully capture the events inside water.

To overcome the problems, we introduce an effective approach to enhance the information content of the images/records. The method does not require us to have the knowledge of the underwater conditions or scene structure. It builds on the blending of two images that are directly derived from a color compensated and white-balanced version of the original degraded image. The two images to fusion, as well as their associated weight maps, are defined to promote the transfer of edges and color contrast to the output image. To avoid that the sharp weight map transitions create artifacts in the low frequency components of the reconstructed image, we also adapt a multiscale fusion strategy. Our extensive qualitative and quantitative evaluation reveals that our enhanced images and videos are characterized by better exposedness of the dark regions, improved global contrast, and edges sharpness. Our validation also proves that our algorithm is reasonably independent of the camera settings, and improves the accuracy of several image processing applications, such as image segmentation and key point matching.

The above image enhancement technique would include the steps as follows:

- While balancing
  - i) Grey
  - ii) Max RGB
  - iii) Color Balance**Planning to deploy by the end of September.**
- Multi scale fusion
  - i) Laplacian
  - ii) Saliency
  - iii) Saturation
  - iv) Corresponding normalized weights**Planning to deploy by the mid of October.**
- Filtering technique  
**Planning to deploy by the end of October.**

## References:

C. O. Ancuti, C. Ancuti, C. De Vleeschouwer and P. Bekaert, "Color Balance and Fusion for Underwater Image Enhancement," in *IEEE Transactions on Image Processing*, vol. 27, no. 1, pp. 379-393, Jan. 2018. doi: 10.1109/TIP.2017.2759252