

CS-663 Digital Image Processing

Project Proposal

Group Members:

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Topic:

Sunlight flicker removal in underwater videos.

Reference Paper:

A motion compensated filtering approach to remove sunlight flicker in shallow water images- <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5152111>

Dataset:

Due to absence of any reliable dataset online in this field, the dataset has been borrowed from team AUV-IITB. Link- https://www.cse.iitb.ac.in/~hariprasad/AUV_Database.tar.gz

Evaluation:

The goal is to run the implemented algorithm on various videos involving sunlight flicker, and to visually inspect the result for absence of the flicker. The algorithm would also be tested on videos which do not involve sunlight flicker, with the result expected to be very similar to the input (by verifying that the absolute difference between the input and the result is close to zero).

Algorithm:

The key idea behind the algorithm is that the illumination fluctuations over a region are sparse, thus a **temporal median**, after correcting the image due to motion during capture, would reduce the fluctuations. The algorithm also relies on the difference in the spectral range of the reflectance and illumination, thus using a low pass filter to estimate the illumination field. **Homomorphic filtering** technique is used, since illumination and reflectance combine multiplicatively, the components are made additive by taking the logarithm of the image intensity, so that these multiplicative components of the image can be separated linearly in the **frequency domain**. The implementation of the proposed method is summarized in the following steps:

- For all images compute the logarithm of pixel intensities.
- For a given image, consider a set of time neighboring images.
- Using robust feature matching, find the 2D image registration parameters.
- Compute the temporal median of image stack .
- Apply a low-pass filter.
- Compute the illumination corrected image.
- Invert the logarithm to recover the linear pixel intensities.