

CME4412 Introduction to Digital Image Processing

Underwater Circle Detection Project Report

Introduction

Underwater circle detection is a crucial aspect of various applications, including underwater robotics, marine biology research, and environmental monitoring. As DEU ROV Community our goal is to create an autonomous circle-detecting underwater robot for the upcoming competition.

Objectives

The primary objectives of our project were to:

- Develop a robust algorithm for underwater circle detection.
- Improve the accuracy of circle detection in challenging underwater conditions.

Methodology.

Preprocessing

To enhance image quality and reduce noise, we applied Gaussian blur and adaptive thresholding to our video frames.

Circle Detection Algorithm

We implemented a circle detection algorithm based on Hough Transform. The algorithm was fine-tuned to account for the distortions and challenges posed by underwater imaging.

Implementation Tools and Technologies

The project was implemented using Python and leveraged OpenCV for image processing and Tkinter for graphical user interface.

Dataset

Because of lack of data we worked on only one video. That video is taken by the DEU ROV Team this semester.

Conclusion

In conclusion, our underwater circle detection project successfully achieved its objectives. The developed algorithm showcases the potential for applications in underwater robotics. The project lays the groundwork for further advancements in underwater imaging and object detection.

References

https://docs.opencv.org/4.x/d4/d13/tutorial_py_filtering.html

https://docs.opencv.org/4.x/da/d53/tutorial_py_houghcircles.html

https://docs.opencv.org/3.4/d7/d4d/tutorial_py_thresholding.html

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