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# Robust Underwater Fish Detection Using an Enhanced Convolutional Neural Network

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**Abstract:** Underwater Object Detection is one of the most challenging and unexplored domains in this area of Computer Vision. The proposed research refines the image enhancement of under-water imagery by proposing an improvement of already existing tools for underwater Object detection. The comparative study clearly depicts the enhancement of the proposed method with respect to the existing methods for underwater object detection. Moreover, a framework for detection of underwater organisms such as fishes are proposed, which will act as the steppingstone for re-serving the ecosystem of the whole fish community. Mostly the object detection using deep learning has been the prime goal to this research and the comparison between other preexisting methods are compared at the end. As a result, techniques that are already well established will be used for overall enhancement of those images. Through this enhancement and through finding a healthy environment for their breeding ground, the extinction of selected species of fishes is can be diminished and decreased. All this is carried out by overcoming difficulties underwater through a novel technique that can be integrated into an Underwater Autonomous Vehicle and can be classified as robust in nature. Robustness will depend on three important factors in this research, first is accuracy, then fast and lastly being upgradeable. The proposed method is a modified VGGNet-16, which is trained using the ImageCLEF FISH_TS dataset. The overall result provides an accuracy of 96.4% which surpasses all its predecessors.

**Index Terms:** Underwater Object Detection, VGGNET, Convo-lutional Neural Networks, Data Augmentation

## 1. Introduction

Underwater imaging faces some terrible consequences during object detection. Degrading of images and presence of certain anomalies poses a very difficult task to detect. Almost 70% of the Earth is water and the ecosystem underwater is still a mystery. As a result, observance of the underwater environment is required. The underwater image processing and enhancing algorithm for detecting underwater organisms that can be integrated into a mapping payload of an UAV needs to be implanted to detect and observe underwater ecosystem. As a result, through observance several aspects of underwater object detection as well as enhancement of existing methods can be achieved. This provides a wider range of possibilities to explore underwater to discover more objects. To preserve the ecosystem a far more efficient method needs to be used. Based on the findings, it is possible to determine the right track of research and in the meanwhile better results of the problem may be achieved, to contribute towards more accurate and faster method of object detection underwater. Beside detection, it is also required to find the most suitable track of further research in this very specific domain of research.

This Research is a steppingstone of detecting underwater organisms using basic yet robust deep learning mechanism. A proper enhancer and detector imaging technology for marine organism needs improvement. For Further improvement of underwater imaging, this research has some vital importance. The proposed enhancing tool will be an innovation formarine life as this enhancement is solely for seabed waterbedorganisms.

Object detection had been one of the most vital functionalities of Computer Vision and for a very long time, various types and forms of objects are studied and detected, taking this field into a completely new level. Even then, object detection had not been so easy for each type of environment. Most importantly, underwater object detection is still at developing stage, and each day new methods are proposed to make the overall process accurate and faster. Previously researches regarding underwater environment required experts to manually annotate objects for detection. Due to huge data explosions all over the world, image data are of huge abundance, mainly for marine objects.

 