UNDER WATER OBJECT DETECTION BASED ON IMPROVED CNN

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Abstract — ***Detection and analyzing underwater noise is crucial for companies working in the marine industry. The CNN model employs single forward propagation through a neural network to detect objects in real time, that is the entire image is predicted in a single algorithm run for training and validation. Thus, to overcome the overfitting problem due to these inherent problems in the domain-specific dataset, CNN model pre-trained by the public image dataset is usually adopted for its fine-tuning. For example, an autonomous ship equipped with an Automatic Identification System (AIS) requires safe navigation , which is achieved by the detection of surrounding objects. Therefore, this study aimed to develop a new optimized model using one of the network architectures for deep learning features that would learn automatically from the input data, eliminating the requirements and engineering effort. Machine learning (ML) is the study of computer algorithms that can improve automatically through experience and by the use of data. In this work, we propose a solution for underwater object detection that uses a combination of Convolutional Neural Network and specific image pre-processing steps. The goal is to classify underwater objects into biodegradable and non-biodegradable.***

Keywords—Detecting underwater object and classifying objects into Biodegradable or Non biodegradable..

I. INTRODUCTION

Understanding and analyzing the underwater objects which plays vital role in several applications such as maintenance of oceans sub-aquatic system and underwater environment. As the Complex nature of underwater environment possess biggest challenge towards object detection and recognition of underwater images. Detecting and analyzing underwater noise is crucial for companies working in the marine industry. The conventional systems serving this objective utilize traditional handcrafting algorithms and process methodologies that are extremely inefficient. This brings out the necessity for computer vision-based systems that are machine-controlled and can be machine learning-based models. To overcome this deep learning method is employed for improving object detection with more accurate positioning, faster speed, and more accurate classification. Object detection can also be used to count and track different objects. It is quite different from recognition, where image recognition assigns a label to an image, but on the other hand, object detection draws a bounding box and then labels the object. Object discovery is a way to find the meaningful parts of a class in digital images and recordings. In this paper our objective is to find out the various items from the image. For finding an item, we use Object localization. Object identification, can be done using different methods. First is the calculation using CNN and RNN. In this, we

need to choose the intrigued areas from the picture and need to arrange them utilizing Convolutional Neural Network. The second method is calculations based on regressions. YOLO technique belongs to this class. YOLO is an abbreviation for the term 'You Only Look Once'. This is an algorithm that detects and recognizes various objects in a picture (in real-time). Object detection in YOLO is done as a regression problem and provides the class probabilities of the detected images. YOLO algorithm employs convolutional neural networks (CNN) to detect objects in real-time. As the name suggests, the algorithm requires only a single forward propagation through a neural network to detect objects. This means that prediction in the entire image is done in a single algorithm run. The CNN is used to predict various class probabilities and bounding boxes simultaneously.

II. RELATED WORK

Underwater maritime targets, such as shipwrecks, submerged containers, etc., will bring a threat to navigation safety, and affect the efficiency of water transportation. Furthermore, oil and sewage from the shipwreck, as well as chemicals in the container, can cause heavy marine pollution once leaked. Therefore, it is essential to detect the underwater maritime targets fast and accurately. Side-scan sonar (SSS) can provide high-resolution images , which is extensively used in underwater object detection and maritime search and rescue (SAR). When the DL method is used for ATR from SSS images, two problems have to be faced, insufficient SSS target images for training the recognition network and the incomplete applicability of the existing detection networks designed for optical images Nguyen et al. increased the SSS target images by scattering, polarization, and geometric transformation and achieved 91.6% accuracy in submerged human body detection, Kim et al. And, The exploration of underwater environment has been popular recently based on the growing deficiency of natural resources and the development of global economy. However, acquiring underwater images based on optical imaging devices encounters more challenges than that in the atmosphere. More specifically, underwater images often suffer from degeneration due to attenuation, color distortion, and noise from artificial lighting sources, as well as the effects possibly induced by low-end optical imaging devices.Some research works have been presented in this literature for underwater image restoration or enhancement . In this, underwater image enhancement was formulated as a haze removal problem and a dehazing method with minimum information loss and histogram distribution prior was presented. However, this article focuses on object detection from a single underwater image without needing to restore image quality in advance and presents to jointly learn the process for image color conversion and object detection to solve the problem of underwater color distortion and scattering effects for improving detection performance also proposes to generate training underwater images for well training the proposed deep object detection model.

III. PROPOSED SYSTEM

In this Project we Pre-train the model on collected image for the feature extraction of the object. YOLOv5 is an algorithm that detects and recognizes various objects in a picture (in real-time).YOLOv5 algorithm employs convolutional neural networks (CNN) to detect objects in real-time. Image Preprocessing for underwater computer vision, the image preprocessing is the most important procedure forobject detection. Because of the effects of light scattering and absorption in the water, the images obtained by the underwater vision system show the characteristics of uneven illumination, low contrast, and serious noise. By analyzing the current image processing algorithms, enhancement algorithms for underwater images are proposed in this project. The Underwater Vision Detection Architecture. The typical underwater visual system is composed of light illumination, camera, image acquisition card, and application software. Thesoftware process of the underwater visual recognition system generally includes several parts, such as image acquisition, image preprocessing, convolution neural network, and target recognition. Image preprocessing is at the low level, the fundamental purpose is to improve image contrast to weaken or suppress the influence of various kinds of noise as far as possible, and it is important to retain useful details in the image enhancement and image filtering process. The research of this paper mainly focuses on image preprocessing and recognition of typical targets from the underwater vision and classifying object as biodegradable and non-biodegradable.

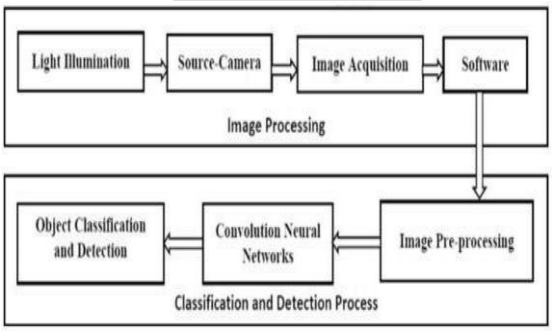

Fig 1.1 Classification And Detection Process

Convolutional Neutral Network is used to divide images into multiple non overlapping regions;the basis of object detection and classification is based on feature extraction, which is aimed atextracting the most effective essential features that reflect the target. Every aspect is closely related, so every effort should be made to achieve satisfactory results.

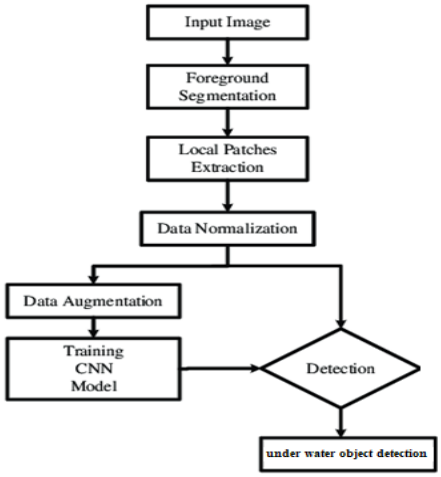

Fig: 1.2 Flow Diagram

IV. RESULT AND ANALYSIS

An underwater object detection model produces the output using one of the network architectures of deep learning method which helps in improving detection of underwater objects. YOLOv5 algorithm employs convolutional neural networks (CNN) to detect objects in real-time, this algorithm requires only a single forward propagation through a neural network to detect objects and classifying them as biodegradable or Non-Biodegradable based on their features.

V. CONCLUSIONS

In this paper, we briefly explained the detection of underwater objects using Yolov5 algorithm and classifying the objects has Biodegradable and Non-Biodegradable. Compare to all the model YoloV5 model as high performance rate for underwater object detection with more accurate positioning, faster speed and more accurate classification. Proposed method is aimed to give probability of 85% to 90% accuracy. It produces probability score for that prediction -how certain the model is that the class is actually the predicted class.

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