IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

UNDERWATER IMAGE CLASSIFICATION USING MACHINE LEARNING TECHNIQUE

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Abstract: While analyzing the strategic areas of underwater observation any as resource exploration or scrutiny, object detection plays a significant role. The potential of analyzing the objects together with extracting the inherent data emphasizes the high analysis of object detection within the field of underwater further because of the low light-medium. 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

Index Terms **-. *scrutiny, the inherent data emphasizes, The conventional systems, traditional handcrafting algorithms, machine learning-based models***,

I. INTRODUCTION

The precision of aquatic target recognition by autonomous underwater vehicles (AUV) is a precise guarantee for aquatic detection, rescue, and security. Deep learning has just made significant advancements in digital image processing for target recognition and classification, making the aquatic target recognition study a hot exploration field This project consistently describes the applying of deep learning in underwater image analysis within the past few years and in brief, expounds on the fundamental principles of varied underwater target recognition ways. Meanwhile, the applicable conditions, pros, and cons of varied ways area unit detected. The technical issues of AUV underwater dangerous target recognition ways are analyzed, and corresponding results are given. At an equal time, we tend to outlook the longer-term development trend of AUV aquatic target recognition. The problem of object detection is a crucial task that is being used broadly in various kinds of industries for monitoring, inspection, sorting, etc. It can be defined as a technique that identifies and localize the required targets from video frames in real-time. 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. This finds application in various fields like mechanized vehicle frameworks, movement acknowledgment, robotized CCTV, object checking, etc. The methods by which object detection can be implemented are through traditional approaches as well as learning approaches. Traditional approaches use a regression model to predict the output by combining the information from various features of the image and giving information about the object's location and its label. Whereas in learning approaches deep neural network architectures are used for the end-to-end process in which feature extraction with object detection is achieved.

As of now, underwater object detection plays an important role in studying climatic factors, port safety, resource exploration, etc. Previously used manual methods for analysis are labor-intensive and time-consuming; hence it is replaced by automatic ROV where manpower can be reduced. The video data obtained from ROV are very large and it's able to process large amounts of such video information automatically, which would make the process tedious. The main objectives of these vehicles show that they should perform automatic identification of man-made structures, off-shore structures, perform object detection and/or obstacle avoidance, etc.

YOLOv3 is an improved version of the YOLO detection model which is a fast-performing object detection algorithm. Enhancing the previous models enables to extend the detection model to multi-scale with stronger feature extraction, and uses cross-entropy error functions, hence can be applied for multiple object tracking. Like SSD, YOLOv3[1] also performs faster object detection thus enabling real-time inference using GPU. The detection precision of YOLOv3[1] resembles Faster R-CNN. RCNN based models use a region proposed method which makes the detection process tedious as it uses a selective search algorithm for the elimination of bounding boxes with low confidence values and selects the best one. Whereas in YOLO, the information in image pixels is directly used to predict bounding boxes and the probability of being a particular object class.

I. LITERATURE REVIEW

Sr .No	Title	Author & Year	Methods	Research Gap
1	Anomalous Behaviours Detection for Underwater Fish Using AI Techniques"	[1]Jung-Hua Wang, Shi-Kai Lee, Yi-Chung Lai 2020	Fish behavior Deep learning Spatiotemporal information CNN	A simple convolutional neural network is constructed to quickly identify the behavior state of fish shoals. Some pressure environments are made in a laboratory, the behavior states of fish shoals are recorded, and the sample database of shoals' behavior state is established.
2	Underwater Fish Detection	Aditya Agarwal, Gaurav Rawal, Tushar Malani, Prof.Manonmani S,2020	Mask RCNN CV Image processing ResNet	They are utilizing convolutional neural systems to order the fishes. Following the preprocessing step, the Faster Regional Convolutional Neural Network design is utilized to remove the highlights of pictures.
3	Detection, Localization, and Classification of Fish and Fish Species in Poor Conditions using CNN	Jesper Haahr Christen, Roberto Galeazzi,2019	Object detection Fish detection Deep learning CNN	A Deep CNN OFDNet is introduced. The task of fish detection, localization, and classification is carried out using visual data obtained from cameras
4	Underwater-Drone with Panoramic Camera for Automatic Fish Recognition Based on Deep Learning	Lin Meng, Takuma Hirayama, Shigeru Oyanagi (2018)	Raspberry Pi compute module Deep learning CNN	This paper presented an underwater drone equipped with fisheye lenses and with the function of a 360-degree panoramic camera for taking panoramic images by using an image generation algorithm
5	Underwater Image Processing using Hybrid Techniques"2019 1st International Conference on Innovations in Information and Communication Technology (ICIICT).	Krishnapriya T S, Nissan Kunju	The hybridized technique of white balancing using gray world algorithms and discrete wavelet-based fusion	Provide better results in the compensation of bluish and greenish color cast.
6	Fish Detection and Tracking in Pisciculture Environment using Deep Instance Segmentation	C.S.Arvind, R.Prajwal, Prithvi Narayana Bhat, A.Sreedevi, K.N.	Pisciculture Mask-RCNN RP N/W FP N/W UAV	In this research paper, a deep instance segmentation algorithm called Mask R-CNN along with the GOTURN tracking algorithm is employed for real-time fish detection and tracking.

		Prabhudeva,2019		
7	A Fish Classification on Images using Transfer Learning and Matlab	Suryadiputra Liawatimena, Yaya Heryadi, Lukas,2018.	Image classify Machine Marine classify	This paper proposed a fish classification on fish images using transfer learning and Matlab as the first stage of tackling the problem FishNet is a modification from AlexNet to classify 3 types of fish.
8	Real-time classification of fish in underwater sonar videos	Ludwig Bothmann, Michael Windmann, GoeranKauermann,2016.	Sonar Videos Video tracking	This paper focuses on automatic fish classification based on sonar videos. After preprocessing the videos, it shows how can we Krishnapriya T S, Nissan Kunju classify fishes based on shape and movement.

II. DISCUSSION

[1] Jung-Hua Wang, Shi-Kai Lee, Yi-Chung Lai, "Anomalous Behavior Detection for Underwater Fish Using AI Techniques", IEEE Access, vol. 8, pp 224372-224382, Dec 2020.

Advantages

The advantage of deep learning in aquaculture is that deep learning models perform better than do the traditional styles.

In contrast, a DL algorithm can automatically learn and pull the essential features from images in a sample dataset.

It has strong stability under challenging conditions such as low light and high noise, and they perform better than the traditional artificial feature extraction methods.

A deep learning model can be used not only to monitor unknown objects or anomalies but also to predict parameters such as water quality.

Deep learning models require more computing power and longer training times

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Disadvantages

The ability of deep learning models to constantly learn and improve is still very weak

Deep learning is the large amount of data required during training.

[2] Krishnapriya T S, Nissan Kunju, "Underwater Image Processing using Hybrid Techniques"2019 1st International Conference on Innovations in Information and Communication Technology (ICIICT).

Advantages

It contains low uniqueness and dark regions

It's the most effective fashion for grayscale images.

It begins in the world satellite and upstanding mapping.

It's used to acclimate the image intensity fluently

It's used to reduce the noise from an image fluently

Disadvantages

Won't work effectively.

But the color images in it are a difficult task to work on.

It is a much-complicated process than the other described site.

Not able to find the original image.

While the dispensable image is in low light.

[3] Lin Meng, Takuma Hirayama, Shigeru Oyanagi," Underwater-Drone with Panoramic Camera for Automatic Fish Recognition Based on Deep Learning"- at IEEE Access vol.6, pp 17880-17886 Mar 2018.

Advantages

Automatic feature extraction from raw data, reducing effort in feature engineering.

The high accuracy and fast processing speed are both conducive to the extensive use of underwater robots

A good generalization is another advantage of deep learning technology

Deep learning approaches have nice robustness for the variations of occlusion, lighting, resolution, pose, and background.

Disadvantages

Raised here on the growing number of parameters the reduction of the coverage speed was not ignored.

Ideas are not evolved and it is not clearly understood because of it, many challenges in identifying them are still found

The deep learning process of marine life is time-based and it also includes both the theoretical and practical importance in the marine engineering community

IV. CONCLUSION

This study is proposed to compare different YOLOv3 models by centering on the architecture configurations for object discovery similar to the original YOLOv3. Significant confirmation that YOLOv3 is applicable to be executed to determine underwater objects which specific surroundings such as haze/ cloudy and low light conditions.

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