**Paper 1 :-**

**A modified YOLOv3 model for fish detection based on MobileNetv1 as backbone Kewei Caia,b,c , Xinying Miaoa,b,c , Wei Wanga,b,c , Hongshuai Panga,b,c, \*, Ying Liua,b,c , Jinyan Songa,b,c**

**Conclusion :-**

The paper proposes a new approach for fish detection and counting in real breeding farms by combining YOLOv3 with MobileNetv1. Existing fish counting methods are manual, time-consuming, and error-prone. RGB imaging is a preferred solution due to its ease of operation, lightweight system, and no harm to fish. Lidar and sonar-based techniques have high accuracy but are bulky and expensive. The feature maps of MobileNet are optimized based on their receptive fields to improve fish detection. The optimized feature map selection based on receptive field analysis and the use of a smaller dataset for pre-training the backbone network results in high accuracy fish detection. A dataset of fish images from breeding farms is used to evaluate the proposed method, which achieves high accuracy. Additionally, a smaller dataset of 16 fish species is used for backbone network pretraining instead of ImageNet, which further improves detection. The proposed method can be used for multiple classes of fish detection and determining fish length and weight. Future work involves implementing the algorithm online and expanding its applicability.

**Paper 2 title :-**

**Underwater Image Processing Method for Fish Localization and Detection in Submarine Environment Mohcine Boudhane, Benayad Nsiri**

**Conclusion :-**

In this paper, the authors present a novel method for fish localization and detection in underwater images based on a Poisson-Gauss theory. Object detection is an important process in computer vision, especially in marine environments where cameras are widely used due to the limitations of human access. The proposed approach includes denoising and image restoration, region splitting using mean shift algorithm, and statistical estimation for object combination and detection. The proposed approach outperforms existing state-of-the-art methods under various underwater conditions. As underwater visibility is limited, image processing and computer vision algorithms have become increasingly important for monitoring and tracking marine environments. The proposed method can be adapted to different noise models, making it versatile and practical for various underwater applications. The approach can be used without prior knowledge of the environment and does not require user interaction. In conclusion, the proposed approach has the potential to be applied in various applications such as marine conservation, fisheries management, and underwater exploration. The proposed method has potential applications in underwater fish detection and other computer vision tasks.

**Paper title 3 :-**

**Accelerating Fish Detection and Recognition by Sharing CNNs with Objectness Learning Xiu Li, Min Shang, Jing Hao, Zhixiong Yang Department of Automation Graduate School at Shenzhen, Tsinghua University Shen Zhen, 518055 China**

**Conclusion :-**

Li et al.2016, this paper presents an approach for Automatic object detection and recognition is in great demand for underwater imagery analysis and marine environment surveillance due to the increasing volume of underwater visual data. The paper presents an approach for accelerating underwater object detection and recognition using a region proposal network based on Faster R-CNN. The proposed system achieved a real-time frame rate of 9.8 ftps and 15.1% higher Mean Average Precision (mAP) than the Deformable Parts Model (DPM) baseline on a fish dataset with 12 classes. The use of region proposal networks generated high-quality proposals, improving segmentation performance and fish detection precision. Sharing convolutional features reduces the cost of proposal generation in the fish detection and recognition process. However, video analysis presents a more pressing problem for deep-sea observation systems, which requires further research. The proposed system demonstrates the potential of convolutional networks in underwater image processing.

**Paper title 4 :-**

**YOLO fsh detection with Euclidean tracking in fish farms Youssef Wageeh1  · Hussam El‑Din Mohamed1  · Ali Fadl1  · Omar Anas1  · Noha ElMasry1  · Ayman Nabil1  · Ayman Atia2,**

**Conclusion :-**

Wageeh et al. 2020, this paper proposed method aims to address the challenges of manually monitoring fish farms, which is time-consuming and costly. This paper presents a method for improving fish detection and tracking in fish farms by combining an image enhancement algorithm based on retinex with an object detection algorithm. The object detection algorithm used in this study is YOLO. The experiment setup involved a temporary fish tank and a web camera. A dataset of 2000 images was created for the YOLO model to detect fish. Two experiments were conducted. the experiment setup and dataset used for two experiments were presented. The fish tank used for testing was built in a controlled environment, and a web camera was placed above it to capture videos and images. A dataset of 2000 images of golden fish was collected for YOLO model detection. The first experiment aimed to enhance unclear water images and determine the best camera location for accurate detection. The results showed that there was no significant change in underwater image detection before and after enhancement, and the camera was settled above the pond. The enhanced images improved detection accuracy, confirming the usefulness of the enhancement algorithm. Overall, the experiment setup and dataset were effective in testing and validating the algorithm's performance in fish detection. two methods for drawing fish trajectories and tracking their movements were compared. The first method combined YOLO and optical flow, while the second method utilized a trajectories extraction method. The trajectories extraction method was found to be more accurate than the optical flow method, producing clearer trajectory lines with fewer scattered and wrongly drawn lines. The results showed that the enhanced images had better accuracy in detecting fish. The trajectory extraction method was found to be better than the optical flow method in accurately tracking fish movements. This method can improve fish farm management and reduce costs. Clustering could be used in the future to detect and cluster different fish behaviors. Overall, this method has the potential to improve fish farming efficiency and reduce costs associated with manual monitoring.

**Paper title 5 :- Underwater Image Processing and Object Detection Based on Deep CNN Method Fenglei Han, Jingzheng Yao , Haitao Zhu, and Chunhui Wang**

**Conclusion :-**

Han et al. 2020,this paper proposes a method for enhancing underwater vision and detecting marine organisms using a deep CNN. This paper proposes a combination of max-RGB and shades of gray methods for enhancing underwater vision, followed by a CNN method to solve weakly illuminated problems and perform detection and classification of marine organisms. Two improved schemes were proposed to modify the deep CNN structure and scheme 2 was found to be better in detecting underwater objects with a detection speed of about 50 FPS and mAP of about 90%. The proposed method was tested on an underwater robot and was found to be accurate and fast enough to assist with underwater working operations. The effectiveness and capability of the proposed method were verified by qualitative and quantitative evaluations, although some objects were missed. Further improvements could be made by using a more complicated algorithm to reconstruct the network. Overall, this method is suitable for detecting objects in underwater environments and outperforms typical methods for this dataset.

**Paper title 6 :-**

**A DEEP CNN METHOD FOR UNDERWATER IMAGE ENHANCEMENT Yang Wang Jing Zhang Yang Cao Zengfu Wang**

**Conclusion :-**

Wang et al. 2017, this paper proposes an end-to-end CNN-based framework called UIE-Net for underwater image enhancement. which includes two subnetworks: CC-Net and HR-Net. CC-Net is used to correct color distortion and HR-Net enhances the contrast of underwater images. The framework is trained with two tasks, color correction and haze removal, and utilizes a pixel disrupting strategy to improve convergent speed and accuracy. The UIE-Net is evaluated on benchmark underwater images for cross-scenes and achieves superior performance over existing methods in terms of entropy and PCQI. The proposed method is robust and effective in enhancing contrast and preserving details. The adaptability of the UIE-Net on cross-scenes is demonstrated through its application on underwater video frames. The framework contains two subnetworks, CC-Net and HR-Net, which output color absorption coefficients and transmission maps for enhancing underwater images. The paper proposes future work to improve the efficiency of the approach by using a fully-CNN implementation.

**Paper title 7 ;-**

**Marine Organism Detection and Classification from Underwater Vision Based on the Deep CNN Method Fenglei Han , Jingzheng Yao , Haitao Zhu, and Chunhui Wang**

**Conclusion :-**

Linfeng et al. 2020, this paper presents a method called GLHDF to enhance the quality of real-world and low-light underwater images. GLHDF involves four stages, namely, Pixel intensity center regionalization, Global Equalization of Histogram, Local Equalization of Histogram, and Dual-image multi-scale fusion. The method aims to remove noise, correct color, improve contrast, and enhance the overall image quality of underwater images. The first step involves using a multi-scale Gaussian filter to smooth the image, followed by a global equalization of histogram strategy to correct color in the second step. The third step uses a dual-interval histogram based on the average of peak and mean values to improve the contrast of

Han et al. 2020, this research proposes a deep convolutional neural network for detecting and classifying marine organisms in underwater environments. The development of underwater robots for collecting marine products has become a feasible solution to the dangers faced by humans in seabed fishing. One key technique is the detection and location of the main target from underwater vision. This paper proposes a deep convolutional neural network (CNN) based on faster RCNN and the modified method of hyper net for target recognition in underwater vision. The dataset was prepared using an underwater video obtained from a sea cucumber fishing ROV. The dataset used for training and testing is obtained from ROVs and the Underwater Robot Picking Contest. The method proposed in this paper shows good performance of recall and object detection accuracy, with a mean average precision (mAP) of over 90% when the IoU is set to 0.7. The detection runs at a speed of 17 fps on a GPU, which is suitable for real-time processing. The detection time is 58 ms on a GTX 1080ti GPU, which is suitable for real-time processing. This approach has the potential to reduce the dangers associated with seabed fishing by replacing human divers with underwater robots for marine product collection. The modified framework is also applicable in the Underwater Robot Picking Contest. The proposed method is feasible to be applied in underwater vision detection and can be used in real-time for marine organism detection. Further development and testing could lead to a safer and more efficient fishing industry.