ABSTRACT

Indonesia is an archipelagic country with abundant marine resources. Aruna is one of the technology companies operating in the maritime and fisheries sector and is appointed to manage Indonesia's marine resources. Among all marine resources, lobsters are one of Indonesia's valuable assets compared to other countries. However, in handling lobsters, Aruna still faces challenges in terms of supervision. Until now, the process of checking the number of lobsters by Aruna's field team is still done manually, including diving and counting them directly. This method is highly ineffective and inefficient because counting lobsters one by one through diving requires more time and resources, and the lobster count is not continuous at all times.

This Final Project proposes the implementation of Smart Camera Lobster (SCL) in the form of object detection and object counting, which can count the number of lobsters in real-time and continuously using underwater cameras. The methods used for image enhancement employ deep learning and image formation models to improve clarity, sharpen images, and enhance mAP0.5-0.95 in detection for object detection, and object counting is done using YOLOv7, reducing the number of parameters and adding average precision. For object tracking, StrongSORT is used, which excels in feature matching and utilizes Kalman Filter to handle occlusion and estimate the position of the target object even when partially obscured.

The performance of SCL is highly satisfactory through a computer device with Nvidia GTX 1650 TI GPU for image enhancement and YOLOv7. The best-trained model achieves an mAP0.5 of 0.942, mAP0.5-0.95 of 0.461, with an average FPS of 5 frames per second, and this model is used in the SCL system. This implementation will be highly beneficial for Aruna as a user partner to determine the number of lobsters automatically, thus saving time and costs.

Keywords: SCL, Aruna, Lobster, Image Enhancement, YOLOv7.