I. Introduction

The research entitled “Development of an Image-based Size Sorter for Crayfish Growth Management Using YOLOv10-N” primarily focuses on developing an image detecting AI agent that facilitates the measurement of crayfish growth within a controlled environment such as crayfish tanks.

According to Bontia and Daniel, they found the crayfish industry to be a highly lucrative investment for breeding and consumption business. As such, it is only natural that its quality goes under rigorous and attentive checking to ensure the best product in every batch exported. However, the problem is that in Zamboanga City, most crayfish business owners have to manually measure crayfish length by taking the crayfish and a ruler. This involves personally handling each crayfish which is not only a lengthy process, but also poses a threat to crayfish as excessive handling puts stress on the sea creature.

The researchers also acknowledge the potential of using sorting machines that serve the same purpose. While this is true, the researchers argued that the crayfish run through the sorting machines encounter the same stress-inducing consequences as manual measurement because machines are hard and made of steel, making the surface uncomfortable for crayfish as they pass by the queue. Additionally, crayfishes are generally unloaded into conveyor belts by dropping them from a certain height, concluding to once more discarding them into multiple baskets, which in turn stacks crayfishes on top of each other.

To solve this problem, the researchers opted to development an AI image-based sorting algorithm using YOLOv10-N to avoid harming the crayfish and improve sorting procedures, aiding the business’ productivity and efficiency

II. Research Background

One of the authors owns a crayfish farm and container which aided in the data gathering phase. Top-down images were taken, with environmental factors such as water clarity, brightness, image resolution, and crayfish density were set up to capture flawless images which would then be fed into YOLOv10-N. The algorithm used, YOLOv10-N is a lightweight deep learning object detection

model designed to be operable for low-end computing platforms such as the NVIDIA Jetson 4GB. The authors preferred these settings to allow compatibility with low-end devices in future applications.

Following the data gathering, the authors pretrained the algorithm using hundreds and thousands of preset images of crayfish from CVAT.ai Using a reference scale, the authors measured pixel dimensions and converted them into real-world distances. The authors then reviewed existing studies on aquaculture automation and deep learning object detection models like YOLO (You Only Look Once). As previously mentioned, the authors acknowledge that existing technology for general sorting exists but one specifically for crayfish has yet to be implemented.

The authors demonstrated the results through evaluation matrices such as precision and call, resulting in an overwhelmingly positive result which indicated that the model was strongly learning as more information was fed in. The model also showcased its strength by epoch diversity, finding an increase from each set epoch.

III. Challenges

The authors stated that their major challenges encountered were the quality of images which could prevent accurate and precise recognition. Because the initial testing and training were gained for a controlled environment, practical applications to multiple environments could prove to be difficult because water quality could drastically modify the system's behavior such as how much the AI can see to measure the total length.

IV. Reflection

Leveraging image-based object detection is indeed a viable option for sorting algorithms, especially for crayfish in this case. The potential versatility and compatibility offered by the program ensures that any crayfish enthusiasts can accurately measure and count the crayfish without putting heavy stress on the aquatic creature. Allowing low-end devices to be compatible also adds more to its effectiveness because it does not force the users to lock into a specific phone model or have an outstanding camera to capture crayfish images.

However, like the authors mentioned. The shortage of environments in which the crayfish images were taken from makes it challenging. The authors did not mention how much of the training dataset they took were imperfect conditions. Imperfect conditions would be beneficial in understanding how powerful or how scalable the system can be, granted that most crayfish containers would have clear water, it is still a good practice to test on imperfect conditions to accommodate for all scenarios for users.