ABSTRACT

The quality of fish catches is a crucial aspect in the fisheries industry, particularly in ensuring the standard of products distributed to consumers. Fish freshness level is a primary indicator in determining both the edibility and market value of fishery products. However, the process of assessing fish freshness is still largely carried out manually by human inspectors through visual observation, which tends to be subjective, time-consuming, and prone to inconsistency. Based on this issue, this research focuses on developing a system capable of identifying the freshness level of skipjack tuna automatically and objectively using modern technological approaches.

As a solution to the aforementioned problem, this study proposes a system based on computer vision and deep learning, utilizing the YOLOv11 algorithm, which is implemented in a mobile Android application called FishQ. The application is integrated with cloud computing service s, enabling real-time *image* classification. The dataset used is divided into two categories: frozen and non-frozen skipjack tuna, obtained from field documentation, industry partners, and online sources. The dataset underwent annotation and augmentation processes. The application was developed using the Flutter framework, with a user interface designed to be simple and accessible for field operators and quality control personnel.

The test results show that the trained YOLOv11 model achieved a mAP@0.5 of 0.956 for frozen fish and 0.959 for non-frozen fish, as well as a mAP@0.5:0.95 of 0.933 and 0.924, respectively. Application testing using the black-box method and System Usability Scale (SUS) showed that the system had an inference time of less than 1 second and obtained a SUS score of 81.4, which falls into the “Usable” category. Based on these results, it can be concluded that the developed fish freshness detection system successfully meets the criteria of accuracy, speed, and user-friendliness, making it feasible for implementation in quality control processes within the fisheries industry.

Keywords: skipjack tuna, freshness detection, deep learning, YOLOv11, mobile application