

ABSTRAK

WIDYANTI EKA FAZRI PURBA. Cephalopoda seperti cumi-cumi (*Loligo* sp.), sotong (*Sepia* sp.), dan gurita (*Octopus* sp.) merupakan komoditas ekspor perikanan Indonesia dengan nilai tinggi, namun identifikasi jenisnya di lapangan masih dilakukan secara manual sehingga rentan terhadap kesalahan akibat kemiripan morfologi antar spesies, khususnya antara *Loligo* sp. dan *Sepia* sp. Penelitian ini bertujuan untuk membangun sistem klasifikasi jenis Cephalopoda secara *real-time* menggunakan metode *Single Shot Multibox Detector* (SSD) dengan *backbone* MobileNetV2. Dataset yang digunakan berjumlah 1.500 citra yang dikumpulkan secara langsung di Pasar Bintan Center, Tanjungpinang, dengan pembagian merata pada tiga kelas dan rasio data latih, validasi, dan uji sebesar 80:10:10. Proses pelatihan dilakukan sebanyak 30.000 iterasi menggunakan Google Colab dengan GPU Tesla T4, menghasilkan nilai *total loss* akhir sebesar 0,0589. Hasil pengujian pada 150 citra data uji menunjukkan performa model yang tinggi, dengan rata-rata *precision* sebesar 96,28%, *recall* 98,71%, dan *F1-score* 97,45%. Kelas *Loligo* sp. memperoleh *F1-score* tertinggi sebesar 99,03%, diikuti *Sepia* sp. sebesar 97,09% dan *Octopus* sp. sebesar 96,23%. Analisis lebih lanjut menunjukkan bahwa kesalahan deteksi umumnya disebabkan oleh gangguan lingkungan pasar, seperti pantulan cahaya dan penumpukan spesimen, bukan karena kegagalan model dalam membedakan karakteristik morfologi spesies. Model yang telah dilatih kemudian dikonversi ke format TensorFlow Lite dan diimplementasikan pada aplikasi mobile berbasis Flutter, sehingga dapat melakukan deteksi dan klasifikasi Cephalopoda secara langsung melalui kamera perangkat. Hasil penelitian ini menunjukkan bahwa metode SSD MobileNetV2 dapat menjadi solusi identifikasi Cephalopoda yang objektif, akurat, dan aplikatif untuk mendukung pencatatan hasil tangkapan di lapangan.

Kata kunci: Cephalopoda, klasifikasi citra, *deep learning*, *Single Shot Multibox Detector*, MobileNetV2, deteksi objek *real-time*

ABSTRACT

WIDYANTI EKA FAZRI PURBA. Cephalopods such as squid (*Loligo* sp.), cuttlefish (*Sepia* sp.), and octopus (*Octopus* sp.) are high-value fishery export commodities in Indonesia, yet field identification of these species is still largely performed manually, making it prone to error due to morphological similarities, particularly between *Loligo* sp. and *Sepia* sp. This study aims to develop a real-time Cephalopod classification system using the Single Shot Multibox Detector (SSD) method with a MobileNetV2 backbone. The dataset consists of 1,500 images collected directly at Pasar Bintan Center, Tanjungpinang, evenly distributed across three classes, with an 80:10:10 split for training, validation, and testing data. The model was trained for 30,000 iterations on Google Colab using a Tesla T4 GPU, resulting in a final total loss of 0.0589. Evaluation on 150 test images showed strong performance, with an average precision of 96.28%, recall of 98.71%, and F1-score of 97.45%. The *Loligo* sp. class achieved the highest F1-score at 99.03%, followed by *Sepia* sp. at 97.09% and *Octopus* sp. at 96.23%. Further analysis revealed that most detection errors stemmed from environmental noise in the market setting, such as light reflections and overlapping specimens, rather than from the model's inability to distinguish morphological features. The trained model was converted to TensorFlow Lite format and deployed in a Flutter-based mobile application, enabling real-time Cephalopod detection and classification through a device camera. These results indicate that the SSD MobileNetV2 method offers an objective, accurate, and practical solution for supporting field-based catch identification.

Keywords: Cephalopod, image classification, deep learning, Single Shot Multibox Detector, MobileNetV2, real-time object detection