

ABSTRAK

Implementasi Metode *Deep Learning* Untuk Menghitung Benih Ikan Gabus Pada Sistem *Fish Counter*

(2026 : xiii + 69 Halaman + 29 Gambar + 15 Tabel + Daftar Pustaka + Lampiran)

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Penghitungan benih ikan yang masih dilakukan secara manual membutuhkan waktu yang lama dan berpotensi menimbulkan kesalahan pencatatan, terutama pada jumlah benih yang banyak. Penelitian ini bertujuan mengimplementasikan metode *deep learning* menggunakan algoritma YOLOv11 pada sistem Fish Counter untuk mendeteksi, mengklasifikasikan, dan menghitung benih ikan hidup dan mati secara otomatis. Dataset yang digunakan terdiri dari 438 citra benih ikan gabus yang dibagi menjadi data pelatihan, validasi, dan pengujian. Model dilatih menggunakan platform Google Colab dan diimplementasikan pada Raspberry Pi 4 yang terhubung dengan webcam sebagai media akuisisi citra. Evaluasi model dilakukan menggunakan metrik *precision*, *recall*, *F1-score*, dan *mean Average Precision* (mAP), sedangkan kinerja sistem penghitungan dievaluasi berdasarkan persentase *error*. Hasil penelitian menunjukkan bahwa model memperoleh *precision* sebesar 100%, *recall* sebesar 97%, *F1-score* sebesar 93%, dan mAP@0.5 sebesar 95%. Pengujian sistem sebanyak lima kali menghasilkan rata-rata persentase *error* sebesar 6,12% atau setara dengan akurasi penghitungan sebesar 93,88%. Hasil tersebut menunjukkan bahwa algoritma YOLOv11 mampu mendeteksi, mengklasifikasikan, dan menghitung benih ikan secara otomatis dengan tingkat akurasi yang baik sehingga layak diterapkan pada sistem Fish Counter.

Kata kunci: *Deep Learning*, YOLOv11, *Fish Counter*, Deteksi Objek, Benih Ikan.

ABSTRACT

Implementation of a Deep Learning Method for Counting Snakehead Fish Fry in a Fish Counter System

(2026 : xiii + 69 Pages + 29 Pictures + 15 Tables + List of References + Attachment)

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Manual fish seed counting is time-consuming and prone to recording errors, particularly when handling large quantities of fish. This study aims to implement a deep learning approach using the YOLOv11 algorithm in a Fish Counter system to automatically detect, classify, and count live and dead fish seeds. The dataset consisted of 438 images of snakehead fish seeds, which were divided into training, validation, and testing sets. The model was trained using Google Colab and deployed on a Raspberry Pi 4 connected to a webcam for image acquisition. Model performance was evaluated using precision, recall, F1-score, and mean Average Precision (mAP), while the counting system was assessed based on the percentage error. The experimental results achieved 100% precision, 97% recall, 93% F1-score, and 95% mAP@0.5. Furthermore, five testing sessions produced an average counting error of 6.12%, corresponding to a counting accuracy of 93.88%. These results demonstrate that the proposed YOLOv11-based Fish Counter is capable of automatically detecting, classifying, and counting fish seeds with high accuracy, making it suitable for practical implementation in aquaculture applications.

Keywords: Deep Learning, YOLOv11, Fish Counter, Object Detection, Fish Seed.