ABSTRAK

PENERAPAN *DEEP LEARNING* UNTUK KLASIFIKASI DAN DETEKSI IKAN DI SISTEM AKUAPONIK

(2025: 57 Halaman + 32 Gambar + 6 Tabel + Daftar Pustaka + Lampiran)

GITA AYU JULIANTIKA
062230320557
JURUSAN TEKNIK ELEKTRO
PROGRAM STUDI D-III TEKNIK ELEKTRONIKA
POLITEKNIK NEGERI SRIWIJAYA

Hasil implementasi model *Transformer* dalam klasifikasi dan deteksi lima jenis ikan mas koki, komet*, manfish*, sepat biru, dan sepat kuning pada dua lingkungan berbeda: akuarium (terkontrol) dan kolam di sistem akuaponik (nyata). *Dataset* dikumpulkan menggunakan kamera *smartphone* dan CCTV, kemudian dilabeli dengan *Roboflow* dan digunakan untuk melatih model di Google Colab. Pada lingkungan akuarium, model mencapai *precision* sebesar 82%, *recall* 81%, *F1-score* 81%, dan mAP 61%. Sedangkan pada lingkungan sistem akuaponik, model menunjukkan performa lebih baik dengan *precision* 81%, *recall* 83%, *F1-score* 82%, dan mAP 73%. Grafik *training loss* dan *validation loss* menunjukkan penurunan stabil selama pelatihan, mengindikasikan proses pembelajaran berjalan efektif tanpa *overfitting*. Hasil ini menunjukkan bahwa model *Transformer* dapat mengenali ikan secara akurat meskipun dalam kondisi visual yang kompleks, serta memiliki potensi besar untuk digunakan dalam sistem pemantauan otomatis berbasis akuaponik.

Kata kunci: *Deep Learning, Transformer,* Klasifikasi Ikan, Deteksi Ikan, Akuaponik.

ABSTRACT

IMPLEMENTATION OF DEEP LEARNING FOR FISH CLASSIFICATION AND DETECTION IN AQUAPONIC SYSTEMS

(2025: 57 Pages + 32 Figures + 6 Tables + References + Appendices)

GITA AYU JULIANTIKA
062230320557

This study presents the implementation of the Transformer model for the classification and detection of five fish species—goldfish, comet, angelfish, blue gourami, and golden gourami—in two different environments: an aquarium (controlled) and a tarp pond in an aquaponic system (real-world). Datasets were collected using a smartphone camera and CCTV, labeled via Roboflow, and used to train the model on Google Colab. In the aquarium environment, the model achieved a precision of 82%, recall of 81%, F1-score of 81%, and a mean Average Precision (mAP) of 61%. In the aquaponic system environment, the model demonstrated improved performance with a precision of 81%, recall of 83%, F1-score of 82%, and mAP of 73%. The training and validation loss graphs showed a stable downward trend throughout the training process, indicating effective learning without overfitting. These results demonstrate that the Transformer model can accurately recognize fish under visually complex conditions and has great potential for use in automated fish monitoring systems within aquaponic environments.

Keywords*: Deep Learning, Transformer, Fish Classification, Fish Detection, Aquaponics.*