

**UNIVERSITI TEKNOLOGI MARA
CAWANGAN PULAU PINANG**

**OBJECT DETECTION AND CLASSIFICATION IN
MARINE ECOSYSTEM USING DEEP LEARNING
NEURAL NETWORK**

MUHAMMAD AFIQ BIN AZMAN

**BACHELOR OF ENGINEERING (HONS)
ELECTRICAL AND ELECTRONIC
ENGINEERING**

February 2025

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Muhammad Afiq Bin Azman
Student I.D. No. : 202278
Programme : Bachelor of Engineering (Hons.) Electrical and
Electronic Engineering (CEEE200)
Faculty : Electrical Engineering Studies
Thesis : Object Detection and Classification in Marine
Ecosystem Using Deep Learning Neural Network
Signature of Student :
Date : February 2025

ABSTRACT

The marine ecosystem is vital for maintaining ecological balance and biodiversity, serving as a habitat for countless species and supporting human livelihoods. This study explores the application of artificial intelligence (AI) and machine learning (ML) for the detection and classification of marine organisms using YOLOv8 and ResNet50 models. The primary objective is to develop and implement artificial intelligence (AI) and machine learning (ML) algorithms tailored to effectively identify within marine ecosystems. A comparative performance evaluation revealed that while YOLOv8 excels in object detection with high precision (0.85) and recall (0.83) due to its multi-scale feature extraction capabilities, ResNet50 demonstrated higher overall accuracy (77%) in classification tasks. YOLOv8 outperforms in handling multiple objects in complex backgrounds, whereas ResNet50 struggles with multiple-class detection in single images, attributed to its architecture designed primarily for single-object classification. These findings highlight the complementary strengths of both models in advancing marine ecosystem analysis.

ACKNOWLEDGEMENT

First and foremost, all the praises to the Almighty for the things that had been granted to me in my life. I would like to first thank both of my parents from the bottom of my heart for their unending support in whatever I am doing. Plus, my siblings and family always support me whether directly or indirectly in my journey and work.

Furthermore, many thanks to my supervisor Dr. Ahmad Puad Bin Ismail giving advice regarding the final year project and for continuing to push me to do my best in it. I also would like to express our sincere gratitude to everyone who contributed to the successful completion of this research on YOLOv8 and ResNet50 in object detection and image classification.

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