ABSTRAK

Nama : Muthiah Kamilah Fatih (140 2022 049);
Rizky Firmansyah Sipahutar (140 2022 058);
Program Studi : Sarjana Teknik Informatika
Judul : CBAM-Integrated Detection Pipeline with Weighted Boxes Fusion for High-Sensitivity Screening

Kanker serviks merupakan salah satu penyebab utama kematian perempuan di seluruh dunia, terutama di negara berkembang yang menghadapi keterbatasan dalam deteksi dini. Sebagian besar seluruhnya disebabkan oleh infeksi *human papillomavirus* (HPV), khususnya jenis HPV berisiko tinggi. Namun, keterbatasan kualitas dan kuantitas data menjadi tantangan utama dalam pengembangan model deteksi berbasis kecerdasan buatan. Proyek ini bertujuan untuk meningkatkan performa dan generalisasi model deteksi lesi serviks dengan menambahkan modul pada arsitektur. Strategi penambahan modul pada arsitektur model YOLOv5, YOLOv8, dan YOLOv10 dengan menggunakan modul *Convolutional Block Attention Module* (CBAM) dan *Weighted Boxes Fusion* (WBF). Model dikembangkan untuk klasifikasi biner (normal dan abnormal), dengan evaluasi dilakukan menggunakan data train, validasi, dan test, serta metrik *Precision*, *Recall*, mAP@50, dan mAP@50–95. Hasil menunjukkan bahwa integrasi CBAM dan WBF secara signifikan meningkatkan kemampuan ekstraksi fitur dan optimalisasi prediksi *bounding box* dibandingkan model standar. Peningkatan performa yang terukur terlihat pada akurasi deteksi objek kecil dan stabilitas model pada data terbatas, dengan tetap mempertahankan efisiensi waktu inferensi yang kompetitif. Dengan stabilitas kinerja yang dihasilkan, model *Artificial Intelligence* (AI) yang diusulkan ini berpotensi besar untuk diimplementasikan sebagai sistem pendukung keputusan klinis dalam upaya deteksi dini kanker serviks.

Kata kunci: Kanker Serviks, deteksi objek, AI.

ABSTRACT

Name : Muthiah Kamilah Fatih (140 2022 049);
Rizky Firmansyah Sipahutar (140 2022 058)

Study Program : *Bachelor of Informatics Engineering*

Title : *CBAM-Integrated Detection Pipeline with Weighted Boxes Fusion for High-Sensitivity Screening*

Cervical cancer is one of the leading causes of death among women worldwide, especially in developing countries that face limitations in early detection. Most cases are caused by human papillomavirus (HPV) infection, particularly high-risk types of HPV. However, limitations in the quality and quantity of data pose a major challenge in the development of artificial intelligence-based detection models. This project aims to improve the performance and generalization of cervical lesion detection models by adding modules to the architecture. The strategy is to add modules to the YOLOv5, YOLOv8, and YOLOv10 model architectures using the Convolutional Block Attention Module (CBAM) and Weighted Boxes Fusion (WBF) modules. The model was developed for binary classification (normal and abnormal), with evaluation performed using train, validation, and test data, as well as Precision, Recall, mAP@50, and mAP@50–95 metrics. The results show that the integration of CBAM and WBF significantly improves feature extraction and bounding box prediction optimization compared to standard models. Measurable performance improvements were seen in the accuracy of small object detection and model stability on limited data, while maintaining competitive inference time efficiency. With the resulting performance stability, this proposed Artificial Intelligence (AI) model has great potential to be implemented as a clinical decision support system in early detection of cervical cancer.

Keywords: *Cervical cancer, object detection, artificial intelligence.*