

Abstract

Myocardial infarction remains to be a leading cause of death worldwide, making an early and accurate detection essential for an early treatment. . Electrocardiography (ECG) is commonly used to identify myocardial ischemia and infarction through ECG abnormalities which would include ST-elevation and ST-depression, as well as T-wave inversion and T-wave peak. However, interpretation often depends on the expertise of the physician and may be subject to variability. This study aimed to develop and evaluate a vision-based artificial intelligence system for an ECG abnormality detection application using the You Only Look Once (YOLO). ECG images are obtained from the European ST-T Database and were annotated using CVAT. Six YOLO model variants, namely YOLOv11n, YOLOv11m, YOLOv11l, YOLOv26n, YOLOv26m, and YOLOv26l were then trained and compared using recall, mean Average Precision at IoU 0.50 (mAP50), and mean Average Precision at IoU 0.50–0.95 (mAP50-95). Among the models, YOLOv26m was found to have the best performance, achieving the highest recall (0.990) and mAP50 (0.992), and an mAP50-95 score of 0.722. The model also demonstrated acceptable class-level performance, with average precision values exceeding 0.99 across all abnormality classes. Furthermore, YOLOv26m was successfully integrated into a Streamlit-based application for image- and video-based ECG abnormality detection.

Keywords: Electrocardiogram (ECG), Myocardial Infarction, YOLO, Object Detection, Artificial Intelligence