ABSTRACT

Tuberculosis (TB) is one of the major infectious diseases that is a global health problem, including in Indonesia. Early detection is very important to prevent the spread of TB disease, but the detection process is conventional. Therefore, artificial intelligence-based technology is needed to help speed up and simplify the process of TB disease detection through lung x-ray images. This study aims to evaluate an artificial intelligence model based on lung x-ray image processing using the YOLOv8 method to detect TB, using x-ray image datasets that have been processed and annotated, and measure the performance of the system in detecting TB in lung x-ray images.

The method used in this study includes several stages, namely x-ray image dataset collection, preprocessing, using CLAHE for lung spot detection, integrating the model into the application, and evaluating system performance. During the training process, several important parameters are tested, such as learning rate, IoU threshold, confidence threshold, and optimizer, to optimize confidence in detection. The test results show that the use of AdamaW as an optimizer with IoU 0.5 and confidence threshold 0.25 resulted in the best performance, with mAP reaching 88%, precision 81.5%, recall 84.6%, and F1-score 83%. The use of CLAHE on the x-ray dataset improved the object detection capability, especially the spots associated with tuberculosis.

In addition, the application created using this model successfully detects TB directly and provides convenience for users in diagnosing TB without the need for experienced medical personnel. Overall, the model built is reliable to help early detection of TB based on x-ray images, with the potential to be used in Health services.

***Keywords**: TB detection, YOLOv8, x-ray image, spot detection, medical application*