

ABSTRACT

Visually impaired individuals often exhibit significant creative potential by using Braille as a medium of expression, enabling access without relying on electronic devices. However, a large portion of the general public faces difficulties in reading Braille due to limited familiarity with the script in everyday life, highlighting the importance of finding ways for the general public to appreciate the written works of the visually impaired so that their creations can be recognized by a broader audience. Deep learning, as a branch of artificial intelligence, has made substantial advancements. One of the leading algorithms for real-time object detection is You Only Look Once (YOLO). Despite its efficiency, the application of YOLO in image identification for Braille-to-alphabet conversion remains limited compared to other methods. This study aims to develop a Braille-to-alphabet recognition system using the YOLOv8 model. The optimal configuration obtained for this model includes the use of the AdamW optimizer, a learning rate of 0.001, and a batch size of 32. The results from testing with the best optimizer indicate that the model is capable of achieving an average precision of 0.945, recall of 0.833, mAP50 of 0.904, and mAP50-95 of 0.817. The performance of Braille-to-alphabet recognition between offline and online evaluations was also compared. The offline evaluation demonstrated higher accuracy and better consistency, while the online evaluation conducted in real-time produced more varied results with more fluctuating confidence levels.

Keywords—Visual Impairment, Braille, Deep Learning, Yolov8, Object Detection.