ABSTRACT

Visually impaired individuals face significant challenges in their mobility, especially in road environments filled with various vehicles and obstacles. Assistive technology that integrates computer vision and object detection algorithms like YOLOv5 offers a potential solution to enhance their independence and safety. This research aims to develop a real-time object detection system based on YOLOv5, specifically designed to support the mobility of visually impaired individuals in road environments. The CRISP-DM methodology was used in this study, consisting of six main phases: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. YOLOv5 was chosen for its superior ability to detect objects quickly and accurately. The system was developed to detect various types of objects such as cars, motorcycles, trucks, and road holes, and to provide real-time voice feedback to users. Evaluation results show that the developed YOLOv5 model achieved high detection accuracy, with a Mean Average Precision (mAP) of 0.933 and detection accuracy of 96% for bus, 86% for cars, 84% for motorbike, 81% for potholes, 94% for vans, and 92% for trucks. The system also demonstrated an average latency of 1.711 seconds and detection latency of 0.303 seconds, with a frame rate of 1.65 FPS. These results indicate that the deployed system can provide significant support for visually impaired users in their mobility on the road.

Keywords: *Assistive Technology, Computer Vision, Latency, Object Detection, YOLOv5*