ABSTRACT

Traffic congestion on toll roads is a serious challenge in the context of modern, evolving transportation. This phenomenon has become more prominent with the significant increase in the number of motor vehicles traveling on toll roads in recent years. This increase significantly contributes to the occurrence of traffic congestion, which is often detrimental to the efficiency of the transportation system and people's mobility. This research aims to solve the problem of traffic congestion on toll roads by implementing a detection system using image processing and the You Only Look Once (YOLO) algorithm. The test scenario was conducted over a 7-day period with morning, afternoon, and evening times. The evaluation results show that the YOLOv5 detection system provides an average accuracy percentage of 93,2% and 67,1% at night. This technology provides real-time information-based solutions to improve the efficiency of traffic management and avoid congestion. From the results of using YOLOv5 and the counting system, it will be easier for drivers on the toll road. Thus, the integration of YOLOv5 and the counting system not only supports toll road efficiency, but also stimulates cross-sector cooperation in creating an integrated transportation environment. Sustainability is also the focus of this research, with an emphasis on more efficient energy use and environmentally friendly traffic management methods. The application of this technology is expected to promote sustainable solutions in urban traffic management, providing long-term benefits for the sustainability of future transportation systems.

Keywords: You Only Look Once, image processing, counting