ABSTRACT

The increasing use of four-wheeled vehicles in the campus environment creates new problems in finding access to parking lots available in the campus environment. This problem is increasing because the number of vehicle users is increasing every time. This makes it difficult to know the available parking access, especially in the parking area outside the TULT building. In addition to making it difficult for people who want to park in the parking area outside TULT, new problems arise due to the difficulty of accessing the parking area, namely the absence of a reservation feature that makes it easy to find available parking spaces or slots quickly. Therefore, a smart parking system in the campus parking environment can solve the above problems.

The smart parking system is a system designed using CCTV cameras as sensors that will capture images that will be processed using the YOLOv8s model Machine Learning Algorithm as an algorithm for detecting and classifying car vehicles. In addition, color classification is carried out on detected cars and detection of parking slot availability is carried out. The processing is done at the edge, then the data from the processing is sent to a cloud-based MySQL database. The detection results in the cloud database are sent to the user by providing information about the available slots of a parking lot by displaying each parking slot on the Hybrid website-based application display and providing a feature to reserve an empty parking slot before the user gets a parking space.

Using the results of the YOLOv8s model that has been tested using parking slot detection, car detection, color classification, and vehicle classification produces parameter values such as F1-Score and mAP. For parking slot and car detection, the F1-Score value is obtained 99% in parking slot detection and 99.2% mAP value in car detection. For color and vehicle classification, both F1-Score values are 35.81% and 99.2%. For the application part, using the black box testing method and usability testing, the application runs smoothly in functionality and is easy to use by users with a percentage of 85% for the ease of running the application on the user's device and 92% for the display that is easily understood by the user.

Keywords: CCTV Camera, YOLOv8, and Hybrid App