

ABSTRACT

In Indonesia, the rapid growth in the number of vehicles has magnified the challenges of maintaining road traffic safety. In 2023, a total of 152,008 traffic accidents were recorded, with a significant increase in fatalities and material losses compared to the previous year. In the face of this problem, facial expression recognition technology offers potential as a preventive solution with its ability to detect signs of fatigue and impaired concentration in drivers. However, the implementation of this technology is still often applied to devices that are less compact and not optimal for real-time use in vehicles.

As a solution, this study implements MobileNet-based facial expression recognition technology in a real-time mobile application to monitor driver expressions. The system assesses alertness and provides early warnings when signs of fatigue or concentration impairment are detected, thereby preventing potential accidents.

Test results show that fine-tuning outperforms transfer learning in both models. MobileNetV3Small with fine-tuning (4e-6) achieved the highest accuracy of 99.72%, outperforming MobileNetV3Large, which achieved 99.44%. In transfer learning, MobileNetV3Large performed better with an accuracy of 93.89%, while MobileNetV3Small only achieved 78.89%. With high accuracy and a lighter model, MobileNetV3Small is considered the most optimal for real-time facial expression recognition on mobile devices.

Keywords: facial expression recognition, driving safety, detection, driver fatigue, real-time, mobilenet.