**Abstract**

The increasing complexity of urban traffic systems necessitates advanced solutions for automated vehicle categorization to enhance traffic monitoring, improve road safety, and support autonomous driving technologies. In this project, we propose an efficient deep learning-based system for categorizing traffic objects (buses, cars, motorbikes, pedestrians, and trucks) using the EfficientNetB0 architecture. The system processes images from a custom traffic dataset containing over 41,000 annotated images, where region proposals are generated to isolate objects before classification. To address challenges such as class imbalance and diverse object appearances, we employ data augmentation techniques and fine-tune the pretrained EfficientNetB0 model. Our approach achieves high accuracy in classifying traffic objects, with performance metrics including precision, recall, F1-score, and mean Average Precision (mAP) evaluated on both training and validation datasets. Additionally, we utilize annotation tool Roboflow to ensure high-quality labelled data for model training. Experimental results demonstrate the robustness and efficiency of the proposed system, making it suitable for real-time applications in traffic management and intelligent transportation systems. This work contributes to the development of scalable computer vision solutions for automated vehicle categorization, paving the way for safer and smarter urban environments.