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Vehicles are a common mode of transportation frequently used by people in their daily activities. However, over time, the number of vehicles has increased significantly. Therefore, a vehicle classification system is needed to facilitate data management. Based on related research, ResNet-50 has shown better accuracy compared to other architectures. This study aims to design a vehicle classification system using the Convolutional Neural Network (CNN) method with the ResNet-50 architecture. The dataset used includes seventeen different types of vehicles, and in its implementation, the Adam optimizer was applied with several variations of hyperparameters using 100 epochs. The experimental results show that the use of pre-trained weights significantly improves performance compared to models without pre-trained weights. The model with pre-trained weights achieved the highest validation accuracy of 95.72% and a test accuracy of 85.02%, while the model trained from scratch only achieved a validation accuracy of 34.66% and a test accuracy of 32.77%. Additionally, this study found difficulties in classifying vehicle types with limited data or visually similar features, such as Barge and Limousine, which often experienced misclassification. Thus, this research demonstrates that transfer learning with pre-trained weights is highly effective in improving the accuracy of vehicle classification models.

Keywords:: CNN, Classification, Vehicles, ResNet-50