ABSTRACT

In the development of modern society, a system that can assist electronic-based configurations is needed to simplify the community's needs in the field of transportation, especially in the identification and classification system of vehicle types. However, the vehicle classification system has previously been studied with an accuracy of 73%. Furthermore, according to data from the literature, another thing lacking from previous research is that the type of vehicle is only classified into three classes. Therefore, to improve the previous research, it is necessary to improve the classification of vehicle types. Thus, this research will classify vehicle types into four classes: motorcycles, cars, buses, and trucks using Convolutional Neural Network (CNN) with AlexNet architecture and a self-constructed architecture consist of three hidden layer namely NNNS-Net.

In this study, the first step was to collect a dataset of 1400 images with 350 images in each class from the dataset available. The next stage was pre-processing, which included the addition of Contrast Limited Adaptive Histogram Equalization (CLAHE) and Gaussian Filters. Then the classification is carried out using the AlexNet and NNNS-Net architecture with a model designed through a training and testing process that uses different input sizes, optimizers, learning rates, and batch size values to get the best model. Finally, the results are analyzed with parameters of accuracy, precision, recall, and f1-score.

The final result of this final project shows the best model for the classification of vehicle types with the NNNS-Net optimizer Adam architecture using original images and a learning rate of 0.001 and a batch size of 64, which has an accuracy of 99.14%.

Keywords: Digital Image Processing, Convolutional Neural Network, Vehicle Type Classification, AlexNet.