FINE-GRAINED CLASSIFICATION OF VEHICLES BY USING CONVOLUTIONAL NEURAL NETWORKS

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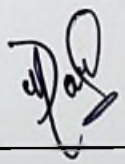
Scholar / Authors Sign: 

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ABSTRACT

Machine Learning has a practical and profound application in intelligent traffic management systems. ITS is a very broad terminology in which includes vehicle detection, classification, monitoring, surveillance, license plate recognition, etc. Vehicle classification playing a vital role in the intelligent transportation system for traffic management and monitoring. This study is aimed at the fine-grained classification of vehicles using convolutional neural networks. To accomplish the task there are lots of challenges involved in which the biggest challenges are Inter-class and Intra-class similarities between the make and models of vehicles, lightning conditions, background, shape, pose, a viewing angle of the camera, speed of the vehicle, the size of the vehicle, color occlusion and environmental conditions. There are three different datasets are used in this research BMW-10, Stanford Cars, and PAKCars.The BMW-10 and Stanford Cars datasets are available open-source, while PAKCars dataset is self-generated especially for fine-grained classification of cars in Pakistan to analyze the implementation of research. The system will work on machine learning which is further divided into two steps namely training and testing. Initially, the system will be trained on the training dataset and afterward, the performance of the system will be tested using the test dataset. In the training part of the system, four different DCNN models are Mobilenet, InceptionV3, VGG-19, and ResNet-50 used. Each model is trained on all three datasets (BMW-10, Stanford Cars, and PAKCars).

A total of 10 classes are evaluated in the BMW-10 dataset having a total of 511 images whil 196 classes are evaluated in Stanford Cars datasets having 8144 training images and 44 classes evaluated in PAKCars datasets which have total 1000 images. To perform the classification of the fine-grained vehicle DCNN models are used. The result acquired after processing reveals the results under the performance of true classification ResNet-50, VGG-19, inception-V3, and Mobilenet respectively. Mobilenet and InceptionV3 models consume less computational power and are less accurate, but VGG19 and Resnet50 are more accurate, because of their higher numbers of layers and architecture that make them complex and more computational power consuming as compared to Mobilenet and InceptionV3. Some false classifications occur due to inter-class and intra-class similarities.

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