Ilkogretim Online - Elementary Education Online, 2021; Vol 20 (Issue 1): pp. 7859-7866
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.01.811

Development Of A Motorcycle Model Detection System Using Machine Learning And Network Algorithms

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Abstract

A network framework is used to identify motorcycle models and perform application based categorization. Additionally, the project categorizes the video data according to manufacturer models and utilities. Over 20,000 pictures were captured and uploaded to the system, creating the database. These numerous motorcycle photographs were used to train the network model for effective detection. This work uses a convolutional neural network, which is an efficient approach for creating classifications. To accomplish the goal, a CNN- ALGORITHMS model called "resnet34" and an activation function called "Relu" are constructed. Layer detection and characterization are done by Resnet34, a 34-layered CNN- ALGORITHMS network. About 20 motorcycle manufacturers and their models are intended to be processed by the layer. The method is looped repeatedly until it reaches 85% accuracy in the targeted classification.

1. Introduction

The webcam elevation angles are taken as variable to detect the vehicle at different angles. This process will provide large pool of images of maker's logo at different elevation and different angles. There is an issue with webcam angle of view that is change of dimension of the vehicle. This change is dimension of the vehicle / motorcycle with respect to change of angle of view is taken as a prediction based model [1]. Therefor the variables associated with classification are camera quality, color, elevation, angle of view and Neural network database. The output responses are maker name and model name. It's crucial to effectively handle and use the shared accountability while working with complex webcam setups. The aforementioned issues are discussed in this study, and the results of the vehicle identification are used for the monitoring of multiple devices and the enumeration of automobiles [2].

Motorcycle picture categorization and model prediction have been done up to this point. Based on the subsequent related work, the classification and forecasting of videos of vehicles with their models still needs to be prioritized. Therefore, this work addresses the categorization and prediction of motorcycle-related films and their models [3].

Researchers developed a technique for estimating the worth of used motorbikes in India and China using the Machine Learning Algorithm. Additionally, the strategies outlined were used in a group environment. A website extractor written in PHP was used to crawl the autopijaca.ba website and collect relevant data for the forecast. [4]. For determining which strategy best fitted the statistical model, the comparison capabilities of numerous approaches were further compared. The forecasting mechanism that resulted was implemented using a Java programmer. [5].

These techniques were used across the board, not simply on particular data elements. The estimate was based on the data set values, which is received from a web related portal. The data must be obtained using a browser scrape written in the PHP programming language. In order to determine which algorithm would produce the suitable results for the data set, various algorithms with varying overall performance were examined. A Java application was used to implement the final prediction model[8].

Information from the online platform Quikr was used to create the estimations. The predictions were made using stochastic search ai algorithms, multiple linear regression, and randomised forest bayesian inference. The forecasts are then analysed and contrasted to determine which ones provide the intended effects. A seemingly straightforward issue showed to be quite tricky to manage. In order to prioritise driver safety, a warning unit was developed integrating motorcycle identification, lane pattern revealing, and automotive-specific methodology. Automobile identification can correctly identify motorcycles, while lane recognition can assist drivers drive more safely [4].

With the help of both transfer type learning and unique digital frameworks for regression and classification, a large number of deep CNN- ALGORITHMSs were trained for the main framework. They greatly outperformed rival frameworks on both datasets in innumerable criteria, leading to successful results. The visual qualities that cause higher or lower costs were highlighted in using a range of freshly developed approaches [6].

2. **Method of working**

The vehicle model like BMW and DUCATI can be identified easily because of its popularity. But, the objective is include even a small-scale maker to effectively classify the model and maker names. This can be done by developing large pool of database based on image and video data available in the whole globe. The process of creating the database can be either by using Internet as a source or by collecting pictures from the local area database in private domain. The Pytorch library is the database sight to perform neural network classification based on image classification. This library classifies the images into same type based on their color, pixels and size of the detected objects. The video data can be processed separately in the domain by downloading the video then do rendering process.

Software tools	*ents*
CPU	
Second storage	
Primary memory	
Computer display size	

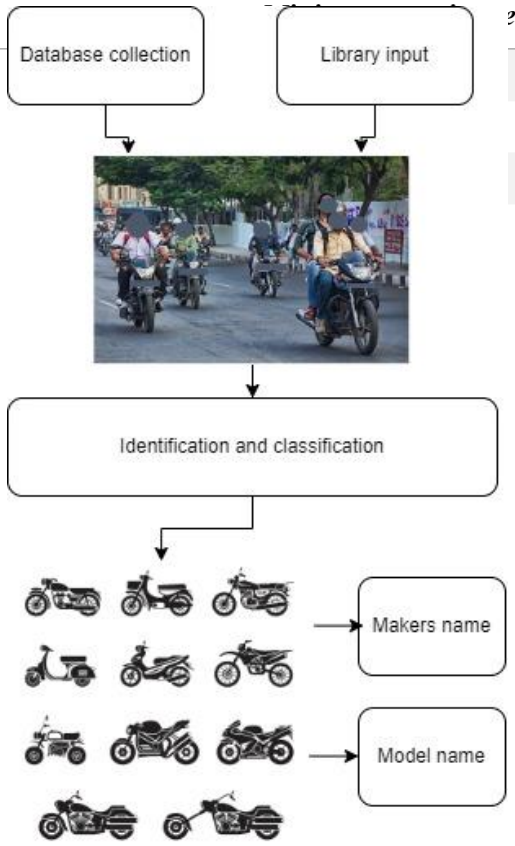

Figure 1. Working methodology

The video is made to edit into number of frames. Then the numbered frames are fed into the library along with the database. The more number of images that equals to more number of makes and models. The more in number means more in accuracy of the neural model.

The video data can be normal and it can be utilized for general purpose. Accident video are avoided because the makers may claim the vehicle is prone to accident in some cases. The video data can be procured in the common platforms in web itself. The next option is extracting the data from the available webcams on the roads. The road side webcams installed in the shops are clearly prone to the process for the classification.

3. Machine learning and tools requirements

Information is a group of facts that are often displayed in a vertical manner. Each column corresponds to a different factor. Each of the members of the dataset is represented by each row. It gives tenets parameters such as an item's elevation and weightiness.

Table 1. Hardware requirements

Any fact can be referred to as data. The record may contain data for one or more people, with rows matching the individuals. This dataset contains three csv files: Name1.csv, Train1.csv, and Test1.csv. The spreadsheet with a list of names of people is called

Names.csv. There are 195 rows of occurrences. One set of attributes The attribute's description is "Name of motorcycle model manufactured."

Hardware Requirements: The physical devices and their minimal needs are shown in Table 1.

4. **Implementation**

- Built on the Torch toolbox, PyTorch is an open-sourced toolkit. It has a variety of applications, including pattern classification.
- All of the fundamental image processing operations, including picture scaling, rotation, and transformations, are available in Pillows (image package) accessible here.
- matplotlib: Tableau is a library for graphical data visualisation and plotting in Py as well as its numerical counterpart Pandas. it is cross-platform.
- CUDA (nvidia device driver software): It provides Modern tools or packages may incorporate common Interfaces and requirements to enable GPU-based parallel computation. enabling simpler HPC, big data, and AI.
- A modern computer vision package of tools, hardware, plus software is called Opencv (computer vision). You may use it to run models for machine learning as well (ML)

CNN- ALGORITHMS

Filtering are used while using CNN- ALGORITHMS. Depending on the type of application, There are many dissimilar brands of filters. Modern neural network topologies, such as convolutional neural networks (Cn), are often used in computer vision outcomes. It can be applied to a number of tasks, box localization, change detection, and picture identification. A challenging request from such a significant motorcycle maker may be made to Advanced Analytics. Make a CV recognition programme that can identify a motorcycle's model from a picture. Despite the fact that several motorcycle models may look similar, depending on the surroundings and lighting where it is driven, every motorcycle may appear to be different.

Figure 2. Output of identification

5. Result and Discussion

Figures 2 below demonstrate how the motorcycle's model and manufacturer are accurately recognised. The program with such an epoch value of 10 obtained test accuracy of 80%, as seen in the data beneath. The training time Fig. 3 depicts a significant decrease in training dataset first from epoch value of 3. of 4.0 toward less than one. Validation loss is the mistake on the training set of data.

Validation loss is the size of the fitness function that is decreased. As a result, trained accuracy Fig. 3 illustrations that correctness is higher than 80% approximately. The sample code for the process is shown in the figure 4. The images offered throughout the teaching phase of the implementation were used to calculate the subsequent revisions.

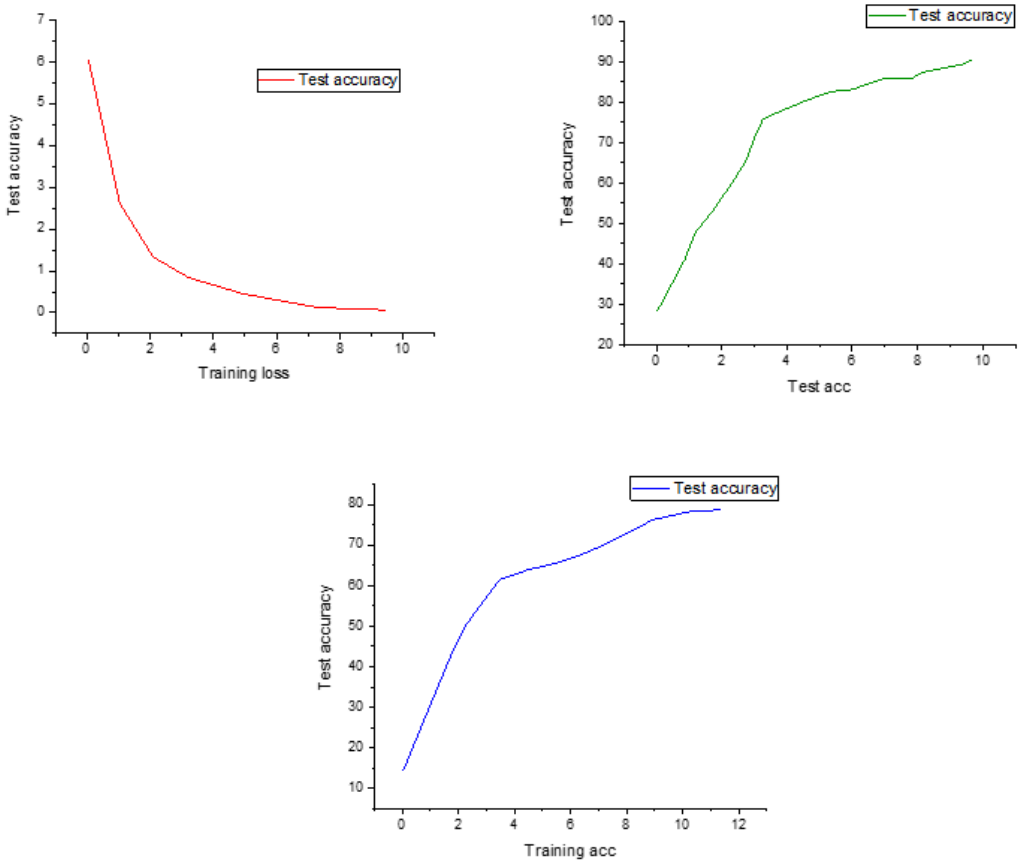

Figure 3. Test accuracy

```
# Python ≥3.5 is required
import sys
assert sys.version_info &gt;= (3, 5)
# Scikit-Learn ≥0.20 is required
import sklearn
assert sklearn.__version__ &gt;= "0.20"
try:
    # %tensorflow_version only exists in Colab.
    %tensorflow_version 2.x
except Exception:
    pass
# TensorFlow ≥2.0 is required
import tensorflow as tf
assert tf.__version__ &gt;= "2.0"
# Common imports
import numpy as np
import os
# to make this notebook's output stable across runs
np.random.seed(42)
# To plot pretty figures
%matplotlib inline
import matplotlib as mpl
import matplotlib.pyplot as plt
mpl.rc('axes', labelsize=14)
mpl.rc('xtick', labelsize=12)
mpl.rc('ytick', labelsize=12)
```

Figure 3. Sample code for Image classification

In this scenario, the Deep CNN- algorithms Resnet34 is used. Resnet34 is just a framework for a 34-layer convolutional neural network that can categorise pictures. A new layer that only classifies about 30 different automobile makes and models replaces the previous layer of the fully integrated structure. ReLU is the firing mechanism of this human brain.

Conclusion

The Convolution layer with resnet34 were both used, but with the latter layer substituted with bespoke layer, occasioning in fewer categorisations. The system recognizes the name and model of an automobile with either an effectiveness of 80%. A neural network may have been trained for a number of various automakers or motorcycle models. It aids to correctly catalogue a larger collection of automobiles with more information on this kind of motorcycle. One may submit more details on the vehicle model and its review for a correctly identified motorcycle.

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