IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 5, May 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005201|

CNN Based Automatic Helmet Detection

D. Gopi Sankar[1], G.Sai Prasanth[2], D.Keerthi Charan[3],A. Bhanu Venkata Nadh[4], Sk.Riyazuddien[5]

U.G Students, Dept. of Electronics and Communications Engineering, Vasireddy Venkatadri Institute of Technology, Nambur, Guntur, Andhra Pradesh, India[1-4]

Associate Professor, Dept. of Electronics and Communications Engineering, Vasireddy Venkatadri Institute of Technology, Nambur, Guntur, Andhra Pradesh, India[5]

ABSTRACT: Most of cities and small towns, the traffic Helmet detection system is manual process. The traffic police officers have to focus on violations like illegal parking, driving on the wrong side, whether the people are wearing the helmet or not and drunk driving. It has become an impossible task for traffic police officers to watch and control every road and every vehicle. This will cause burden to the police officers. So, we are implementing Automatic Helmet Detection is a Deep Learning (CNN) based project for traffic violation to mainly focus on the people are wearing helmet or not. This project is designed to reduce the work of traffic police officers so that they can focus on other violations like illegal parking, driving on the wrong side and drunk driving.

KEYWORDS: Convolutional Neural Network (CNN), Deep Learning, TKinker, Keras, ConvNets, Convolutional Layers.

I. INTRODUCTION

The Automatic Helmet Detection for the traffic violation is a Deep Learning (CNN) based project that will automatically detect the violating vehicles and accurately punish them. In this Automatic Helmet Detection, the methodology that we follow is at first we are going to train the model by giving some images which contain pictures of the persons who are wearing a helmet and not wearing a helmet. This Automatic Helmet Detection model predicts whether a person going on the road has kept the helmet or not. If a person is not wearing a helmet, then the system predicts the person and challan will be generated for that person.

II. PROPOSED METHOD

The methodology used in this project is image classification using CNN.

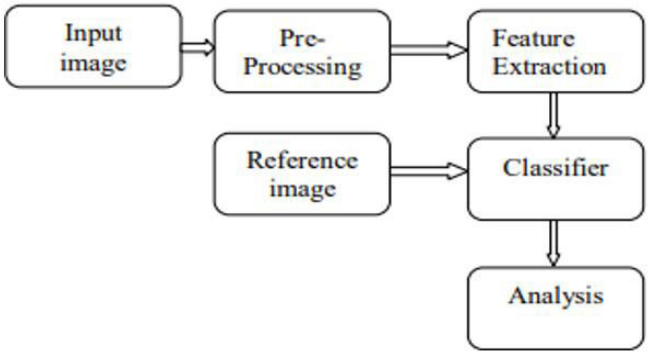


Figure 1: Architecture

A. Convolutional Neural Network:

Convolution neural network algorithm is a multilayer perceptron that is the special design for identification of two-dimensional image information. Deep learning models used to find vast number of neurons. Deep learning algorithms learn more about the image as it goes through each neural network layer. For classifying Neural Network is

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005201|

used. The neural network is a framework for many machine learning algorithms. Neural networks consist of vector of weights and the bias.

B. Deep Learning:

In deep learning, convolutional neural network (CNN) is a class of deep neural network mostly used for analysing visual images. It consists of an input layer and output layer as well as multiple hidden layers. Every layer is made up of group of neurons and each layer is fully connected to all neurons of its previous layer. The output layer is responsible for prediction of output. The convolutional layer takes an image as input, and produces a set of feature maps as output. ConvNets are the superheroes that took working with images in deep learning to the next level. With ConvNets, the input is a image, or more specifically, a 3D Matrix.

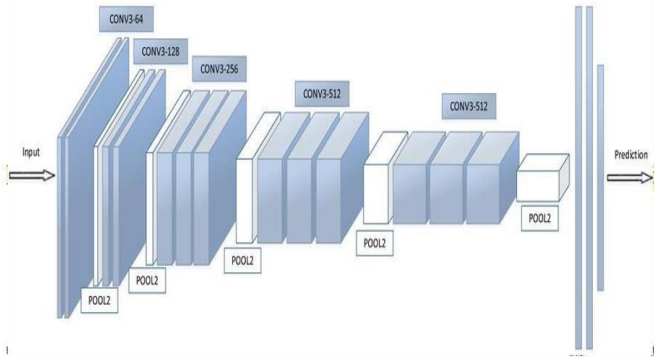


Figure 2: Convolutional Neural Networks

C. Convolutional Layers:

A ConvNet usually has 3 types of Layers. 1.Convolutional Layer (CONV). It allows extracting visual features from an image in small amounts. Convolutional Layers is also called as the Input Layer 2. Pooling Layer (POOL). It is used to reduce the number of neurons from previous convolutional layer but maintaining the important information. Further Classified into 2 types: 1. Max Pooling. 2.Average Pooling. 3.Fully Connected Layer (FC). It connects a neuron from one layer to every neuron in another layer.

D. Keras:

keras is a high-level neural networks API, capable of running on top of Tensorflow, The neo and CNTK. Keras can also be run on both CPU and GPU. Keras can be installed using pip or anaconda. Keras has a method called Image Data Generator which can be used for augmenting images. This Image Data Generator will create new images that have been rotated, zoomed in or out, and shifted in width and height. To train a model we would normally use the fit method.

III. IMPLEMENTATION

The convolutional neural network (CNN) would be developed using the following steps:

i. Data Collection – image dataset.
ii. Data pre-processing – augment, standardize and split the images to training and testing dataset.
iii. Training the CNN model – using the training dataset.
iv. Testing the CNN model – using the testing dataset.

A. Collecting the Dataset:

In order to train our machine, we need a huge amount of data so that our model can learn from them by identifying out certain relations and common features related to the objects. Fortunately, many such datasets are

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005201|

available on internet. Here is a link for the helmets and without helmets dataset which consist of 500 images— 250 of each. This will help in training as well testing our classifier.

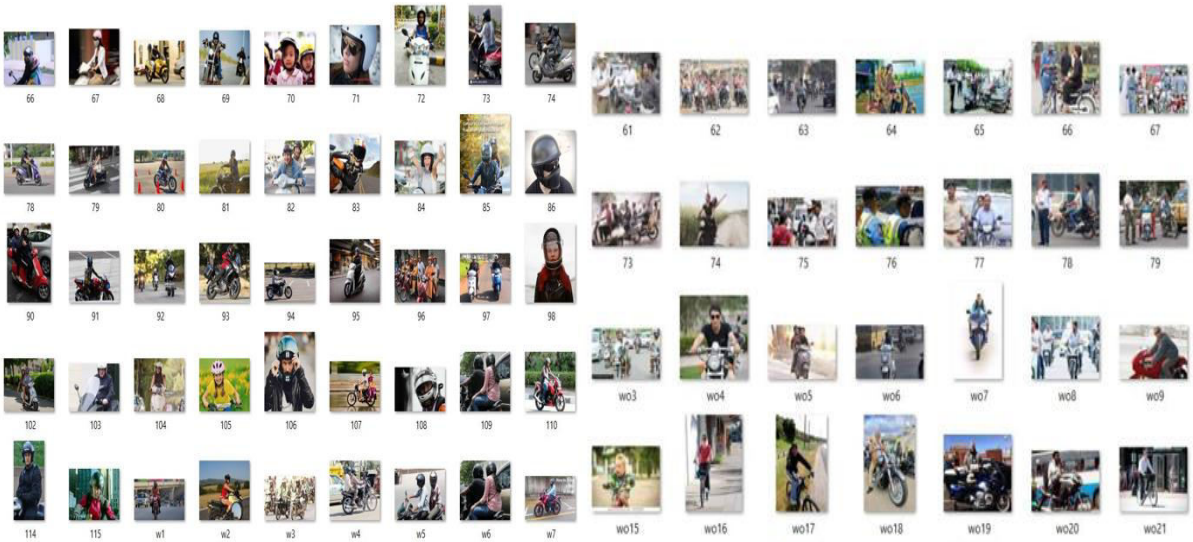
B. Data Pre-Processing:

a) Standardization:The images were transformed to the same size i.e. 128px by 128px and converted to the same image format

b) Folder Structure:Approximately 80% of the images formed the training dataset and the remaining 20% formed the validation dataset. The images collected were put into the respective dataset folder and subfolders corresponding to the species name. The subfolder name defined the label that would be applied to each image.

C. Training the CNN Model:

With Helmets: Without Helmets:



D. Testing the CNN Model:

With Helmets: Without Helmets:

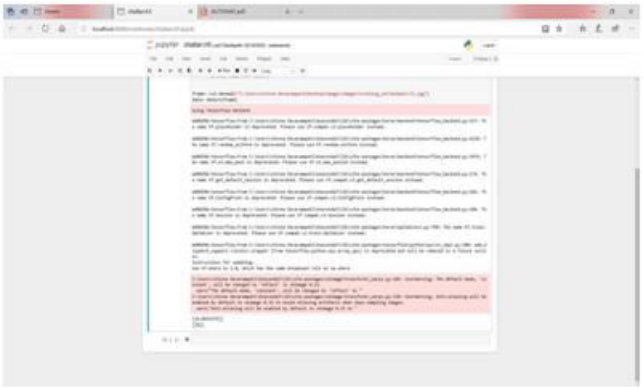
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

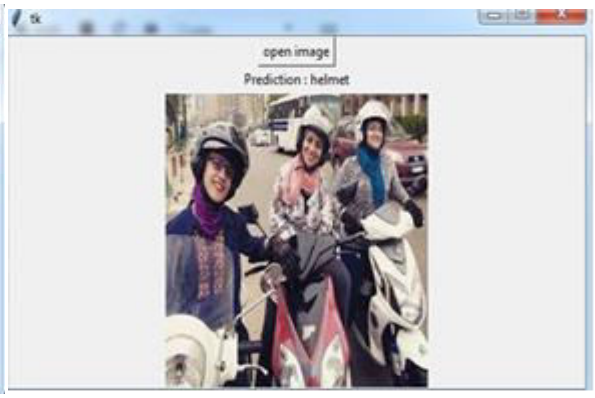
| DOI: 10.15680/IJIRCCE.2022.1005201|

IV. RESULTS

The below shows the predicted value i.e., either 1 or 0. If the person wears helmet it predicts the value as 0, otherwise it predicts the value as 1.



The below diagram shows TKInker predicting that the person is wearing the helmet. After opening the image in the TKInker, it predicts whether the person is wearing helmet or not.



V. FUTURE SCOPE

The system aims at harnessing strength of technology and minimize human intervention to bring about the speed and transparency in the whole process of traffic regulation which will go a long way in solving the problems of traffic on roads to a great extent.

V. CONCLUSION

The present study investigated a method to identify the whether the person is wearing helmet or not using Deep learning algorithm on the dataset for classification of image. The generated system is connected with a user-friendly website where user will upload photo for identification purpose and it gives the desired output. The proposed system works on the principle based on detection of a part and extracting CNN features from multiple convolutional layers. These features are aggregated and then given to the classifier for classification purpose. On basis of the results which has been produced, the system has provided the 96% accuracy in prediction of finding whether the person is wearing helmet or not.

REFERENCES

[1]https://helmetsaves.life/4-mistakes-people-make-while-wearing-a-helmet-89a705d21667
[2] https://mainorwirth.com/blog/why-is-it-so-important-to-wear-a-helmet-on-motorcycles/
[3]https://www.naidunia.com/national-many-people-not-wearing-helmet-but-agree-to-compulsory-it-1542797
[4]https://www.indiatoday.in/mail-today/story/isi-helmets-two-wheelers-ministry-of-road-transport-and-highways-

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 5, May 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1005201|

984453-2017-06-24
[5] https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53
[6]J.Chiverton,"Helmetpresenceclassification withmotorcycledetectionandtracking,"IETIntelligenceTransportSystems(ITS),Volume6,no.3,pp.259-269,2012.
[7]C.Y.Wen, S.H.Chiu,J.J.Liaw, andC.P. Lu,"The safetyhelmet detection for ATM's surveillancesystemviathe modifiedthough transform"inIEEE37thAnnualInternationalCarnahanConferenceonSecurityTechnology,2003,pp-364-369.
[8]C.C. Chiu, M.Y. Ku, and H. -T. Chen, "Motorcycle detection and trackingsystemwithocclusionsegmentation,"in Proceeding of InternationalWorkshoponImage AnalysisforMultimediaInteractiveServices,Santorini,Greece,6-8June2007,pp.32-32.
[9]R. V. Silva, T. Aires, and V. Rodrigo, " Helmet Detection on Motorcyclistsusingimagedescriptorsandclassifiers",in Proceeding of Graphics, Patterns an Images (SIBGRAPI), RiodeJaneiro,Brazil,27-30August2014,pp.141-148.
[10]K. Dahiya,D. Singhand C.K.Mohan,"Automatic detection of bikeriderswithouthelmetusingsurveillancevideos inreal- time",inProceedingofInternational Joint ConferenceNeuralNetworks(IJCNN),Vancouver,Canada,24-2July2016,pp.3046-3051.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details