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.2022.1005042 |

Helmet Detection and Number Plate Recognition Using Artificial Intelligence

Saurabh B. Waman[1], Vishal P. Jadhav[2], Abhishek S. Jagtap[3], Prof A.A.Trikolikar[4]

Student, Dept. of E&TC Engineering, JSPM's Imperial College of Engineering & Research, Pune, Maharashtra, India

Assistant Professor, Dept. of E&TC Engineering, JSPM's Imperial College of Engineering & Research, Pune, Maharashtra, India

ABSTRACT: In poor nations, motorcycles have always been the primary form of transportation. In recent years, the number of motorcycle accidents has climbed. A biker or traveller who does not wear a helmet is one of the most common causes of mortality in accidents. The most popular technique for traffic cops to guarantee that motorcyclists wear helmets is to physically monitor them on the road or to monitor them through CCTV or video footage and punish those who do not. However, human involvement and effort are required. As a result, this method proposes an automated technique for recognising and capturing motorcyclists who do not wear a helmet from camera video footage.

KEYWORDS:Raspberry Pi, HDMI Cable, Artificial Intelligence, OCR Algorithm, YOLO Algorithm

I. INTRODUCTION

In countries like India , Brazil , Thailand, majority of population uses motorcycles for daily commute. In most of these countries, wearing helmet for motorcyclists is mandatory by law. Also, considering safety of people using motorcycles, wearing helmet is paramount.Currently, in practice, Police are entrusted with the task of ensuring that motorcycle riders wear helmet. But, this method of monitoring motorcyclists is inefficient due to insufficient police force and limitations of human senses . Also, all major cities use CCTV surveillance based methods. But, those require human assistance and are not automated. Due to the increasing number of the motorcycles and the concern for human safety, there has been a growing amount of research in the domain of road transport. The system proposed in this paper automates the task of monitoring motorcyclists. The system detects motorcyclists not wearing helmets and retrieves their motorcycle number plate in real time from videos captured by CCTV cameras at road junctions by making use of Machine Learning.

Problem Statement:
In India road accidents are increased very rapidly and lots of deaths are occur due to head injuries because number of peoples not wearing helmets , so to avoid the system that automatically detects the people who are not wearing helmet and also detect number plates of the motorcycles to penalize that person.

II. LITERATURE REVIEW

Automated detection of traffic rule violators is an essential component of any smart traffic system. In a country like India with high density of population in all big cities, motorcycle is one of the main modes of transport. It is observed that most of the motorcyclists avoid the use of helmet within the city or even in highways. Use of helmet can reduce the risk of head and severe brain injury of the motorcyclists in most of the motorcycle accident cases. Today violation of most of the traffic and safety rules are detected by analysing the traffic videos captured by surveillance camera. This paper proposes a framework for detection of single or multiple riders travel on a motorcycle without wearing helmets. In the proposed approach, at first stage, motorcycle riders are detected using YOLOv3 model which is an incremental version of YOLO model, the state-of-the-art method for object detection. In the second stage, a Convolutional Neural Network (CNN) based architecture has been proposed for helmet detection of motorcycle riders. The proposed model is evaluated on traffic videos and the obtained results are promising in comparison with other CNN based approaches.

In today's world, the increasing use of Motorcycles has prompted increment in road accidents and injuries. Helmet not used by the motorcycle rider is one of the major cause. Currently, one procedure is to physically check use of helmet at the pavement junction or through the CCTV footage video, which requires human intervention to detect motorcyclists

| 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.2022.1005042 |

without helmet. The proposed framework presents a computerization machine structure to distinguish the motorcycle rider with or without helmet from images. The system extracts objects class based on feature extracted. The system uses You Only Look Once (YOLO)-Darknet deep learning framework which consists of Convolutional Neural Networks trained on Common Objects in Context (COCO) and combined with computer vision. YOLO's convolutional layers are modified to detect specified three classes and it uses a sliding window process. The map (Mean Average Precision) on validation dataset achieved 81% by usingtraining.

This paper is about detecting two-wheeler riders without helmet with the help of machine learning and provide them with a user interface to pay challans. The proposed approach first captures the real time image of road traffic and then differentiates the two wheelers from other vehicles in the road. It then processes to check whether the rider and pillion rider are wearing helmet or not using OpenCV. If any one of the riders and pillion rider found not wearing the helmet, their vehicle number plate is processed using optical character recognition (OCR). After extracting the vehicle registration number, a challan will be generated against respective vehicle and all the details of the challan will be sent via E-mail and SMS to the concerned person. An user interface (an app and a website) will also be provided to pay their challans.

Numerous reasons lead to dangerous accidents. Lack of helmet is one of the major reasons for death during accidents. People are negligent regarding helmet usage. This needs to be controlled by proper surveillance. The present traffic control system is mostly based on human power. A police officer cannot manage the whole traffic and look out for rule-breakers. It would be a very tough job and will need a lot of human power to cover all the areas. This can be solved through our new automated system where two-wheelers with no helmets will be recognized through yolov2 and the respective frames are taken from the video from which the number plate of the particular vehicle is extracted and the fine for disregarding traffic rules. This fine detail will be updated over the server and message is sent to the phone number registered along with number plate. This paper is about an automated system where traffic surveillance videos are scavenged for vehicles, where extraction of number plates of vehicles with no helmet and generation of electronic fine management system takes place.

III. METHODOLOGY

The project is geared toward developing a system capable of monitoring or detecting the Helmet as a object. The following block diagram shows the how the system is actually working.

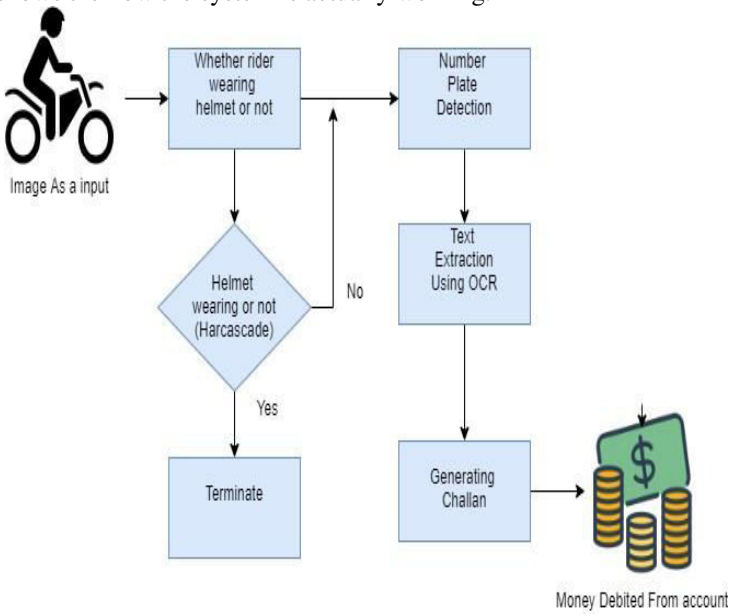

Fig. Block Diagram

Above fig shows that the actual procedure of the system . firstly the input is taken from the digital camera or CCTV footage also take as input. After getting the input the system will check whether it is a car or motorcycle. After that it will detect a helmet if the motorcyclist does not wear the helmet it will get detected using YOLO algorithm which 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.2022.1005042 |

used for theobject detection. In this system yolo detect helmet as a object. Then the number plate of motorcycle get captured using OCR algorithm which is used to detect a text which are present in a image or a video then text extraction will be done using OCR Algorithm. And then challan will be generated of that vehicle owner.

System Specification:

The Raspberry Pi may be a low cost, credit-card sized pc that plugs into a pc monitor or TV, and uses a customary keyboard and mouse. it's a capable very little device that permits individuals of all ages to explore computing, and to be told the way to program in languages like Scratch and Python.

HDMI Cable

The HDMI interface permits a port to send highresolution digital video, theatre-quality sound and device commands through an HDMI connector and down a single HDMI cord, each designed to support a video resolution and options within the HDMI specification.HDMI connectors are available in three sizes: Standard, mini and small.

Fig. HDMI Cable

HDMI means High-Definition Multimedia Interface, a standard for simultaneously transmitting digital video and audio from a source, such as a computer or TV cable box, to a computer monitor, TV or projector.

IV. SYSTEM DESIGN

OCR Algorithm:

- Optical Character Recognition, is a process of recognizing text inside images and converting it into an electronic form. These images could be of handwritten text, printed text like documents, receipts, name cards, etc., or even a natural scene photograph.

| 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.2022.1005042 |

- OCR has two parts to it. The first part is text detection where the textual part within the image is determined. This localization of text within the image is important for the second part of OCR, text recognition, where the text is extracted from the image.

Using these techniques together is how you can extract text from any image.

Steps OF OCR Algorithm:

Step 1:

Select appropriately-sized contours and extract them: Line 42 computes the bounding box of the contour. Next, we...

Step 2:

Clean up the images using a thresholding algorithm, with a goal of having white characters on a black...

Step 3:

Resize every character to a 32×32 pixel image with a border: Depending on whether the width is greater than the...

Step 4:

Prepare each padded ROI for classification as a characte

Application Of OCR Algorithm:

OCR has found applications across many industries, including banking, legal, and healthcare. Here are a few examples of Optical Character Recognition use cases.

1. **Document identification:** Document identification forms an important use case of OCR, with the detected text being used to classify documents into groups, making access infinitely easier and faster.
2. **Data entry automation:** With OCR, data can be efficiently captured from documents and tables, making manual data entry redundant. Automation of data entry with OCR reduces anomalies in the data due to typing issues. Furthermore, the extraction of data becomes super fast and extremely cheap.

Archives and digital libraries creation:

OCR helps create digital libraries by recognizing classes into which a book or a document belongs. These classes (or genres) can be used to look up a particular category of books, helping the reader seamlessly navigate through the list. Correspondingly, OCR helps in digitizing old documents, thereby making preservation extremely easy and secure.

V. RESULT

The detected helmet and number plate are displayed below fig.

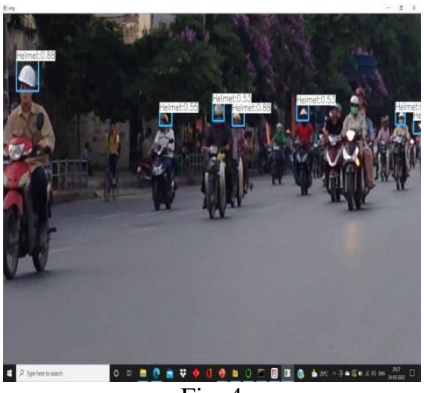

Fig. 4

Fig 4 shows the helmet is detected by system who wear the helmet and fig 5 shows the number plate detection.

| 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.2022.1005042 |

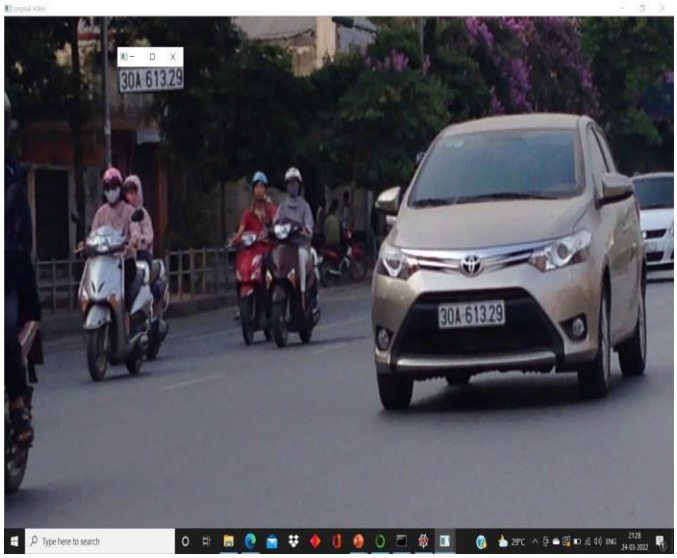

Figure 5

In this project we have described a framework for automatic detection of motorcycle riders without helmet from CCTV video and automatic retrieval of vehicle licensenumber plate for such motorcyclists. The use of Convolutional Neural Networks (CNNs) and transfer learning has helped in sensible good accuracy for detection of motorcyclists not wearing helmets. The accuracy obtained was 98.72%. But, only detection of such motorcyclists is not sufficient for taking action against them. So, the system also detects the number plates of their motorcycles and save the data. The saved number plates can be then used by Transport Office to get information about the motorcyclists from their database of licensed vehicles. Concerned motorcyclists can then be penalized.

VI. FUTURE SCOPE

Motorcycle accidents have been rapidly growing throughout the years in many countries. The helmet is the main safety equipment of motorcyclists, however many drivers do not use it. The main goal of helmet is to protect the drivers head in case of accident.In case of accident, if the motorcyclist does not use can be fatal . and it is not possible for traffic police force to watch every motorcycle and detect the persons who are wearing helmet or not .so there was need to make the automates system that's automatically monitor motorcycles and detects the persons wearing helmet or not and also detect number plate to penalize those persons without a helmet.

VII. CONCLUSION

In this project we have described a framework for automatic detection of motorcycle riders without helmet from CCTV video and automatic retrieval of vehicle licensenumber plate for such motorcyclists. The use of Convolutional Neural Networks (CNNs) and transfer learning has helped in sensible good accuracy for detection of motorcyclists not wearing helmets. The accuracy obtained was 98.72%. But, only detection of such motorcyclists is not sufficient for taking action against them. So, the system also detects the number plates of their motorcycles and save the data. The saved number plates can be then used by Transport Office to get information about the motorcyclists from their database of licensed vehicles. Concerned motorcyclists can then be penalized.

REFERENCES

1. R. R. V. e. Silva, K. R. T. Aires and R. d. M. S. Veras, "Helmet Detection on Motorcyclists Using Image Descriptors and Classifiers," 2014 27th SIBGRAPI Conference on Graphics, Patterns and Images, Rio de Janeiro, 2014, pp. 141-148.
2. P. Doungmala and K. Klubsuwan, "Helmet Wearing Detection in Thailand Using Haar Like Feature and Circle Hough Transform on Image Processing," 2016 IEEE International Conference on Computer and Information Technology (CIT), Nadi, 2016, pp. 611-614.

| 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.2022.1005042 |

3. Li, J., Liu, H., Wang, T., Jiang, M., Wang, S., Li, K., & Zhao, X. (2017, February). Safety helmet wearing detection based on image processing and machine learning. In Advanced Computational Intelligence (ICACI), 2017 Ninth International Conference on (pp. 201-205). IEEE.
4. K. Dahiya, D. Singh and C. K. Mohan, "Automatic detection of bike-riders without helmet using surveillance videos in realtime," 2016 International Joint Conference on Neural Networks (IJCNN), Vancouver, BC, 2016, pp. 3046-3051.
5. C. Vishnu, D. Singh, C. K. Mohan and S. Babu, "Detection of motorcyclists without helmet in videos using convolutional neural network," 2017
6. International Joint Conference on Neural Networks (IJCNN), Anchorage, AK, 2017, pp. 3036-3041.
7. Mistry, K. A. Misraa, M. Agarwal, A. Vyas, V. M. Chudasama, and K. P. Upla, 'An automatic detection of helmeted and nonhelmeted motorcyclist with license plate extraction using convolutional neural network' In Proceedings of IEEE International Conference on Image Processing Theory, Tools and Applications (IPTA), pp. 16, 2017.
8. R. V. Silva, T. Aires, and V. Rodrigo, 'Helmet detection on motorcyclists using image descriptors and classifiers,' in Proceedings of Graphics, Patterns and Images (SIBGRAPI), pp. 141–148, 2014.
9. G. Ross, D. Jeff, D. Trevor, and M. Jitendra, 'Rich feature hierarchies for accurate object detection and semantic segmentation,' in Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR), pp. 580– 587, 2014.
10. Z. Guo, D. Zhang, and L. Zhang, "A completed modeling of local binary pattern operator for texture classification," IEEE Trans. Image Processing, vol. 19, no. 6, pp. 1657–1663, 2010.
11. C. Cortes and V. Vapnik, "Support vector networks," Machine Learning (Springer), vol. 20, no. 3, pp. 273–297, 1993. [20] D. Singh, D. Roy, and C. K. Mohan, "Dip-svm: distribution preserving kernel support vector machine for big

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