HELMET DETECTION AND NUMBER PLATE RECOGNITION

Vishal Sakat[1], Komal Wakade[2], Shweta Tribhuvan[3], Sandesh Tribhuvan[4], Mr. G. B. Kote[5]

[1]*StudentDepartment of Computer Engineering, PREC Loni, India*

[2]*StudentDepartment of Computer Engineering, PREC Loni, India*

[3]*StudentDepartment of Computer Engineering, PREC Loni, India*

[4]*StudentDepartment of Computer Engineering, PREC Loni, India*

[5]*Assistant ProfessorDepartment of Computer Engineering, PREC Loni, India*

Abstract

In our country the increment in quality of life has led many people to get new vehicles and thus has led to increase in the amount of traffic that has entered the Indian roads. The increasing traffic has left the traffic administrators being unable to monitor the rules and regulation of the Motorcycle riders that often do not follow the traffic norms. This project aims to help the traffic enforcers to automatically detect the riders that are not wearing a helmet and then automatically scan their number plate using OCR to keep a record of riders who were not wearing a helmet even in a lot of crowds. This system would surely help to maintain order on the busy streets.

Keywords: *Helmate, IOT, Vehicle*

I. Introduction

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 isto protect the riders head in case of an accident. In such a case, if the motorcyclist does not use a helmet, it can be fatal. It is not possible for traffic police force to watch every motorcycle and detect the person who is not wearing a helmet. There was need to propose an automated system that monitors motorcycles and detects the persons wearing helmet or not and a system to detect number plates. In India, road accidents are increasing very rapidly and lots of deaths occur due to head injuries as number of people do not wear helmets.

Currently all major cities have a CCTV surveillance system that requires lots of resources and also personnel that cannot sustain the efficiency and productivity for a long time.

Thus, there was a need for a system that would do all these things automatically. This system works exactly on these terms

it automatically detects the people who are not wearing a helmet and a system that detects number plates of the motorcycles and extracts the vehicle number which would help find the motorcyclist to be penalize. By doing this we propose that rate of accidents will reduce and many lives will be saved.

II. Problem Definition

The helmet is the most essential part of the motorcycle rider, in spite of that most of the people do not use it. The main aim for this project is to construct an automatic detection system that detects motorcyclists without helmet from a video from a traffic CCTV camera and then from that same footage extract the registered number plates and then store that data in a database.

III. Literature Review

The cases for accidental death of motorcyclists in the past years have a single thing in common. That is the rider was not wearing a helmet and this caused serious injury to the head or sometimes even death. The government should really focus on this matter and tighten the laws and also impose heavy fine on the law breakers. There have been previous attempts at solving this same problem by using different approaches in the past.

1. HELMET DETECTION AND NUMBER PLATE RECOGNITION USING MACHINE LEARNING

Authors: Gauri Marathe, Pradnya Gurav, Rushikesh Narawde, Vallabh Ghodke, Prof. S. M. Patil

Abstract: Motorcycles have always been the primary mode of transportation in developing countries. Motorcycle accidents have increased in recent years. One of the main reasons for fatalities in accidents is that a motorcyclist does not wear a protective helmet. The most common way to ensure that motorcyclists wear a helmet is by traffic police to manually monitor motorcyclists at road junctions or through CCTV footage and to penalize those without a helmet. But it requires human intervention and effort. This system proposes an automated system for detecting motorcyclists who do not wear a helmet and a system for retrieving motorcycle number plates from CCTV video footage. First, the system classifies moving objects as motorcycling or non-motorcycling. In the case of a classified motorcyclist, the head portion is located and classified as a helmet or non-helmet. Finally, the motorcyclist without a helmet is identified. Further we have developed a system which identifies the number plates and extracts the characters of the number plate using OCR algorithm.

2. DETECTION OF HELMET USING YOLOV4 AND GENERATION OF AN E-CHALLAN

Authors**:** Anirban Ashok Rudra, Shrish Kiran Vaidya, Kaushal Rajbahadur Singh

Abstract**:** Motorcycle accidents have been on the rise in several countries over the years. Any smart traffic system must include automated detection of offenders of traffic rules. Motorcycles are one of the main ways of transportation in a country like India, where population density is considerable in all major cities. Over 37 million people in India ride two-wheelers. Most motorcyclists do not wear helmets in the city or even on highways, according to reports. In most motorcycle accident scenarios, wearing a helmet can lower the likelihood of a biker suffering a head or severe brain injury. As a result, a technology for automatically detecting helmets is required for road safety. As a result, using a CNN-based algorithm (YOLOv4), custom object detection models are built. The License Plate is retrieved and the License Registration number is recognized using an OCR whenever a Helmetless rider is detected. This project aims to develop a CNN-based automated detection system for helmet identification utilizing custom-trained models and datasets that will aid police departments in enforcing the law for the greater good of society.

3. HELMET DETECTION AND LICENSE PLATE RECOGNITION USING YOLO MODEL

Authors:Prof. Muneshwar R. N., Miss. Pote Pranavi Vijay, Mr. Bhawar Shivam Ashok, Miss. Jadhav Pratiksha Sitaram, Miss. Gite Nikita Rajendra.

Abstract: 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 causes. Currently, one procedure is to physically check use of helmet at the pavement junction or through the CCTV footage video, which requires human energy to detect motorcyclists without helmet.

The object detection and tracking are the important steps of computer vision algorithm. The robust object detection is the challenge due to variations in the scenes. Another biggest challenge is to track the object in the occlusion conditions. Hence in this approach, the moving objects detection using OpenCV object detection API. Further the location of the detected object is pass to the object tracking algorithm. A YOLO object tracking algorithm is used for robust object detection.

The proposed approach is able to detect the object in different illumination and occlusion. 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.

IV. Methodology

Proposed Model:

Our Proposed model takes user input as real-life traffic images and processes it to find motorcycles riders from it.It then checks whether the riders are wearing helmet or not and classifies them into two categories as to be further processing or to be discarded.Then it detects the number plate of the motorcycle and then using OCR algorithm it identifies the number plate and extracts its vehicle number.

Algorithms:

1. YOLO:

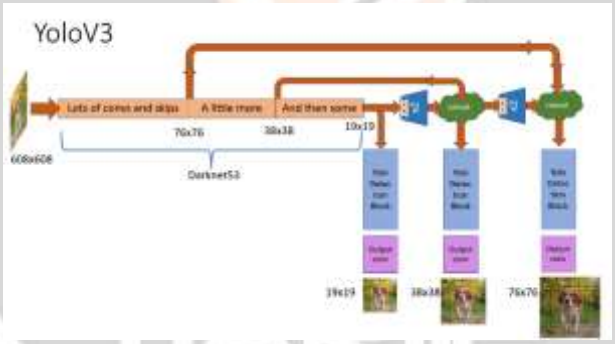
It is a real time object detection algorithm that is used to identify specific objects from video, photos and live feeds.

YOLO is a Convolutional Neural Network (CNN) for performing object detection in real-time. CNNs are classifier-based systems that can process input images as structured arrays of data and recognize patterns between them (view image below). YOLO has the advantage of being much faster than other networks and still maintains accuracy. It allows the model to look at the whole image at test time.

so, its predictions are informed by the global context in the image.

YOLO and other convolutional neural network algorithms "score" regions based on their similarities to predefined classes. High-scoring regions are noted as positive detections of whatever class they most closely identify with. For example, in a live feed of traffic, YOLO can be used to detect different kinds of vehicles depending on which regions of the video score highly in comparison to predefined classes of vehicles

This algorithm is used in the initial step for detecting motorcycle riders.



2. OCR:

Optical character recognition is a technology that converts typed or handwritten text and printed images containing text into machine-readable digital data format. OCR algorithms help turn large amounts of paper documents into digital files, facilitating text storage, processing, and searching.

A modern OCR training workflow follows a number of steps:

1: Acquisition

Obtaining non-editable text content from scanned documents of all types, from flatbed scans of corporate archival material through to live surveillance footage and mobile imaging data.

2: Pre-processing

Cleaning up the source imagery at an aggregate level so that the text is easier to discern, and noise is reduced or eliminated.

3: Segmentation and feature extraction

Scanning of the image content for groups of pixels that are likely to constitute single characters, and assignment of each of them to their own class. The machine learning framework will then attempt to derive features for the recurring pixel groups that it finds, based on generalized OCR templates or prior models. However, human verification will be needed later.

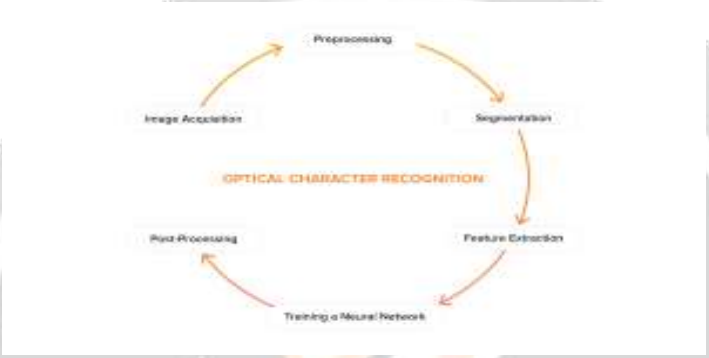
4: Training

Once all features are defined, the data can be processed in a neural network training session.

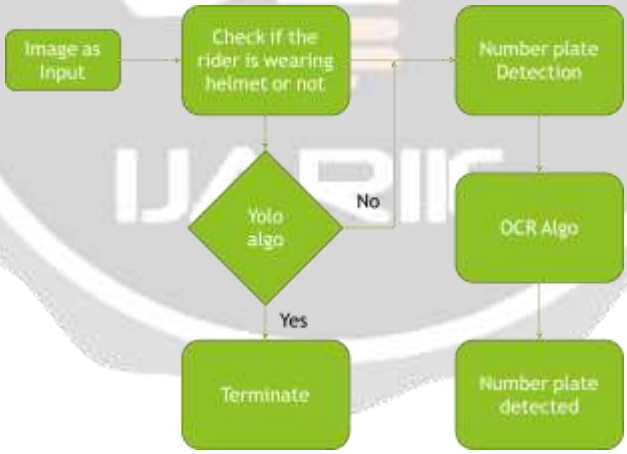
where a model will attempt to develop a generalized image>text mapping for the data.

5: Verification and re-training

After processing, humans evaluate the results, with corrections fed back into subsequent training sessions. At this point, data quality may need to be reviewed. Data cleaning is time-consuming and expensive, and while initial training runs will perform de-skewing, high contrast processing, and other helpful methods to obtain a good algorithm with minimal pre-processing, further arduous refinement of the data may be necessary.



SYSTEM ARCHITECTURE



V. Conclusion& Future Scope

In this project we have described a framework for automatic detection of motorcycle riders without helmet from CCTV video and automatic retrieval of vehicle license number plate for such motorcyclists. The use of Convolutional Neural Networks (CNNs).

Transfer learning has helped in achieving good accuracy for detection of motorcyclists not wearing helmets. The accuracy obtained in better condition, But only detection of such motorcyclists is not sufficient for taking action against them. So, the system also recognizes the number plates of their motorcycles and stores them. The stored

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.

We used Spyder to implement the program and we successfully implemented the program. Our project was tested successfully tested in python. We also made study of applications and future scope of the project. Our project can be linked with the traffic cameras and with some modifications it can be used to detect helmets in the real time system. Furthermore, we can merge the algorithm of automated license plate detection and make a system which generates challans for those who don't wear helmets

VI. References

1. Helmet detection and license Plate Recognition using YOLO model

   Authors: Prof. Muneshwar R. N.Miss. Pote Pranavi Vijay Mr. Bhawar Shivam Ashok
   Miss. Jadhav Pratiksha Sitaram Miss. Gite Nikita Rajendra

2. Helmet Detection and Number Plate Recognition using Machine Learning

   Author: Gauri Marathe1, Pradnya Gurav2, Rushikesh Narwade3, Vallabh Ghodke4, Prof. S. M. Patil5

3. DETECTION OF HELMET USING YOLOV4 AND GENERATION OF AN E-CHALLAN

   Authors: Anirban Ashok Rudra Shrish Kiran Vaidya Kaushal Rajbahadur Singh

4. Automatic Number Plate Detection in Vehicles using Faster R-CNN Authors: N. Palanivel Ap T. Vigneshwaran

5. R. R. V. e. Silva, K. R. T. Aires and R. d. M. S. Veras," Helmet Detection on Motorcyclists Using Image Descriptors and Classifiers,"

6. P. Doungmala and K. Klubsuwan," Helmet Wearing Detection in ThailandUsing Haar Like Feature and Circle Hough Transform on Image Processing,"

7. 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.

8. C. Vishnu, D. Singh, C. K. Mohan and S. Babu," Detection of motorcyclists without helmet in videos using convolutional neural network,