Vehicles Congestion Controller and Penalty System

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ABSTRACT

Road accidents are one of the major causes of human deaths. Among the different types of road accidents, motorcycle accidents are common and cause severe injuries. Motorcycle accidents have been rapidly growing throughout the years in many countries. Due to various social and economic factors, this type of vehicle is becoming increasingly popular. The helmet is the main safety equipment of motorcyclists, however many drivers do not use it and other safety measure is to avoid triple rides. 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. This project aims to propose a system for detection of motorcyclist without helmet and motorcycle with triple ride.

In this paper following are the implementations: 1.When the motorcycles passes through camera it should recognise the no helmet number plate and penalty is sent to that recognised vehicles. 2. When the motorcycles passes through camera it should recognise triple ride of motorcycle number plate and penalty is sent to that recognised vehicles mobile number

Keywords: Python Modules, Visual Studio Code.

I. INTRODUCTION

As social, economic, and transportation factors vary from place to place, the number of motorcycle accidents has increased with time in every country. One of the popular forms of transportation for persons in the middle class is the motorcycle.

The primary piece of safety gear for motorcycle riders is a helmet, however not all drivers use them. Adults ride at excessive speeds and triples because they don't follow the required safety precautions. The structural support that an automobile provides to keep drivers safe and protected makes a motorcycle accident a severe problem for society. Even when a motorcyclist takes every precaution, incidents with injuries still happen.

The main purpose of a helmet is to safeguard the wearer's head in the event of an accident or bike fall. Today, fewer individuals wear helmets, and many disregard traffic laws like those against triple riding. The suggested project assists in upholding proper triple riding regulations and determining whether motorcycle riders are wearing safety harnesses, or helmets, while operating their vehicles.

II. LITERATURE REVIEW

Pezhman Niksaz et. al. [1] proposed a system that estimates the size of traffic in highways by using image processing and the result of the project is a message which is shown to inform the number of cars in highway. This project has been implemented by using the Matlab software and it aims to prevent heavy traffic in highways. The steps implemented in the project are as follows: 1) image acquisition 2) RGB to grayscale transformation 3) image enhancement and 4) morphological operations.

Chandrasekhar. M, Saikrishna. C, Phaneendra Kumar [2] proposed the implementation of image processing algorithm in real time traffic light control which will control the traffic light efficiently. A web camera is placed in each stage of traffic light that will capture the still images of the road where we want to control the traffic. Then those captured images are successively matched using image matching with a reference image which is an empty road image. The traffic is governed according to percentage of matching. The key point of the paper is the

technique which is used for image comparison. The authors have used image matching technique. SIFT algorithm is been used in this paper and this is very effective and pretty simple.

Vikramaditya Dangi, Amol Parab, Kshitij Pawar & S.S Rathod [3] proposed the way to implement an intelligent traffic controller using real time image processing. The image sequences from a camera are analyzed using various edge detection and object counting methods to obtain the most efficient technique. Subsequently, the number of vehicles at the intersection is evaluated and traffic is efficiently managed. The paper also proposes to implement a real-time emergency vehicle detection system.

Pallavi Choudekar et. Al [4] they proposed a system for controlling the traffic light by image processing. The system will detect vehicles through images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light. It will capture image sequences. The image sequence will then be analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road traffic light can be controlled.

III. PROPOSED SYSTEM

The triple riding of motorcycles is a common issue in many countries, leading to road accidents and fatalities. Additionally, the absence of helmets and the inability to detect and verify number plates of motorcycles further contribute to this problem. In this paper, we propose a solution to detect triple riding, helmet usage, and number plates using the YOLOv5 model. We trained the model on a large dataset of motorcycle images and achieved high accuracy in detecting triple riding, helmet usage, and number plates. Our proposed solution can be integrated into existing traffic monitoring systems to enforce safety regulations and prevent road accidents caused by reckless driving.

IV. PACKAGES

Numpy

Numpy is a module in Python language which is used for numerical computations. It mainly works on the domain of linear algebra, matrices and fourier transform. The main advantage of using numpy module is for faster and more compact than lists in python.

Computer Vision

Computer Vision library is mainly used for image processing and computer vision tasks. Computer Vision helps in loading the images with the help of functions such as imread().

Torch

Python Torch is a machine learning framework used for creating neural networks and provides wide range of algorithms for deep learning. It is mainly used for CPU and GPU applications.

Utils

Utils subpackages include utils.datasets, utils.general, utils.plots, utils.torch_utils. This package contains loss functions, model definitions and metrics in both functional and modular pure PyTorch implementations.

Datetime

The datetime module represents date and time with respect to Gregorian calendar. This module contains classes such as date, time, datetime, timedelta.

TensorFlow

TensorFlow is used for creating machine learning models. It is an open source software library.

V. RESULTS

The project uses the Visual Studio Code Editor to run model. This project uses datasets to detect objects like helmets, people, and number plates. Then pretrained Yolo models are included in the code when they are needed. Video inputs are stored in the project folder. Then used a function called videotest.py to process each frame and store frames in the folder.

Then load the trained model for detection of a helmet, person, and number plate in the code. Then, by using Yolo, objects like a person, helmet, and motorcycle are detected in the given input video frames. The output image will consist of square boxes on particular objects in the image, which indicate the object was detected. In the console, the processing of each frame, like bike dimensions or whether a helmet is found or not, can be seen.

Then the number plate is detected by importing the module that is created to detect the plate and the number. Then the number plate text is recognized. Then the text is converted into a grey image.

Then, if the helmet is not worn by the person riding the motorcycle or the number on the plate is not

detected, the mail is sent to the authorized person with the image of a violation.

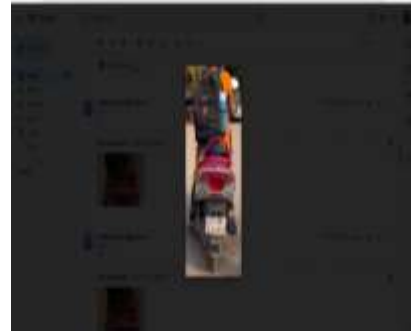**CASE 1**:If a person not wearing a helmet is found

Input Video1

YOLO Output Image (Detection of vehicle_person, motorcycle, helmet)
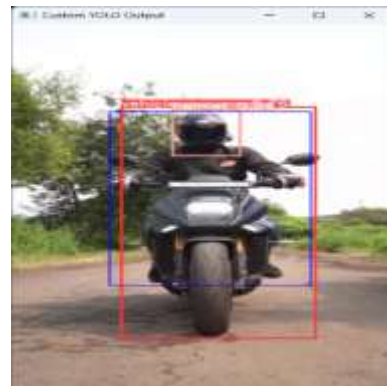

YOLO Output Image (Detection of Number Plate)

Mail Sent to the Authorized Person

CASE 2: If a number is not clearly visible on the number plate

Input Video2

YOLO Output Image (Detection of vehicle_person, motorcycle, helmet)

YOLO Output Image (Detection of NumberPlate)

Mail Sent to the Authorized Person

VI. CONCLUSION

In conclusion, the implementation of a system for triple riding and helmet detection, along with number plate detection, using the YOLOv5 model is a promising solution for improving road safety. The use of YOLOv5 as an object detection model provides high accuracy in detecting both riders and their helmets, as well as number plates, in real-time video feed from a camera. This system can help to enforce compliance with traffic rules, especially in areas where helmet usage and triple riding are prevalent.

The alert mechanism in the system also plays a vital role in notifying riders and authorities about non-compliance with traffic rules, which can further help in reducing road accidents. The system's implementation has the potential to make a significant impact on improving road safety and reducing fatalities caused by motorcycle accidents.

However, there are some challenges that need to be addressed, such as variations in lighting conditions, camera angles, and occlusions. Future research can focus on addressing these challenges and improving the system's accuracy in detecting motorcycle riders, their helmets, and number plates. Overall, the implementation of the triple riding and helmet detection system using the YOLOv5 model shows promising results and has potential applications in improving road safety.

REFERENCES

[1]. Chirag Thakkar, Rajesh Patil, "Smart Traffic Control System Based on Image Processing", International Journal for Research in Applied Science & Engineering Technology, Vol. 5, Issue 8, pp.573-580, July 2017.

[2]. Pezhman Niksaz, "Automatic Traffic Estimation Using Image Processing", International Conference on Image,Vision and Computing, 2012.

[3]. A.Bazila Banu, K.Vidhya , "Density Based Traffic Signal System", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 3, Issue 3, pp.2218-2223, March 2014.

[4]. Digital image processing by Rafael C. Gonzalez and Richard E. Woods.

[5]. Goyal. C, Mehta. M, Srivastava. M, Jain. R. C, "Real Time Object Detection and Tracking: Histogram Matching and Kalman Filter Approach", Computer and Automation Engineering (ICCAE),2010 The 2nd International Conference, Singapore, Vol. 5, pp. 796- 801, 26- 28 Feb. 2010.