Helmet Detection on Motor Cycle Using Machine Learning

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ABSTRACT

Deep learning and its use in picture classification, image segmentation, and object recognition have seen significant technological improvement in recent years. One of these applications is for spotting bike riders wearing helmets. Riders must always wear helmets to prevent injury because the number of traffic accidents is rising daily. Several deep learning methods have been developed during the past few years to address the issue of bike riders' helmet detection. Several studies have been carried out in this area employing archaic technologies like CNNs. However the most recent developments in computer vision methods have been quite promising .In addition to analyzing numerous methods, this research tests many cutting-edge object identification models, including Detectron2 and Efficient Det. The outcomes from these cutting-edge models are very promising.

Keywords: Helmet detection, Descriptors , Classifiers

I. Introduction

This Project is proposed for detecting motor riders who are not wearing helmets. Nowadays many people are using two-wheelers and people are not following traffic rules. The main aim of this application is to reduce the number of helmet violation cases. According to the report by NDTV in India, there are 37 million motorcycles are there and India was the largest number of motorized two-wheelers in the world. the motorcycle is the most popular mode of transport and also it is proved that one of every motor riders who died on roads accidents were not wearing helmet. To overcome this problem government should take strict actions against people who are violating rules. In countries with the highest population like India, it is very difficult to identify the people who are violating traffic rules with human observers. According to

the report by the Hindu the increase was 33% in 2018 within the State, says a report. Despite increased awareness on the utilization of helmets and enforcement of the protection rule by the police within the State, the number of deaths due to non-use of the headgear increased in 2018. In keeping with the Road Accidents in India 2018 report released by the Union Ministry of Road Transport and Highways, as many as 2,385 persons, including riders and pillion riders of motorized two-wheelers, were killed in road accidents as they didn't wear a helmet. It absolutely was 33% quite the quantity of such deaths in 2017 during which the quantity of deaths due to non-use of helmets was 1,586, while it absolutely was 477 in 2016.The enforcement agencies mostly concentrate on making helmets mandatory for riders although the government, imposed it as a requirement for all riders and pillion riders.

In 2018, as many as 7,012 persons sustained injuries which were almost double the amount of persons injured in motorcycle accidents where riders wore no helmet. Also, 846 persons, including drivers and passengers, died because of not fastening life belts in cars and other vehicles says the report says. About 35% of the accidents involved two-wheelers. Across the country, non-use of helmets by two-wheeler riders caused 44,000deaths in 2018 and 38,975 in 2017.Andhra Pradesh registered as many as 24,475 accidents and 7,556 persons were killed in 2018 against 25,725 accidents and eight,060 deaths in 2017.The State was within the seventh place in number of accidents and at eighth in number deaths in accidents among all the States and Union Territories. state became the only real State among the five southern States to figure out a dip within the quantity (1250) of accidents which is about 5 and reduce, While Kerala registered an increase of 4.4% in accidents, Karnataka, province and Telangana registered decrease in accidents by but 2.5%.

Though Government is imposing several laws and fines for helmet violation cases, but most motorcyclists do not wear the helmet properly. This may lead to fatal accidents of motorcyclists, passengers, and even pedestrians. With an increase in the motorcycle count, there is an increase in the violation of the rules. There is the least possibility of imposing a fine on each person who violated the traffic rules due to the shortage of manpower. To control this issue technology should be implemented.so, there is an increasing demand to develop a reliable and timely efficient intelligent system for detecting helmet use of motorcycle riders that do not rely on a human observer.

II. Literature Survey

From many years, different algorithms are being presented to automatically detect helmet. To date many researchers have proposed several methods [1], [2], [3], [4], [5], [6] to solve this problem of helmet detection in traffic. These methods are discussed below in the section.

- The first automated system for detection of bike riders not wearing helmet was done by Chiverton . The system uses SVM classifier trained, derived from image data near head region of motorcyclists. The features selected capture the shape and reflective property of helmets. It also uses circular arc detection technique supported Hough transform. The disadvantage of this approach is that it winds up in many misclassifications. Another drawback is that it doesn't firstly identify motorcyclists within the frames, it directly identifies helmet in some cases.

- To overcome the matter, Waranusast et al, developed a system that uses KNearest Neighbours (KNN) classifier on features extracted from a picture. For KNN classifier for motorcycle classification, the features considered a district of bounding rectangle and ratio of the bounding rectangle. For KNN classifier for helmet classification, features like arc circularity (similarity between a circle and an arc) and average intensity of pixel are considered. But, the photographs captured within the system didn't involve any occlusion because the images were perpendicular to camera. So, occlusion wasn't considered during this system.

- Chiu et al. proposed a system to unravel the motorcyclist detection in surveillance videos. this technique segments the moving object and so tracks motorcycles and heads employing a probability-based algorithm which handle the occlusion problem but unable to handle small variations because of noise and illumination effects. Also, it uses canny edge detection with a hunt window of certain size so as to detect head.

- K. Dahiya et al, proposed a system with helmet detection from surveillance videos and used an SVM classifier for classifying between motorcyclist and non-motorcyclist and another SVM classifier for classifying between helmet and without helmet. For both classifiers, HOG, SIFT and LBP were implemented and also the performance of every was compared. They concluded that HOG descriptor helped them to attain greater accuracy.

- C. Vishnu et al, proposed an approach using Convolutional Neural Networks (CNNs) for classification. They used their own prepared dataset of videos from the surveillance network at IIT Hyderabad campus and achieved good performance and accuracy.

- Waranusast et al.proposed most up-to-date study of the detection of helmet use. Using the AGMM algorithm, moving objects are retrieved from videos. Motorcycles or other things are classified as extracted objects by the system.Three features are employed for this purpose: the realm of the rectangle that contains the image, the ratio between the width and therefore the 1 7 height of the rectangle and also the variance of the H band within the huesaturation value (HSV) colour space around a rectangle at the Centre of the article. the following step uses k-nearest neighbours (KNN) classifier with the calculated features. The counting of passengers, which is performed by the amount of heads that appear on the image, is that the primary advantage of this study. the ultimate step performs classification using geometric information of the pinnacle region and colour information. KNN classifier reapplied these features to classify the pictures of motorcyclists with helmets and without helmets. Hit rate of 95 which there's obtained at the motorcycle detection stage. The passenger counting stage obtained a complete of 83.82 % hits. within the helmet detection stage, the hit rate was 89 %. the pictures of the pinnacle region were manually cut within the latter stage. A flaw of the system was the photographs were perpendicularly captured by the camera, that is, the photographs show the panorama of motorcycles, because the vehicle registration plate is difficult to capture therein position. quite one person on the motorcycle is identified within the images using this method. Another angle images had been taken from other side, one amongst the persons on the motorcycle would presumably be superimposed on another image, which might generate an occlusion.

III. Proposed method

To recognise moving items in the proposed system, we first apply adaptive background subtraction. These moving items are then fed into a CNN classifier, which divides them into two categories: motorcycle riders and non-riders. After this, objects other than motorcyclists are discarded and passed only objects predicted as motorcyclist for next step where we determine whether the motorcyclist is wearing a helmet or not again using another CNN classifier. The second CNN, trained to recognise helmets, is then given the motorcyclist's located head as input. In the following subsections, we can explain each step in details.

- **Recognition of Motorcyclists from Moving Objects:**

  We used Mobile Net SSD, which employs a technique to model each background and highlight the motorcycle, to identify the bounding boxes of various items. A CNN model is created using these photos to distinguish motorcyclists from other moving objects after all the objects belonging to motorcyclists and non-motorcyclists have been collected.

- **Recognition of Motorcyclists without Helmet:**

  We simply cropped the top one-fourth of the images to identify motorcycle riders without helmets because that is where their heads are most often seen in the photographs of riders. We can identify the head's section from this. Then, with the aid of CNN, SSD, and the Mobile Net, we forecast whether the rider will wear a helmet or not.

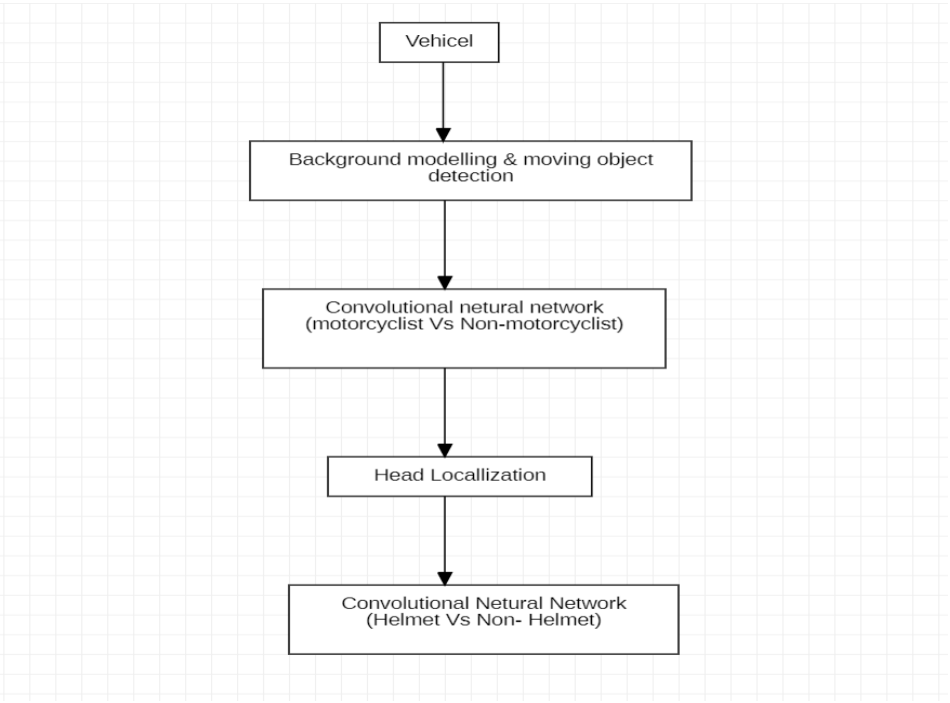

Fig1. System architecture

IV. Sequence Diagram

First we will take traffic video data as input. we are using mobilenet.SSD to get the target the area and then we are running the algorithm on the target area to detect helmet. Video feed is given as input then the video is further split frame by frame then then algorithm is working on the targeted area to analyse for the helmet presence. After that it will scan for motorbike if it is not motorbike then system will ignore the object if it is motor bike it will target the area and scan for helmet and it will delete whether person wearing helmet or not.

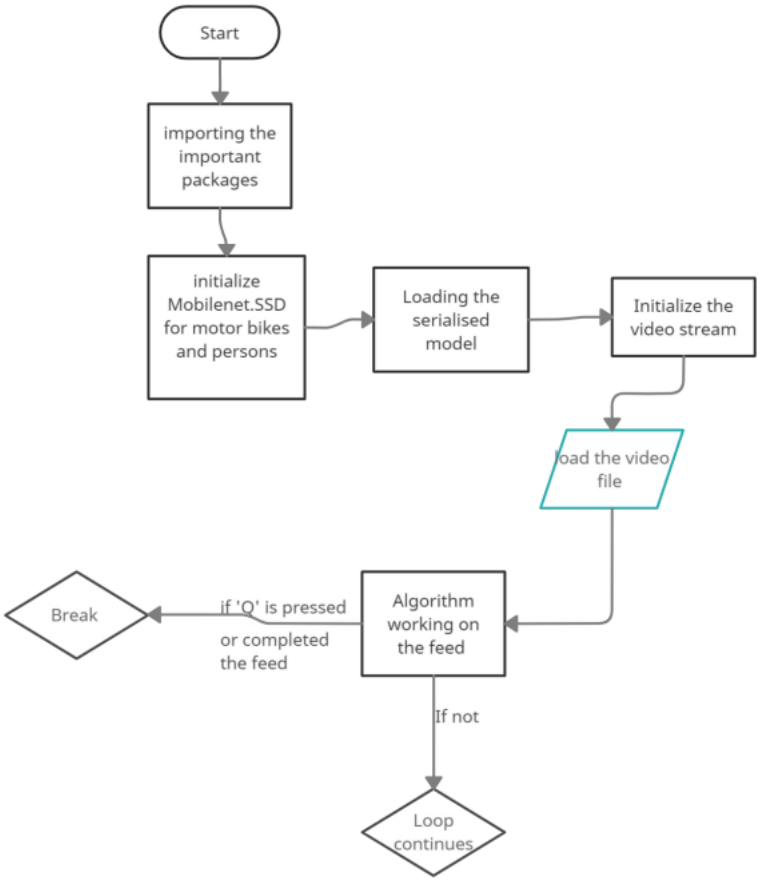

Fig 2. Sequence Diagram

V. Experimental Analysis

In this Project the system is developed for detecting the motorcyclists with helmets. By implementing this system a safe two- wheeler jounery is possible which would decrease the head injuries during accidents and also reduce the accident rate.A helmet may not be a 100% proof but is definitely the first line of defence for the rider in case of accidents.

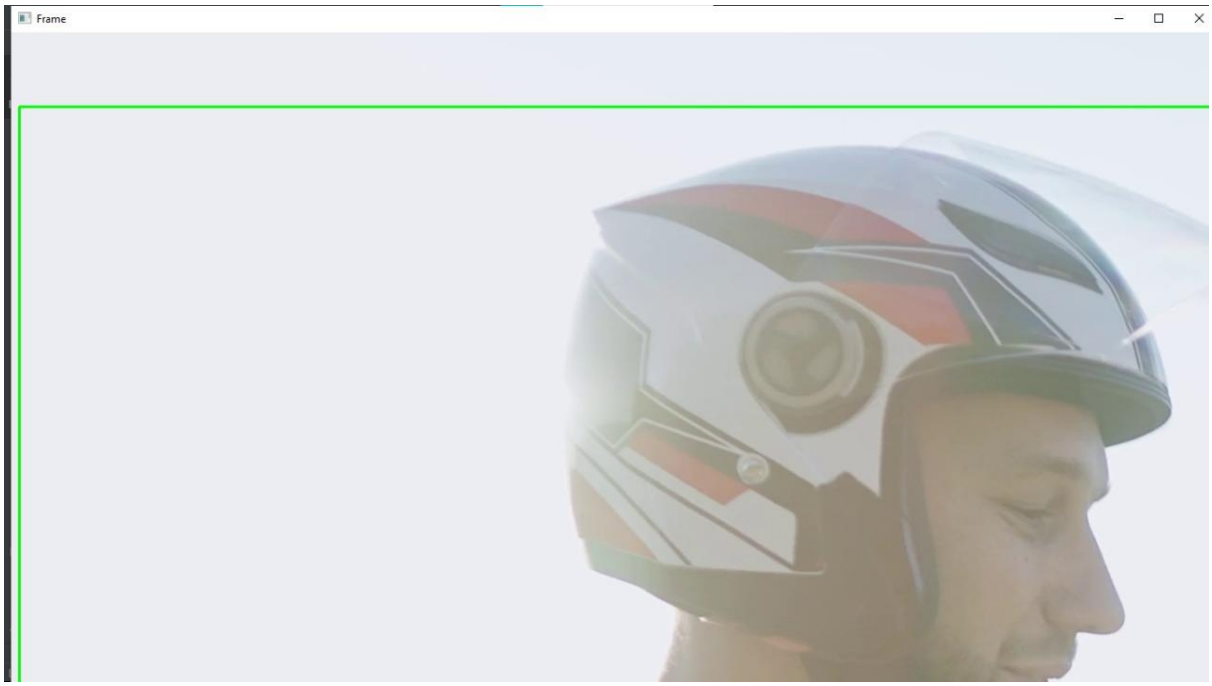

Fig 3: Helmet Detection A

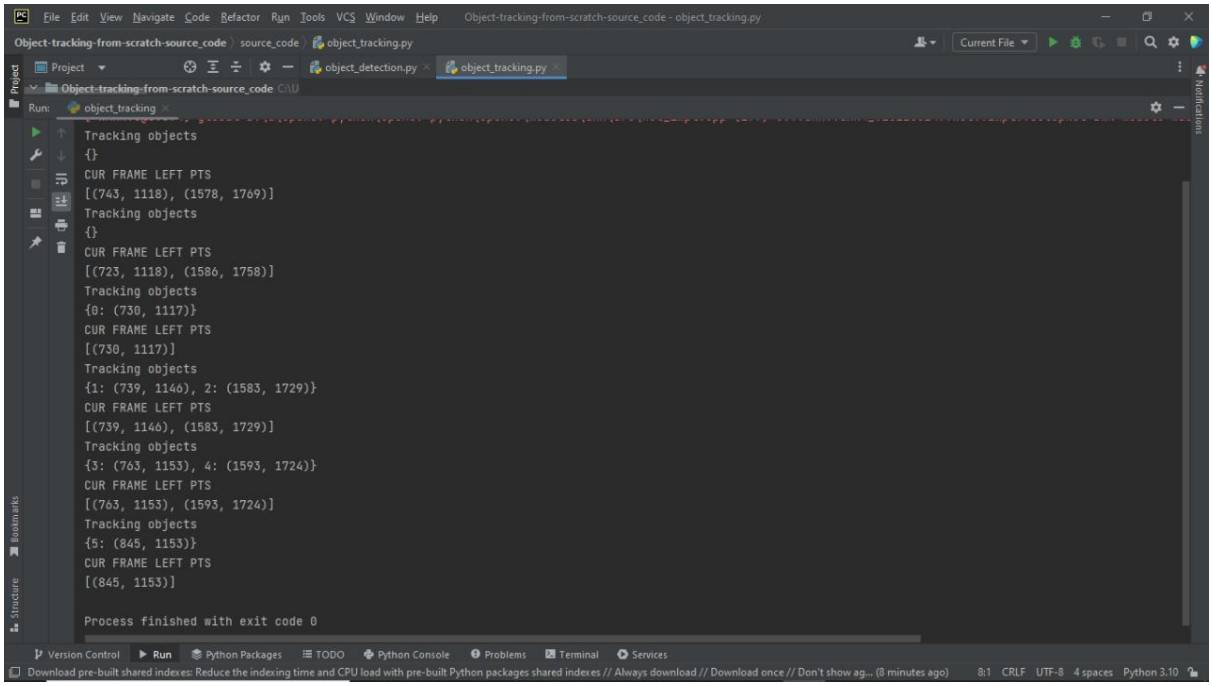

Fig 4: Helmet Detection B

VI. Conclusion

The system is designed to identify motorcycle riders who are not wearing helmets. The two key components of this are the motorcycle detection and the helmet detection. The created mechanism effectively makes sure the rider is wearing a helmet the entire time. A safe two-wheeler ride is made possible by the use of this technology, which lowers the likelihood of head injuries during collisions and lowers the overall accident rate. While not completely foolproof, a helmet is unquestionably the rider's first line of defence in the event of an accident.

VII. References

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